THE ROLE OF COGNITIVE INHIBITION IN EMOTION REGULATION:
IS WEAK COGNITIVE INHIBITION RELATED TO RUMINATIVE STYLE AND
FAILED ATTEMPTS AT THOUGHT SUPPRESSION?

by

Nicola McHale

B.A. (Honours), University of Western Ontario, 2006
A Dissertation Submitted in Partial Fulfilment
of the Requirements for the Degree of
Doctor of Philosophy
in the Graduate Academic Unit of Psychology

Supervisor: David A. Clark, Ph.D., Department of Psychology
Exchanging Board: Chris A. McGibbon, Ph.D., Faculty of Kinesiology
Gary Bowden, Ph.D., Department of Sociology
Troy Harker, Ph.D., Department of Psychology
External Examiner: Nikolaos Kazantzis, Ph.D., School of Psychological Sciences
Monash University, Melbourne, Australia

this dissertation has been accepted by the
Dean of Graduate Studies
THE UNIVERSITY OF NEW BRUNSWICK
March, 2015
© Nicola McHale, 2015
Abstract

Trait rumination is considered a vulnerability factor in major depression (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). It has been suggested that rumination is characterized by weak inhibitory processes, which contributes to the uncontrollable nature of negative thoughts thereby increasing risk for depression (Joormann, 2005). However, questions remain on whether the link between inhibition and rumination may be attributed to comorbid depressive symptoms. Therefore, the current study extended previous research by investigating whether ruminative style is associated with deficits in inhibition ability, while controlling for depression status. Furthermore the present dissertation took an initial step by investigating whether inefficient inhibition predict reduced ability to suppress upsetting thoughts during an induced sad mood state. It was hypothesized that high trait rumination would be associated with weak cognitive inhibition, independent of a major depressive disorder, and that weak inhibitory processes characteristic of depressed or high ruminator groups would predict increased intrusions and prolonged sadness following thought suppression attempts.

Participants (N = 218) completed a list-version directed forgetting task as a measure of cognitive inhibition, and were assigned to suppression or monitor only conditions following a six minute sad movie induction. Thought suppression was measured by number of movie-related thoughts, whereas perceived suppression ability was measured by self-report difficulty ratings for the task. Mood rating scales were administered at four time periods to track reactivity and recovery from induced sad mood. A select group of high and low vulnerability individuals (n = 148) with extreme scores on trait rumination were divided into experimental groups (i.e., depressed/high
ruminator, high ruminator/nondepressed, low ruminator/nondepressed), labeled depressed, high ruminator and low ruminator groups, respectively.

Overall there was mixed support for the hypotheses. Specifically, high ruminators, but not depressed individuals, demonstrated weak inhibition. There was no evidence to suggest deficits were specific to inhibition of negative information. Furthermore, high ruminators perceived more difficulty in suppressing movie-related thoughts compared to depressed and low ruminator groups. Contrary to hypotheses, weak inhibition did not predict difficulty with thought suppression and surprisingly, was associated with fewer overall movie-related thoughts. Results and implications were discussed in terms of potential vulnerability factors for depression.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABSTRACT</td>
<td>ii</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>x</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xiii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>xiv</td>
</tr>
<tr>
<td>CHAPTER ONE- INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>CHAPTER TWO- LITERATURE REVIEW</td>
<td>5</td>
</tr>
<tr>
<td>2.1 Overview of Major Depressive Disorder (MDD)</td>
<td>5</td>
</tr>
<tr>
<td>2.1.1 Measurement of depression: diagnosis versus symptom rating scales</td>
<td>8</td>
</tr>
<tr>
<td>2.2 Vulnerability</td>
<td>11</td>
</tr>
<tr>
<td>2.3 Cognitive Vulnerability for Depression: Theory</td>
<td>12</td>
</tr>
<tr>
<td>2.3.1 Beck's cognitive schema model</td>
<td>12</td>
</tr>
<tr>
<td>2.3.2 Critique of Beck's schema model</td>
<td>19</td>
</tr>
<tr>
<td>2.3.3 Teasdale's differential activation hypothesis (DA hypothesis)</td>
<td>20</td>
</tr>
<tr>
<td>2.4 Ruminative Style: Trait Vulnerability for Depression</td>
<td>25</td>
</tr>
<tr>
<td>2.4.1 Definition of rumination</td>
<td>25</td>
</tr>
<tr>
<td>2.4.2 Response style theory (RST)</td>
<td>26</td>
</tr>
<tr>
<td>2.4.3 Ruminative response scale (RRS): Self-report measure</td>
<td>29</td>
</tr>
<tr>
<td>2.4.4 Mechanisms linking ruminative style and depression</td>
<td>33</td>
</tr>
<tr>
<td>2.4.5 Summary of ruminative style</td>
<td>35</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>2.5 Cognitive Inhibition: Biased Information Processing</td>
<td>36</td>
</tr>
<tr>
<td>2.5.1 Executive functions</td>
<td>36</td>
</tr>
<tr>
<td>2.5.2 Cognitive inhibition</td>
<td>37</td>
</tr>
<tr>
<td>2.5.3 Cognitive inhibition and depression</td>
<td>39</td>
</tr>
<tr>
<td>2.5.4 Summary of cognitive inhibition and depression</td>
<td>50</td>
</tr>
<tr>
<td>2.6 Cognitive Inhibition and Ruminative Style</td>
<td>52</td>
</tr>
<tr>
<td>2.6.1 Empirical evidence linking cognitive inhibition and ruminative</td>
<td>53</td>
</tr>
<tr>
<td>style</td>
<td></td>
</tr>
<tr>
<td>2.7 Emotion Regulation</td>
<td>55</td>
</tr>
<tr>
<td>2.7.1 Cognitive inhibition and emotion regulation</td>
<td>58</td>
</tr>
<tr>
<td>2.7.2 Thought suppression</td>
<td>60</td>
</tr>
<tr>
<td>2.8 Cognitive Inhibition and Thought Suppression</td>
<td>65</td>
</tr>
<tr>
<td>2.8.1 Executive deficit hypothesis</td>
<td>68</td>
</tr>
<tr>
<td>2.9 The Current Study</td>
<td>70</td>
</tr>
<tr>
<td>2.10 Hypotheses</td>
<td>73</td>
</tr>
<tr>
<td>2.11 Exploratory Analyses</td>
<td>75</td>
</tr>
<tr>
<td>CHAPTER THREE: METHODS</td>
<td>77</td>
</tr>
<tr>
<td>3.1 Participants</td>
<td>77</td>
</tr>
<tr>
<td>3.2 Materials</td>
<td>78</td>
</tr>
<tr>
<td>3.2.1 Structured Diagnostic Interview (SCID-I-N/P)</td>
<td>78</td>
</tr>
<tr>
<td>3.2.2 Ruminative Response Scale (RRS)</td>
<td>79</td>
</tr>
<tr>
<td>3.2.3 Beck Depression Inventory- Second Edition (BDI-II)</td>
<td>80</td>
</tr>
<tr>
<td>3.2.4 White Bear Suppression Inventory (WBSI)</td>
<td>80</td>
</tr>
</tbody>
</table>
3.2.5 Emotion Regulation Questionnaire (ERQ) ........................................ 82
3.2.6 Control of Unwanted Thought Scale (CUTS) .................................. 84
3.2.7 Visual Analogue Mood Rating Scale ................................................ 84
3.2.8 Directed Forgetting Task ................................................................. 85
3.2.9 Sad Mood Induction (Stepmom) ...................................................... 88
3.2.10 Positive Mood Induction (Mr. Bean) ................................................ 88
3.2.11 Thought Monitoring Task ................................................................. 89
3.2.12 Manipulation Checks .................................................................... 90
3.3 Procedure ............................................................................................ 90
CHAPTER FOUR: RESULTS ......................................................................... 94
4.1 Data Screening and Conditioning .......................................................... 94
4.2 Participant Characteristics .................................................................... 97
4.2.1 Analysis of Gender ........................................................................ 97
4.2.2 Analysis of University Attendance ................................................ 98
4.3 Descriptive Statistics .......................................................................... 98
4.3.1 Pre-Experimental Questionnaires .................................................. 98
4.3.2 Thought Control Variables .............................................................. 99
4.3.3 Mood Variables .............................................................................. 100
4.4 Creation of Experimental Groups ....................................................... 100
4.5 Validity of SCID Diagnoses of Depression ......................................... 101
4.6 Descriptive Statistics for the Experimental Group Sample .............. 101
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Ruminative Response Scale (RRS)</td>
<td>253</td>
</tr>
<tr>
<td>C. Questionnaire Package</td>
<td>256</td>
</tr>
<tr>
<td>D. Visual Analogue Scales (VAS)</td>
<td>267</td>
</tr>
<tr>
<td>E. Stimuli for Directed Forgetting Task</td>
<td>269</td>
</tr>
<tr>
<td>F. Manipulation Check</td>
<td>271</td>
</tr>
<tr>
<td>G. Informed Consent Form</td>
<td>273</td>
</tr>
<tr>
<td>H. Participant Information Sheet</td>
<td>276</td>
</tr>
<tr>
<td>I. Filler Movie-Related Questions</td>
<td>279</td>
</tr>
<tr>
<td>J. Thought Suppression Rating Scales</td>
<td>281</td>
</tr>
<tr>
<td>K. Debriefing Form</td>
<td>283</td>
</tr>
<tr>
<td>L. Computer-based Procedures</td>
<td>286</td>
</tr>
</tbody>
</table>

CURRICULUM VITAE


**LIST OF TABLES**

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Participant Characteristics for Overall and Experimental Group Samples</td>
<td>164</td>
</tr>
<tr>
<td>2.</td>
<td>Correlations between Gender, University Attendance, and Outcome</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>Variables of Interest – Overall Sample</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Descriptive Statistics for Pre-Experimental Questionnaires and CII</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td>for Overall Sample and by Experimental Groups</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Correlations between CII, CUTS, and Pre-Experimental Questionnaires</td>
<td>167</td>
</tr>
<tr>
<td></td>
<td>for Overall Sample and by Experimental Groups</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Correlations between CII, CUTS, and Thought Suppression Variables by</td>
<td>168</td>
</tr>
<tr>
<td></td>
<td>Condition – Overall Sample</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Descriptive Statistics for Happy VASs at T1, T2, T3, and T4</td>
<td>169</td>
</tr>
<tr>
<td></td>
<td>for Overall Sample and by Experimental Groups</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Descriptive Statistics for Happy VASs at T1, T2, T3, and T4</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>for Overall Sample and by Experimental Groups</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Descriptives for Sad Mood Reactivity, Sad Mood Recovery, and Positive</td>
<td>171</td>
</tr>
<tr>
<td></td>
<td>Mood Reactivity for Overall Sample and by Experimental Groups</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Descriptive Statistics for Number of Words Recalled on the Directed</td>
<td>172</td>
</tr>
<tr>
<td></td>
<td>Forgetting Task for Overall Sample and by Experimental Groups</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Summary of Repeated Measures ANOVA for Predicting Number of Words</td>
<td>173</td>
</tr>
<tr>
<td></td>
<td>Recalled by List, Valence, and Experimental Group – Experimental Group</td>
<td></td>
</tr>
</tbody>
</table>
11. Number of Movie-Related Thoughts at T1 and T2 by Condition and Group based on Log Transformed Scores – Experimental Group Sample.

12. Number of Movie-Related Thoughts at T1 and T2 by Condition, and Group based on Raw Scores – Experimental Group Sample

13. Summary of Repeated Measures ANOVA for Predicting Frequency of Movie-Related Intrusions by Group, Condition, and CII – Experimental Group Sample

14. Summary of One-Way ANOVA for Predicting Sad Mood Recovery from Group, Condition and CII – Experimental Group Sample.

15. Number of Words Recalled on the Directed Forgetting Task by Depression Status – Overall Sample.

16. Summary of Repeated Measures ANOVA for Predicting Number of Words Recalled on Directed Forgetting Task – Overall Sample

17. Descriptive Statistics for Movie-Related Thoughts at T1 and T2 by Condition and Depression Status based on Log Transformed Scores – Overall Sample.

18. Descriptive Statistics for Movie-Related Thoughts at T1 and T2 by Condition and Depression Status based on Raw Scores – Overall Sample.

19. Summary of Repeated ANOVA for Predicting Movie-Related Intrusions by Depression Status, Condition, CII and RRS – Overall Sample

20. Descriptive Statistics for Sad Mood Recovery by Depression Status, and...
LIST OF FIGURES

Figure 1. Overview of the Current Study ............................................. 74

Figure 2. Sad VASs at T1, T2, T3, and T4 105

Figure 3. Happy VASs at T1, T2, T3, and T4 106

Figure 4. Group x list interaction for predicting number of words recalled on... 111
the Directed Forgetting task
ACKNOWLEDGEMENTS

First and foremost, I would like to give my most sincere and heartfelt thanks to my supervisor, Dr. David A. Clark. It has been such an honor and privilege to have had the opportunity to work with you for all of these years. You have been a constant source of support, and your unwavering passion for research is nothing short of inspiring. I am aware of the amount of time and energy that must go into supervising such a large project, and I hope you realize how grateful I am. Few people can say they have had the opportunity to be supervised by one of the leading researchers in the field of psychology, and I consider myself lucky to say that I am one of them.

I would also like to express my deepest gratitude for all of the thoughtful suggestions and recommendations offered by committee members and examining board. In particular, I would like to thank Dr. Diane LaChapelle and Troy Harker. I greatly value the work and time that you put in for this project. I would also like to extend my gratitude towards the faculty at UNB. Your warm wishes and availability for consultation was greatly appreciated. In particular, I would like to acknowledge Dr. Daniel Voyer. Your consultation with statistics and quirky jokes made some of this long journey of graduate school that little bit easier.

Finally, I cannot complete an acknowledgements page without mentioning all of the amazing support I have received from my friends and family. You have always been there to keep me moving and persevering when times were tough. A huge thanks to Sarah Vannier. You have been my backbone for many years. Whether it was working until 2am in Keirstead Hall or de-stressing with ridiculousness, your friendship and support has been so important in carrying me through this grad school process. I would
also like to thank my good friends Julie Wershler and Tony Hopley for your support as well as the time you took to edit my thesis. It is greatly appreciated.
1.0 Introduction

Teasdale's (1988) Differential Activation Hypothesis (DA hypothesis) proposes that difficulty terminating transient episodes of sadness is an important vulnerability factor for clinical depression. Specifically, sad emotions can serve as an internal cue, which activates associated negative cognitions within a neural network. Failure to down-regulate negative emotions can lead to a mutually reinforcing cycle of increasing negative thoughts and emotions, placing individuals at risk for spiraling into a major depressive episode (MDE). Given that persistent sadness is a vulnerability factor for depression (Beevers & Carver, 2003), it is important to identify factors that may contribute to difficulty disengaging from sad mood states. Based on the tenets of the DA hypothesis, identifying factors contributing to difficulty terminating negative affect will provide important information for understanding depression vulnerability.

One potentially useful line of research is to examine information processing factors that may be related to emotion regulation. Information processing refers to the ways in which stimuli from the environment are attended to, perceived, interpreted and recalled (Clark, Beck, & Alford, 1999). While negative information processing biases and emotion dysregulation are both considered vulnerability factors for the onset and maintenance of depression (Beck, 1976; Alloy et al., 2000; Gross, 2007), few studies have investigated how information processing factors may be related to difficulty down-regulating negative emotions.

There is robust evidence to suggest that vulnerability for depression is associated with negatively biased memory recall (Mathews & MacLeod, 2005). However, evidence linking depression with attention for negative information is mixed (Mathews...
Specifically, the bulk of evidence suggests that depression is not associated with orientation towards negative information, but is related to difficulty disengaging from negative information that is captured by attention (Williams, Watts, MacLeod, & Mathews, 1997). In line with this finding, it has been suggested that depression is associated with deficits in executive functions (Joormann, 2005), which are an array of higher order processes that allow individuals to flexibly respond to changes in the environment (Alvarez & Emory, 2006). Executive functions include processes responsible for the control and regulation of lower order processes, such as attention and memory (Miyake et al., 2000). Of particular interest to the current study is the finding that depression is associated with deficits in cognitive inhibition, which is an executive function responsible for actively gating goal-irrelevant information from becoming the focus of attention (Dempster & Brainerd, 1995).

More recent research suggests that deficits with cognitive inhibition may also be a vulnerability factor associated with maladaptive emotion regulation. Given that negative emotions can trigger associated negative cognitions (Teasdale, 1988), difficulty blocking out or removing negative thoughts during a sad mood state may contribute to persistent sadness that is predictive of depression. A number of studies have supported a link between weak cognitive inhibition and rumination (Joormann, 2005; Joormann & Siemer, 2011), which is a trait vulnerability factor characterized by a tendency to respond to negative affect by repeatedly focusing on one’s symptoms and its consequences (Nolen-Hoeksema, 1991). It is posited that weak cognitive inhibition is a potential mechanism contributing to the persistent and often uncontrollable processing
of negative thoughts and emotions associated with rumination (Joormann, 2005; Joormann & Siemer, 2011).

While the emerging evidence is supportive of a link between cognitive inhibition and rumination, it is unclear to what extent positive findings are attributable to the presence of comorbid depressive symptoms. The current study controlled for this potential confound by screening for clinical depression and testing the relationships between cognitive inhibition and depression, vulnerability for depression (i.e., high ruminator/non-depressed) and low vulnerability for depression (i.e., low ruminator/non-depressed) separately. Additionally, only a few studies have examined the potential relationship between cognitive inhibition and other emotion regulation strategies. The current research addressed this gap in the literature by investigating how enduring deficits with cognitive inhibition might predict reduced ability to use thought suppression, which is a maladaptive emotion regulation strategy characterized by effortful prevention and dismissal of unwanted thoughts (Rassin, 2005). It was proposed that deficits in cognitive inhibition contribute to greater intrusions (i.e., spontaneous unwanted thoughts) and prolonged sadness when using thought suppression in response to sad stimuli. Discovering potential mechanisms underlying increased processing of negative cognitions during sad mood states can provide critical information for understanding depression vulnerability.

The following sections reviews theory and research related to the present study. First, background information about depression was outlined to provide context. Next, two cognitive vulnerability models of depression were reviewed, which provided the theoretical basis for linking information processing biases and emotion regulation.
Next, research and theory related to rumination and cognitive inhibition was considered, followed by a section linking the two constructs. It was then argued that weak cognitive inhibition might influence the effectiveness of other emotion regulation strategies.

Specifically, it was posited that enduring cognitive inhibition deficits that are evident in depressed and trait ruminator populations, predict failed attempts at thought suppression for upsetting material. The literature overview concludes with specific hypotheses.
2.0 Literature Review

2.1 Overview of Major Depressive Disorder (MDD)

Depression is a serious mood disorder that is significant in both its prevalence and its consequences. Major depressive disorder (MDD) is recognized to be among the most common mental health disorders (Dozois & Westra, 2004) with lifetime prevalence rates typically ranging between 14-16.2% in the United States (Kessler et al., 2003; Kessler & Wang, 2009). Lifetime prevalence rates of MDD reported in Canada ranged from 10.2-12.2% in two nationally represented community mental health surveys (Patten et al., 2009; Patten et al., 2006). Adding to the high prevalence of MDD, data from the National Comorbidity Study found that an additional 10% of the population report symptoms of subclinical (or minor) depression (Kessler, Zhao, Blazer, & Swartz, 1997), suggesting that symptoms of depression are highly prevalent in North America.

There are notable gender differences in rates of depression. Specifically, rates of depression are 1.5-3 times higher in women as compared to men (Kessler et al., 1994; Kessler, 2003). The higher prevalence of depression in women is consistent across countries (Seedat et al., 2009; Weissman et al., 1996) with differences typically emerging in adolescence (Cyranowski, Frank, Young & Shear, 2000; Nolen-Hoeksema & Girgus, 1994; Twenge & Nolen-Hoeksema, 2002). The 2:1 ratio of women to men also occurs in dysthymic and dysphoric populations (Angst & Merikangas, 1997; Kessler, 2003). Dysthymia and dysphoria refer to lasting depressive symptoms that do not meet criteria for MDD.

The core symptom of depression is a negative mood disturbance, which involves depressed mood and/or loss of interest or pleasure (APA, 2013). The symptom
presentation for depression can be heterogeneous. A clinical diagnosis requires that mood symptoms persist for at least 2 weeks, with the presence of any combination of at least 5 out of 9 possible symptoms pertaining to disturbances in cognition (e.g., excess guilt, suicidal ideation), cognitive processing (e.g., difficulty concentrating) and somatic complaints (e.g., changes in sleep, appetite, or psychomotor speed; APA, 1994). The diagnostic requirement of presenting with 5 out of 9 symptoms results in symptom presentations that can differ markedly among individuals (Kendler, Gardner, & Prescott, 1999). Despite the heterogeneity of symptoms presentations, there appears to be high diagnostic consistency across clinicians due to the characteristic symptom of sustained mood disturbance (see Dozois & Dobson, 2002).

The course of MDD contributes to the debilitating nature of the disorder. It is associated with a relatively young age of onset, with increased risk beginning in adolescence and early adulthood (Hankin & Abramson, 2001; Hankin et al., 1998). MDD typically takes a self-limiting course, with most episodes lasting approximately 3-11 months (Gotlib & Hammen, 1992). However, there is a high relapse rate associated with the disorder. Longitudinal studies conclude that MDD is often a recurring, lifelong condition (Boland & Keller, 2009; Judd et al., 1998; Mulder, Joyce, Frampton, Luty & Sullivan, 2006; Solomon et al., 2004). Between 50-80% of individuals who experience one depressive episode will experience at least one other recurrent episode (Clark et al., 1999; Kessler, Berglund et al., 2003; Moffitt et al., 2010). A study by Judd (1997) concluded that individuals with MDD report an average of four depressive episodes lasting a median of 20 weeks. Other studies have reported higher rates. Using data from the National Comorbidity Study, Kessler and colleagues (1997) found that
among individuals who reported experiencing more than one major depressive episode (MDE), individuals (mean age = 34) reported experiencing an average of 11 MDEs that ranged from 2-69 weeks. Additionally, Andrews, Stewart, Allen & Henderson (1990) found that 11 years after depression onset, participants reported an average of eight MDEs. Thus, although MDEs are generally acute, with only a fraction of cases (1%) characterized by one episode spanning several years (Kessler & Wang, 2009), the recurrent course of depression is a particularly problematic feature of the disorder.

Symptoms associated with MDD can have devastating and far reaching consequences (Clark et al., 1999). MDD is associated with negative psychological outcomes, such as low self-esteem (Orth, Robins & Meier, 2009) and hopelessness (e.g., Alloy et al., 1999) as well as substantial strain on social and romantic relationships (e.g., Trudel & Goldfarb, 2010) leading to reduced social support (e.g., Stice, Rohde, Gau, & Ochner, 2011). In terms of occupational functioning, one study found that annual economic costs of MDD added up to 44 billion dollars in the United States, which was attributed to a decrease in productivity and high absenteeism associated with the disorder (Stewart, Ricci, Chee, Hahn, & Morganstein, 2003). MDD is also associated with economic burden due to increased primary health care utilization (Spitzer et al., 1994). Of particular importance, MDD is associated with an increased risk for suicide and is thus considered a life-threatening disorder. It is estimated that approximately 40-70% of individuals who complete suicide have an affective disorder at the time of death (Brent, Kupfer, Bromet, & Dew, 1988). A more recent study of suicide rates in New Brunswick found that almost 70% of victims had an affective disorder (Séguin et al., 2006) and Johnson, Weissman and Klerman (1992) found that a number of completed
suicides were associated with MDD (23%) or subclinical depression (25.8%). Taken
together, the negative consequences associated with depression can be considered
severe, far-reaching and potentially life-threatening.

The review of the literature thus far suggests MDD is a particularly debilitating
disorder, owing to its high prevalence rates, early age of onset, highly recurrent course,
and far reaching negative consequences. Given its negative impact, it is critical that
research continue to focus on advancing our understanding of this complex disorder.
The current study therefore focused on potential mechanisms that contribute to both the
onset and maintenance of depression, with a particular focus on vulnerability factors that
contribute to a reduced ability to disengage from or terminate dysphoric mood states.

2.1.1 Measurement of depression: diagnosis versus symptom rating scales.

Despite consistency in diagnosis, there is debate in the literature on how
depression should be conceptualized. Two broad categories of conceptualization have
been offered. The first suggests diagnosable depression is a distinct construct that is
qualitatively different from subclinical cases (i.e., categorical or discontinuous view),
while the alternative view proposes that depression falls on a continuum, with minor
depression (dysphoria) at one end and severe clinical states, such as MDD at the other
(i.e. dimensional or continuous view; see Clark et al., 1999 for a review). How
depression and its corresponding symptoms are conceptualized has implications for the
design of depression research. Evidence in favour of a dimensional view supports the
use of symptom rating scales to measure depression, whereas evidence in favour of a
categorical view suggests that diagnostic interviews are more appropriate.
The major arguments in favour of a categorical view of depression focus on the differences in prevalence rates and symptom presentation between clinical and non-clinical cases. Prevalence rates are substantially lower for depressive episodes identified using structured diagnostic interviews (6%) compared to those obtained using self-report symptom rating scales (20%; Coyne, 1994; Flett, Vredenberg et al., 1997). It is argued that symptom measures are capturing other factors such as general distress caused by physical symptoms, negative affectivity or other psychopathological states such as anxiety or substance abuse (Clark & Watson, 1991; Coyne, 1994; Tennon, Hall, & Afflek, 1995). Furthermore, in most cases, mild transient symptoms of depression do not develop into a clinically depressive episode (Gotlib & Hammen, 1992).

Another argument posited by those in favour of a discontinuity model is that symptom presentations differ between clinical and non-clinical populations. For instance, some researchers have pointed out that diagnosable cases of depression are best distinguished by the presence of somatic anxiety and other somatic symptoms, whereas non-clinical depression is generally characterized by subjective feelings of unhappiness, sadness and loneliness (Clark & Watson, 1991; Depue & Monroe, 1986). Additionally, clinical depression is associated with more cognitive symptoms (e.g., difficulty concentrating; Burt, 1995). More recently, a handful of studies have found support for a categorical conception of depression using taxometric statistical analyses (Ruscio, Brown, & Ruscio, 2009; Ruscio, Zimmerman, McGlinchey, Chelminski, Lewinsohn, 2007), which test whether a categorical (i.e., taxonic) or a dimensional (i.e., non-taxonic) model best fits the latent structure of symptom expression.
Despite the arguments in favour of a categorical view of depression, the bulk of recent evidence supports a dimensional conceptualization of the disorder (Hammen, 2001). Although there are notable exceptions (see above), the majority of studies employing taxometric analyses suggest the presence of a dimensional latent structure, particularly in regards to non-somatic symptoms (Baldwin & Shean, 2006; Beach & Amir, 2003; Hankin, Fraley, Lahey, & Waldman, 2005; Okumura, Sakamoto, Tomoda, & Kijima, 2009; Prisciandaro & Roberts, 2005, 2009; Ruscio & Ruscio, 2000, 2002; Slade, 2007; Slade & Andrews, 2005). More recent conceptualizations of depression view it as a "single underlying process with a highly varying continuum of severity" (Hammen, 2001, p.227), suggesting that sub-syndrome and clinical symptoms represent varying levels of the same disorder.

Those in favour of a dimensional view additionally point out that the presence of only a few depressive symptoms can be associated with a level of functional impairment that is comparable to diagnosable cases of the disorder (Broadhead, Blazer, George, & Tse, 1990; Mojtabai, 2001; Spitzer et al., 1994). One study found individuals with elevated depressive symptoms, but no diagnosis, could not be distinguished from clinically diagnosed individuals on most psychosocial functioning variables, including suicidal ideation, physical health, self-esteem and social support (Gotlib, Lewinsohn, & Seeley, 1995). Additionally, there is some support for a genetic component to subthreshold depression. Forty-one percent of dysphoric participants report a family history of depression compared to 59% of clinically depressed individuals (Sherbourne, Wells, Hays, Rogers, Burnam, & Judd, 1994).
Taken together, the balance of evidence favours a continuity view of depression. There appears to be consistent evidence that clinical and subclinical symptoms of depression represent the same underlying condition, but differ in the manifestation and severity of symptoms. Thus, research supports the use of symptom measures of depression. In fact, evidence from dysphoric samples can provide important information regarding vulnerability factors for full-blown MDD. Research suggests that poor management of initial dysphoria plays a key role in increasing risk for an eventual depressive episode (Campbell-Sills & Barlow, 2007). That being said, the important differences that distinguish diagnosable cases, particularly related to somatic disturbances, cognitive difficulties and symptom severity, must be acknowledged. Furthermore, while studies using dysphoric samples are useful, and in fact necessary for research on vulnerability factors for depression, it is also important for researchers to extend findings to more severe and complex manifestations of symptoms in order to establish a clearer understanding of factors directly related to depression. Studies that contrast vulnerability factors in high-risk non-depressed samples with clinical cases represent a particularly powerful research design.

2.2 Vulnerability

One avenue of research that is critically important for understanding etiology in depression is to explore potential vulnerability factors that contribute to the onset and/or maintenance of the disorder. Thus, the current study focused on factors that increase vulnerability for depression. Risk factors describe an association between a particular variable and the occurrence of a disorder. In particular, risk factors suggest that a given variable tends to co-occur with a disorder, but does not necessarily cause it. Examples
of risk factors in depression may include age, gender or the presence of medical illness, which are associated with but do not cause, mental illness. Vulnerability represents a special kind of risk factor, which is causally linked to the onset of a given disorder. Therefore, vulnerability indicates any combination of psychological, cognitive, personality, or interpersonal characteristics that contribute directly to the onset of the disorder (Riskand & Alloy, 2006).

In order to determine what constitutes a vulnerability factor, specific guidelines were offered. One widely accepted set of guidelines suggest that in order to be considered a vulnerability factor, a trait must be: 1) stable, 2) latent and 3) endogenous (Ingram, Miranda & Segal, 1998; Ingram & Price, 2001). That is, the factor of interest is considered to be an enduring trait that is evident in the absence of overt signs of the disorder and resides within the individual. Vulnerability factors may be present at birth (e.g., genetic predispositions) or develop through learning experiences (e.g. negative thinking patterns; Ingram & Price, 2001).

2.3 Cognitive Vulnerability for Depression: Theory

2.3.1 Beck's cognitive schema model. Cognitive models of depression propose that the etiology and maintenance of depressive symptoms is characterized by biased cognitive functioning. Beck's (1967, 1976, 1983, 1987, 1991, 2002, 2008; Beck, Rush, Shaw & Emery, 1979) cognitive theory represents the most influential account of cognitive vulnerability for depression. This schema-based model posits that negative cognitive styles confer vulnerability for depression. Specifically, individuals are vulnerable for depression because of negatively biased schemas, which are relatively enduring memories and beliefs that organize how incoming information is processed.
(Clark et al., 1999). While some schemas may be relatively simple concepts (e.g., a mental representation of a chair being a piece of furniture with four legs) the schemas of importance for depression are more complex self-oriented representations and are highly negative, typically involving themes of loss, failure, or deprivation (i.e., a mental representation of oneself being a worthless person). Negative schemas relevant to depression result in the generation of negative interpretations (or appraisals) about one’s self, world and future, which is referred to as the negative cognitive triad (Beck, 1976). It is reasoned that enduring tendencies to interpret one’s experiences in highly negative and self-defeating ways confers vulnerability to depression. Repeated activation of negative schemas will thus lead to biases in how one attends to incoming information in the environment, subsequently reinforcing and strengthening schematic content so that a negative self-schema organization becomes dominant, thereby constituting a vulnerability for depression.

Beck (1976) proposes a diathesis-stress hypothesis to explain how maladaptive schemas confer vulnerability for depression. Specifically, dysfunctional schemas represent a vulnerability factor, or diathesis for depression, however this cognitive diathesis interacts with stressors from the environment in order to increase one’s risk for depression (Clark et al., 1999). In the non-depressed state, negative schemas remain latent and do not contribute to biased information processing. Stressors from the environment are necessary in order to activate these maladaptive schemas, which then serve to negatively bias thought content and information processing. A sufficiently close match between a life event and one or more aspects of the schema will cause it to become activated, in an all-or-nothing fashion, resulting in a chain reaction that primes
all interrelated concepts in the network. Once activated, depressive schemas tend to be self-perpetuating and dominate the information processing system (Beck, 1987; Clark et al., 1999).

Beck’s theory provides a comprehensive model that links dysfunctional cognitive schemas with the generation of sustained negative affect that is germane to most mood disorders. While the model acknowledges there are other factors, such as physiology, that likely play a role in the generation of depressive symptoms (e.g., Clark et al., 1999), the theory focuses on cognitive processing factors as the primary organizing function to guide understanding of the onset and maintenance of depressive symptoms.

There is now a large body of literature testing Beck’s schema model, with hundreds of studies generally finding support for its major tenets (Abramson et al., 2002; Alloy, Abramson, Safford, & Gibb, 2006; Clark & Beck, 2010; see Clark et al., 1999 for a review). The bulk of evidence suggests that negative cognitive style is a vulnerability factor for MDD. The strongest evidence to support the role of negative cognitions in the development of depression comes from a landmark study referred to as the Temple-Wisconsin Cognitive Vulnerability to Depression (CVD) Project (Alloy & Abramson, 1999). Researchers found that never-depressed participants who were classified as “high risk” based on measures of cognitive vulnerability were more likely to experience a first onset of MDD compared to the low risk group (16.2% vs. 2.7%; Alloy et al., 2006). This finding also extended to cases of minor depression (45.9% vs. 14.4%) and was independent of initial depressive symptoms (Alloy et al., 2006). The CVD project thus demonstrates that enduring dysfunctional schemas are predictive of
first onset of depression, providing strong evidence that negative cognitive style is a vulnerability factor for depression.

2.3.1.1 Information processing biases: selective attention. In addition to dysfunctional cognitive styles, Beck's (1976) model predicts that negative biases associated with dysfunctional schema will be evident at all levels of information processing. Thus, cognitively vulnerable individuals are expected to exhibit negative biases in how information is attended to, interpreted and recalled. Selective attention is a cognitive process defined as "the ability to attend to focal stimuli while simultaneously ignoring task-irrelevant distractions" (Dempster & Brainerd, 1995, p.185). The cognitive model predicts depression will be associated with selective attention to negative information (i.e., preferentially attending to negative information, while simultaneously blocking out other information). However, the empirical findings are mixed. Initial studies examining orienting biases towards negative stimuli failed to yield supportive results. Specifically, studies using subliminal presentations of negative stimuli tapping automatic processing generally found no attentional biases in depressed or dysphoric groups (Mathews & MacLeod, 2005; Mogg, Bradley, Williams & Matthews, 1993). Based on these findings, Williams et al. (1997) proposed that depression is associated with biases in post-attentional elaboration of negative information as opposed to automatic orienting biases.

More recent studies indicate that while depressed and dysphoric individuals do not show an orienting bias towards negative information, they do display difficulty disengaging from negative information once it is captured by attention. The dot-probe task is a commonly used experimental design to assess selective attention (MacLeod,
Matthews & Tata, 1986). In this task participants are asked to stare at a fixation point on a computer screen, which is followed by the presentation of neutral and emotional word pairs. Afterwards, a small black dot appears in the place where either the neutral or negatively biased information was displayed, and participants are instructed to indicate its presence as quickly as possible by pressing a key on the keyboard. Shorter reaction time when the dot replaces the negative word compared to the neutral word indicates a negative attentional bias.

A review of studies using the dot-probe task demonstrates that while no studies evidenced attention biases for depressed participants at stimulus duration below 1000ms, 6 out of 7 studies employing this experimental design found an attentional bias towards negative material when stimulus presentations were longer than 1000ms (Thomsen, 2006). This was found in both depressed (e.g., Gotlib, Kasch et al., 2004; Gotlib, Krasnoperova, Yue, & Joormann, 2004; Joormann & Gotlib, 2007) and dysphoric samples (Bradley, Mogg, & Lee, 1997; Shane & Peterson, 2007). There is now converging evidence from studies using a variety of experimental paradigms (e.g., dot-probe, spatial tasks, and eye tracking) that suggest depression is associated with impaired attentional disengagement (see DeRaedt & Koster, 2010 for a review). Importantly, this bias is found when longer stimulus durations are used, which further supports the notion that biases in attention occur at later stages of information processing. Evidence from prospective studies further suggests attentional biases represent vulnerability factors that contribute to the etiology, maintenance and recurrence of depressive episodes. Beevers & Carver (2003) demonstrated that
attentional bias, as measured by the dot-probe task, predicted higher depressive scores at seven weeks, even after controlling for initial depressive symptoms.

Studies that manipulate attentional responding through the use of training trials have found that individuals who received attentional training subsequently reported less reactivity to real-life stressors compared to a no training group. (Dandeneau & Baldwin, 2004; MacLeod, Koster, & Fox, 2009; MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002). Attentional retraining trials use a modified version of the dot-probe task where the location of the dot is manipulated so that it replaces the neutral word more often (i.e. 85-100% of the time) than the negative stimuli. In order to respond quickly, participants must learn to divert attention away from the negative stimuli. The training is supposed to reduce attentional bias for negative information. MacLeod and colleagues (2002) induced attentional bias to neutral stimuli in one group and threat-related stimuli in the other. They found those who received attentional training for neutral stimuli showed lower stress responses to an anagram stress task compared to those who were trained to attend to threat-related information. Based on a dysphoric sample, Wells & Beevers (2010) found attentional retraining away from depression-related stimuli predicted fewer depressive symptoms both immediately after training and at a 2 week follow-up compared to individuals who did not receive the training.

In summary, the evidence supporting biased attention in depression is mixed. Although there is little evidence to support the view that individuals who are vulnerable for depression have an automatic negativity bias, the bulk of evidence suggests depression is associated with difficulty disengaging once negative information is captured in attention. Inability to redirect attention away from negative information is
proposed as another vulnerability factor for depression. Thus, understanding control processes contributing to difficulty disengaging from negative information may provide a useful avenue for understanding mechanisms conferring vulnerability for depression.

2.3.1.2 Information processing biases: memory. Whereas the findings that link selective attention and depression are inconsistent, there is strong evidence to indicate that depression and dysphoria are associated with biased memory processes (see Mathews & MacLeod, 2005 for a review). Memory refers to the processes involved in the storage and retrieval of information (Cowan, 1995). An influential meta-analysis by Matt and colleagues (1992) found that while non-depressed individuals exhibit biased recall for positive versus negative information (i.e. positive memory bias), depressed (and dysphoric) persons tend to recall positive and negative information equally (even-handedness), or more negative information (negative memory bias). A series of studies by Hertel and colleagues found that memory biases were less consistently evidenced when tasks involved recognition and implicit recall, suggesting that the memory bias associated with depression is more apparent for explicit memories that are recalled using an open search strategy (i.e., free recall; Hertel, 1997; Hertel & Rude, 1991).

In addition to biased memory for negative information, depression has also been linked to reduced specificity when recalling autobiographical memories (i.e., over-generalized memory; see Williams, Barnhofer, Crane, Hermans, Raes, & Watkins, 2007). The extent to which individuals recall overgeneralized memories has also been shown to predict delayed recovery from emotional disorders (e.g., Dalgleish, Spinks, Yiend, & Kuyken, 2001). Apart from the exceptions mentioned by Hertel and colleagues (Hertel, 1997; Hertel & Rude, 1991), memory biases in depression appear to
be a robust finding, suggesting that processes contributing to memory biases may provide important clues for understanding mechanisms involved in the onset and persistence of depressive symptoms.

2.3.2 Critique of Beck’s schema model. Although Beck’s model provides a solid base for understanding cognitive processes that may increase vulnerability for depression, there are some aspects of the model that have received less empirical support. In particular, Beck’s proposition that schemas are activated in response to matching life events has received mixed support. While the occurrence of major life events has been strongly linked to first onset, there is less support for a direct connection between life events and subsequent depressive episodes (Post, 1992). For example, one study found that while 91% of individuals who experienced a first depressive episode could identify a negative event preceding the episode, only 50% of individuals could identify a negative life event as a trigger for their second MDE (Ghaziuddin, Ghaziuddin & Stein, 1990). A twin study utilizing a prospective design also found the strength of association between life events and MDE onset declined with each subsequent episode, with the biggest drop occurring after 5 episodes (Kendler, Thornton, & Gardner, 2000). Post (1992) proposed a neurological explanation for these findings, hypothesizing that the very experience of a MDE leaves a neurological impact, or scar on the individual, lowering the threshold of stress required for a subsequent depressive episode. Thus, according to Post, environmental stressors become less relevant with each subsequent episode.

Another limitation of Beck’s schema model is that less emphasis is placed on the potentially important role that emotions and physiology may play in the onset and
maintenance of depression. There is now evidence to suggest that while emotions do change in response to cognitions, the response appears to be reciprocal, such that changes in mood also directly impact changes in subsequent thoughts (Bower, 1981; Isen, 1984; Siemer, 2005). For example, studies investigating the relationship between anti-depressant medication and depression indicate that negative thinking declines along with reductions in depressive affect (Dozois et al., 2009; Segal et al., 1999). In these studies participants did not receive any psychotherapeutic intervention, suggesting that changes in mood were associated with subsequent changes in depressive cognitions.

Recent refinements to Beck’s model provide a more integrated approach to cognitive vulnerability for depression that accounts for neurophysiological factors that contribute to emotional disturbances in depression (Clark & Beck, 2010). Specifically, it is acknowledged that depression is associated with heightened activation of subcortical regions involved in emotion generation (i.e., bottom-up processing) as well as deficient control or down-regulation of emotional processing (i.e., top-down processing). While Beck’s model provides a thorough account for understanding how cognitive processes lead to emotion generation, an extension of the model is needed in order to more fully account for the role of cognitive inhibitory processing that down-regulate negative emotion. Thus, in addition to focusing on factors involved in the generation of negative affect (i.e., Beck, 1967; 1976), models that account for the down-regulation of negative emotion may also provide critical information for understanding vulnerability for depression.

2.3.3 Teasdale’s differential activation hypothesis (DA hypothesis).

Teasdale’s (1988) DA hypothesis provides a useful adjunct to Beck’s schema model.
The DA hypothesis can account for the reduced role of life events over recurrent episodes and provides a framework for understanding the important role that emotional factors play in contributing to depression vulnerability. Teasdale’s DA hypothesis builds on the basic tenets of Beck’s schema model, proposing that in addition to the cognitive schemas and information processing biases that become activated in response to environmental stressors, vulnerability to depression is related to patterns of negative thinking activated in the presence of a depressed mood state. Thus, in contrast to Beck’s model, which proposes life events serve as the stimulus that activates negative schemas (Beck, 1967), Teasdale proposes that maladaptive responses to a negative mood state are crucial factors in contributing to the onset and maintenance of depressive episodes.

Teasdale’s model of depression vulnerability serves as the theoretical basis for the current study, which investigates potential links between cognitive information processing biases and dysfunctional emotion regulation. Thus, the following section reviews the model, along with the available evidence.

The DA hypothesis states that during early episodes of depression, associations are formed between negative patterns of thinking and emotion states (Segal, Williams, Teasdale & Gemar, 1996; Teasdale & Barnard, 1993). Consequently, regardless of the actual environmental trigger, a depressed mood state will activate negative patterns of thinking as well as biases in information processing (Gotlib & MacLeod, 1997; Williams et al., 1997). If a reciprocal relationship is established between the depressed state and negative thinking, individuals can become locked in a vicious cycle of increasing negative thoughts and affect. Importantly, the DA hypothesis predicts that individuals who become vulnerable to the onset and persistence of depression do not
differ from non-dysphoric counterparts in the intensity of sadness they experience in response to stressors, but rather in the persistence of the sad mood episode that ensues. Maladaptive down-regulation of negative affect is thus of primary importance to Teasdale’s account of vulnerability for depression.

While transient bouts of sadness are a universal experience, the vast majority of individuals recover quickly. The question raised is why do some individuals have difficulty terminating a sad mood episode? Teasdale (1988) proposed that individuals who are vulnerable for depression show a larger shift in negative thinking in response to a dysphoric mood state (i.e., cognitive reactivity). He posited that cognitive reactivity is a marker of the extent to which dysfunctional negative schema become activated in response to a negative mood state (Booij & Van de Does, 2007). Individuals who exhibit high cognitive reactivity are considered vulnerable for depression. Consistent with Post’s (1992) hypothesis that depressive episodes leave a neurobiological scar on one’s information processing system, DA predicts that cognitive reactivity is higher for individuals who have experienced a previous depressive episode. According to Teasdale, information processing biases established during a depressive episode create enduring changes in mental schemas. Over repeated episodes, the interconnections among negative schemas become stronger and better elaborated, which increases the likelihood of becoming re-activated.

The presence of a negative mood state can serve as a strong internal cue that triggers underlying negative schemas, thus making it difficult to disengage from the negative mood state. For example, while a poor grade on a minor quiz may lead to a few minutes of disappointment for a non-vulnerable individual, this feeling of
disappointment may trigger the activation of schema-related thoughts about failure for another individual who is cognitively vulnerable. These schema-related thoughts then lead to increasing negative affect, which further triggers more negative thoughts. The self-defeating cycle of negative thoughts and emotions thus leads to persistent sadness, placing this individual at risk for developing a full-blown depressive episode.

2.3.3.1 Empirical support for the DA hypothesis. There is now substantial empirical support for the major tenets of Teasdale’s model (see Lau, 2004 for a review). A number of studies have demonstrated that induction of a negative mood state is associated with subsequent increases in negative memories (i.e. mood-congruent recall; Blaney, 1986; Bower, 1981; Matt et al., 1992). Notable studies have also found the opposite effect, where induction of a sad mood actually produced increases in positive memories (e.g., Parrott & Sabini, 1990; Rusting & DeHart, 2000). It is suggested that individuals can deliberately and effectively reverse negative mood states by generating positively valenced memories (i.e., mood-incongruent recall; Parrott & Sabini, 1990; Rusting & DeHart, 2000). Thus, Teasdale’s formulation provides a conceptual basis to understand individual differences in the ability to disengage from sad mood states.

Another source of empirical support for the DA hypothesis comes from studies on cognitive reactivity, which indicate latent depressive schemas can be activated by inducing negative mood states. Specifically, when negative schemas are primed, as when a sad mood is induced, individuals who are vulnerable to depression show significant increases in their endorsement of depressotypic beliefs (Miranda, Gross, Persons & Hahn, 1998; Miranda & Persons, 1988; Segal et al., 1999; Segal, Kennedy, Gemar, Sagrati, Hood, & Pedersen, 2003; Teasdale & Dent, 1987). In addition, Segal et
al. (1999) found that individuals who recovered from depression because of pharmacotherapy (PT) had greater cognitive reactivity compared to individuals who recovered with cognitive behaviour therapy (CBT). This indicates latent schemas were sensitive to reactivation in the face of a sad mood for those whose negative schematic content was not targeted during treatment (i.e., PT group). Further support has also been found by investigating changes in dysfunctional attitude scores in response to naturally occurring shifts in daily mood (Miranda, Persons, & Byers, 1990). In these studies individuals who are cognitively vulnerable for depression exhibit increased cognitive reactivity in response to diurnal mood variations.

Evidence from longitudinal studies provide further support for Teasdale’s model and indicate that mood-linked cognitive reactivity predicts depressive relapse (Segal et al., 1999; Williams, 1990). Evans et al. (1989) found that dysfunctional attitude scores of depressed patients shortly after recovery predicted depressive relapse in the following year. Using a mood-recovery design, Beevers & Carver (2003) also found that slower recovery from a sad mood induction interacted with life events to predict depressive symptoms at a seven week follow-up.

2.3.3.2 Summary of Teasdale’s DA hypothesis. DA builds on Beck’s (1967) schema model to suggest that in addition to matching life events, inability to disengage from negative mood states is a powerful vulnerability factor for depression. The model posits that negative cognitions and emotions are interconnected within a neural network. Thus, negative affect can serve as a contextual cue to activate dysfunctional thoughts that are predictive of depression. Difficulty disengaging from a negative mood state can
lead to a self-perpetuating cycle of increasing negative thoughts and emotions, which can then spiral into a full blown depressive episode.

Teasdale’s formulation changes the focus of vulnerability from that of emotion generation (Beck, 1976) to emotion regulation. That is, individuals who are vulnerable for depression do not differ in the severity of sadness they experience but rather in their ability to recover from transient negative mood states. Teasdale’s hypothesis provides an important bridge between cognitive information biases and emotion regulation, and thus provides the theoretical basis for the current study.

2.4 Ruminative Style: Trait Vulnerability for Depression

As discussed above, DA proposes that individuals are vulnerable to depression because of cognitive reactivity to sad mood states. While the model typically focuses on cognitive vulnerability associated with past depressive episodes, Teasdale has suggested that trait rumination is also a vulnerability factor associated with heightened cognitive reactivity, stating that “Nolen-Hoeksema’s… proposals show considerable overlap with the present hypothesis… from a cognitive perspective, the tendency to respond to initial feelings of depression with either a ruminative or active coping response can be seen as a result of… cognitive processes activated in mild depressed mood” (Teasdale, 1988, p. 269). Trait rumination, or ruminative style is a major focus of the current study, thus it is reviewed in detail below.

2.4.1 Definition of rumination. Rumination is a style of thinking characterized by repetitive self-focusing (Martin & Tesser, 1996). It is most commonly conceptualized as a maladaptive response to negative affect that is characterized by repeated focus on causes, consequences and symptoms of depressive affect (Nolen-
It is typically experienced as uncontrollable or difficult to terminate (Lyubomirsky, Tucker, Caldwell, & Berg, 1999). Adopting a perseverative self-focus (i.e., rumination) in response to distress leads to increased processing of negative thoughts and can strengthen associations between negative thoughts within a cognitive network (Nolen-Hoeksema, 1993). Additionally, evidence from both experimental and self-report measures have demonstrated that ruminating in response to distress leads to prolonged sadness (Augustine & Hemenover, 2009; Nolen-Hoeksema, 1991; Nolen-Hoeksema, Wisco, Lyubomirsky, 2008; Thomsen, 2006). These negative consequences are evidenced despite reported intentions to reduce distress or solve problems (Nolen-Hoeksema et al., 2008). It is notable that perseverative self-focus in the presence of a neutral mood state is not associated with negative consequences (Arnow, Spangler, Klein, & Burns, 2004; Bagby & Parker, 2001; Nolen-Hoeksema et al., 2008; Parker, Goodyer, & Teasdale, 2004), suggesting that the negative effects associated with ruminative processing are specific to the presence of negative mood.

**2.4.2 Response style theory (RST).** Habitual or trait-like rumination in response to distress is a proposed vulnerability factor for depression (Aldao et al., 2010; Nolen-Hoeksema, et al., 2008; Roberts, Gilboa & Gotlib, 1998; Wisco & Nolen-Hoeksema, 2008). The most highly researched and well-supported model linking rumination with depression vulnerability is Nolen-Hoeksema’s Response Style Theory (RST; Nolen-Hoeksema, 1991; Nolen-Hoeksema, Morrow & Frederickson, 1993). RST proposes individuals tend to respond to depressive affect in a consistent manner. Importantly, RST posits that individuals’ typical cognitive and behavioural coping
strategies can either buffer or increase vulnerability for depression. Distraction is considered an adaptive response to negative affect and is defined as “purposeful turning away from one’s symptoms of depression and their possible consequences onto pleasant or neutral activities” (Nolen-Hoeksema, 1991, p. 4). Conversely, rumination is considered a maladaptive response to distress. While all individuals likely engage in ruminative processing from time to time, RST proposes that individuals who habitually respond to distress by adopting a perseverative self-focus possess a ruminative response style, which is an important vulnerability factor for the onset and maintenance of depression (Just & Alloy, 1997; Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2008).

2.4.2.1 Empirical support for RST. Initial support for RST was based on an experiment by Morrow and Nolen-Hoeksema (1990) in which a sample of university students received a sad mood induction, followed by random assignment to one of four conditions: active-distraction, passive-distraction, active-rumination and passive-rumination. It was hypothesized that distraction would be associated with alleviation of negative mood, whereas rumination would lead to an increase in sadness. Additionally, active distraction strategies would be associated with a greater reduction in negative mood states compared to passive ones. In the active condition, participants completed a q sort task in which they were asked to sort words into categories. The target words related to external events in the distraction condition (e.g., “Canada’s biggest industry is lumber”) and were emotion-focused in the rumination condition (e.g., “I often wonder why I feel the way I do”). In the passive conditions, respondents were asked to simply read and think about the words. Results supported RST theory, demonstrating that individuals in the distraction condition showed a reduction in negative mood, while
rumination was associated with increased negative affect. Additionally, as expected, active distraction was the most effective for alleviating negative mood, whereas active versus passive instructions were less influential in the rumination condition. Thus, experimental findings supported RST's basic premise, demonstrating that induction of distracting or ruminative responses predicted the course of the sad mood episode.

To examine the roles of rumination and distraction in naturally occurring mood states, Nolen-Hoeksema and Morrow (1993) had dysphoric and non-dysphoric participants either ruminate or distract themselves. The rumination induction asked participants to focus on themselves, their current emotions and why they were feeling that way. This was expected to exacerbate sad mood for dysphoric individuals who were expected to be in a negative mood state, but have no impact on non-dysphoric individuals. As predicted, those within the dysphoric group instructed to ruminate reported deterioration in mood, whereas those in the distraction condition reported improvement in mood. As expected there were no group differences within the non-dysphoric group, indicating the consequences associated with rumination are specific to processing that is carried out in response to negative affect. These studies thus provided initial support for the link between response styles and dysphoric mood.

Findings from a 30-day naturalistic study where participants monitored responses to sad mood episodes further supported these findings (Nolen-Hoeksema et al., 1993). Participants were asked to self-monitor daily responses they used when feeling sad. Results demonstrated ruminative responses were associated with longer daily durations of sadness whereas distraction was unrelated to mood duration. Thus,
initial findings from both experimental and naturalistic studies provided support for the major tenets of RST, indicating rumination is a maladaptive response to distress.

2.4.3 Ruminative response scale (RRS): Self-report measure.

Self-report measures of trait rumination have been particularly useful in establishing links between ruminative style and depression. The most widely researched measure of trait rumination is the Ruminative Response Scale (RRS; Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 1993). The RRS is a 22-item subscale derived from the larger 71-item Response Styles Questionnaire (RSQ), which measures habitual responses to depressed mood states, including rumination, distraction, problem solving and dangerous behaviour. The RRS demonstrates good psychometric properties, supporting its use as a measure of vulnerability for depression. Specifically, it has adequate internal consistency, with coefficient alphas ranging from .86 -.92 across a number of studies (e.g., Kuehner & Weber, 1999; Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema & Morrow, 1991; Schoofs, Hermans & Raes, 2010; Treynor, Gonzalez & Nolen-Hoeksema, 2003). Its convergent validity is evident by higher scores on the RRS predicting more depressive symptoms over a 30-day interval (r = .62; Nolen-Hoeksema et al. 1993). Scores on the RRS are also found to be higher for individuals who are depressed compared to those who have never experienced a depressive episode (Nolen-Hoeksema, 2000). Additionally, higher scores on the RRS are positively correlated with neuroticism (r = .57; Nolan, Roberts & Gotlib, 1998), which is a personality trait characterized by pessimism and high negative affectivity.

A number of longitudinal studies have also demonstrated that an elevated score on the RRS is predictive of future depressive symptoms and onset of a major depressive
episode, which further supports that ruminative style is a vulnerability factor for depression. For example, Nolen-Hoeksema and Morrow (1991) found higher scores on the RRS predicted increased depressive symptoms seven weeks after a major earthquake. Nolan et al (1998) also found that RRS scores predicted depressive symptoms following an 8-10 week interval, even after controlling for initial depressive symptoms. Based on a community sample of individuals with terminally ill family members, Nolen-Hoeksema, Parker and Larsen (1994) also found that RRS scores significantly predicted follow-up depressive symptoms after a 5 month interval, which was evident for both individuals high and low on baseline depressive symptoms. As well, evidence from depression vulnerability studies indicates that elevated scores on trait rumination predict onset of major depressive episodes. Specifically, Just and Alloy (1997) found that higher RRS scores of non-depressed students predicted increased onset of depressive episodes over an 18 month time period in the CVD Project.

Findings from reliability studies indicate that trait rumination is relatively stable over time, which is evident even after controlling for decreases in depressive symptoms (Bagby, Rector, Bacchiochi, & McBride, 2004; Just & Alloy, 1997; Kuehner & Weber, 1999; Nolen-Hoeksema et al., 1993; Nolen-Hoeksema et al., 1994). Thus, ruminative style satisfies the stability criteria for vulnerability factors outlined by Ingram and Price (2001). For example, one study followed a sample of recently bereaved people for a period of 18 months and found a high intra-class correlation in rumination scores ($r = .75$) across 5 interviews, despite changes in depressive symptoms (Nolen-Hoeksema & Davis, 1999). Bagby et al. (2004) noted that the measure demonstrates relative as opposed to absolute stability. That is, scores on the RRS significantly correlate with
later scores over time periods spanning weeks to years but test-retest reliability is highest when there is no change in mood. The above findings indicate that ruminative processing fluctuates with depressive symptoms, but is a relatively stable trait-like construct. Thus, RST’s conceptualization of ruminative style as an enduring trait-like coping strategy is generally supported.

Although the bulk of research supports ruminative style as a vulnerability factor for depression, a major criticism is that the most commonly used measure of ruminative style, the RRS, contains a number of items with depression-related content that might inflate the relationship between rumination and other measures of depressive symptoms (e.g., Conway, Csank, Holm & Blake, 2000; Roberts, Gilboa & Gotlib, 1998; Treynor et al., 2003). Example items that overlap with diagnostic criteria for depression include “think about how hard it is to concentrate” and “think about how sad you feel.” In response to these criticisms, Treynor et al. (2003) revised the scale by eliminating the 12 items that contained depression-related content and examined whether relationships between the RRS and depression scales still emerged. Positive associations between the revised RRS and measures of depression would suggest that the previously established relationship between rumination and depressive symptoms is robust.

Based on a community sample of 1,130 people Treynor et al. (2003) found that the 10 item measure, with deleted depression-related items, yielded a 2 factor structure. Five items were characterized by negative self-focus and self-blame, and loaded onto a factor they labelled “brooding” whereas the other five items were characterized by actively seeking solutions to one’s problems and loaded onto a factor they labelled “reflective pondering.” Analysis revealed that the Brooding Subscale predicted
depression scores \((r = .44)\), which was very similar to the association found using the full 22 item scale \((r = .48)\). The Brooding subscale also predicted future depressive episodes \((r = .37)\), which again was very similar to the association found using the full scale \((r = .38)\). In contrast, the Reflection Subscale demonstrated low correlations with depressive symptoms \((r = .12)\). The results indicate that the relationship between ruminative style and depression cannot be attributed to problematic items on the RRS. Additional support for the RRS is derived from studies demonstrating that alternative measures of ruminative styles also correlate highly with the RRS (e.g., Ehring et al., 2011; Siegle, Moore & Thase, 2004) and have demonstrated similar relationships with depressive symptoms (Ehring et al., 2011; Luminet, 2004; Mor & Winguist, 2002; Siegle et al., 2004). Thus, the bulk of evidence supports the use of the RRS to measure trait rumination and support RST’s contention that ruminative style is a vulnerability factor for depression.

One prediction from RST that has not received general support is that ruminative style contributes to the increased duration of depressive episodes (see Nolen-Hoeksema et al., 2008). That is, among individuals who are already depressed, possessing a ruminative style does not appear to have a significant impact on the duration of a depressive episode (Arnow et al., 2004; Bagby & Parker, 2001; Park et al., 2004). Thus, rumination may be better conceptualized as a vulnerability factor that serves to sustain negative affect, and subsequently increases risk for depression (Nolen-Hoeksema et al., 2008; Teasdale, 1988). Once a full blown MDE occurs, other neurological and cognitive changes may become stronger predictors of episode duration. Rumination coping can also be a symptom of depression (Treynor et al., 2003) and so detecting
differences in ruminative style during a depressive episode may be confounded by the presence of other depressive symptoms.

2.4.4 Mechanisms linking ruminative style and depression. Various mechanisms have been proposed to account for the relationship between ruminative style and depression. One potential mechanism is impaired problem solving (Nolen-Hoeksema et al., 2008). Although individuals often report ruminating as a way to solve problems, instructing dysphoric participants to ruminate using experimental procedures is associated with increased feelings of being overwhelmed, perceptions that significant problems are unsolvable, and reduced willingness to engage in problem-solving (Lyubomirsky, et al., 1999). An early study by Lyubomirsky and Nolen-Hoeksema (1993) found that inducing rumination in dysphoric participants led to decreased willingness to choose a pleasurable activity at the end of the experiment, despite beliefs the activity would help to alleviate sad mood. Additionally, inducing a ruminative focus in dysphoric participants is associated with less effective problem solving for interpersonal problems (Lyubomirsky & Nolen-Hoeksema, 1995).

Of particular interest to the current study are mechanisms that involve cognitions and cognitive processing. Specifically, increased negative thinking is a mechanism proposed to explain links between ruminative style and depression vulnerability (Nolen-Hoeksema, 1993; Nolen-Hoeksema et al., 2008; Wisco & Nolen-Hoeksema, 2008). According to DA the presence of a sad mood is associated with increased accessibility to negative thoughts and memories (Bower, 1981; Siemer, 2005; Teasdale, 1988). Therefore, adopting a self-focus and repetitive processing style in response to a sad mood state will result in increased elaboration of these negative thoughts and memories.
Additionally, the increased processing of negative thoughts and memories will serve to strengthen connections between negative thoughts and emotions that are then incorporated into one’s self-schema (Nolen-Hoeksema, 1993; Teasdale, 1988). Therefore, in line with the DA hypothesis it is proposed that ruminative style confers vulnerability for depression because it contributes to the development of highly elaborated and interconnected negative schemas that are activated in a sad mood.

In support of these propositions, evidence from numerous studies have shown that dysphoric participants who are asked to ruminate spontaneously report more negative events from their past, perceive negative events as occurring more frequently, and report a more pessimistic outlook towards their future compared to dysphoric individuals assigned to a distraction condition (Lyubomirsky, Caldwell & Nolen-Hoeksema, 1998; Lyubomirsky & Nolen-Hoeksema, 1995; McFarland & Buehler, 1998). Additionally, trait rumination has been shown to be associated with other maladaptive cognitive styles, such as negative inferential style and dysfunctional attitudes (Ciesla & Roberts, 2002; Flett et al., 2002) and to mediate the relationship between depressotypic cognitive styles and depressive symptoms (Ito & Agari, 2002; Nolen-Hoeksema et al., 1994).

Another proposed mediator linking ruminative style with depression concerns impairment in adaptive cognitive processing. For example, Lyubomirsky, Kasri, and Zehm (2003) found that dysphoric individuals induced to ruminate exhibited impaired concentration on various academic tasks compared to dysphoric individuals who were initially distracted and non-dysphoric individuals in either response style condition. Additionally, rumination is associated with reduced specificity of autobiographical
recall, an effect that is found in individuals who are high on trait rumination (Watkins & Teasdale, 2001) and dysphoric individuals who are induced to ruminate (Joormann & Siemer, 2004). Thus rumination is associated with cognitive processes that have been linked to the exacerbation of depressive symptoms (see Williams et al., 2007 for a review).

It has also been proposed that increased negative thoughts and affect associated with ruminative style can be attributed to deficits in cognitive control functions that serve to gate or remove goal-irrelevant information from current processing (Joormann, 2005; Joormann & Siemer, 2011; Ursin, 2005). This is consistent with predictions from Teasdale’s DA hypothesis, which proposes that difficulty disengaging from negative mood states is predictive of depression. Cognitive control processes considered prominent in depression vulnerability are reviewed in a later section.

2.4.5 Summary of ruminative style. Rumination is a style of thinking that is characterized by repetitive self-focusing (Martin & Tesser, 1996). It is most commonly conceptualized as a maladaptive response to depressive mood states in which individuals repeatedly focus on causes, consequences and symptoms of depressive affect (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 1993; Nolen-Hoeksema et al., 2008). As predicted by RST and the DA hypothesis, habitual or trait-like use of rumination is a particularly destructive coping style that confers vulnerability to depression onset. Ruminative style is predictive of later depressive episodes, even after controlling for baseline depressive symptoms and other cognitive vulnerability factors (Just & Alloy, 1997). It has also been shown to mediate the relationship between other maladaptive cognitive styles and depression. Recent reformulations of RST acknowledge that
ruminative response style is not associated with chronicity of depressive episodes, rather it is proposed to be a particularly potent vulnerability factor for depression (Nolen-Hoeksema et al., 2008).

Specific mechanisms linking ruminative style and depression include reduced motivation and ability to problem solve, increased negative thinking, and maladaptive cognitive processing (Nolen-Hoeksema et al., 2008). Of particular interest to the current study are the mechanisms that involve negative cognitions and maladaptive cognitive processing. In particular, habitual tendencies to respond to negative mood states with rumination can lead to the elaboration and strengthening of negative self-schema that are triggered in response to negative affect (Nolen-Hoeksema, 1993; Teasdale, 1988). As discussed below, the possibility that deficits in cognitive control may be an important factor underlying the link between ruminative style and vulnerability for depression is of particular interest in the current study.

2.5 Cognitive Inhibition: Biased Information Processing

2.5.1 Executive functions. Executive function is a cognitive control process that refers to a wide range of “higher-level cognitive [processes] involved in the control and regulation of “lower-level” cognitive processes and goal-directed, future-oriented behavior” (Alvarez & Emroy, 2006, p. 17). They allow individuals to flexibly respond to changing environmental demands and include functions such as planning, initiating, sequencing, monitoring, cognitive flexibility, and maintaining focus on goal-directed behaviours (Chan, Shum, Touloupolou, & Chen, 2008; Whitmer & Banich, 2007). Beck’s (1976) cognitive model predicts that vulnerability for depression is associated with negative biases at all levels of information processing (Clark et al., 1999). Thus, it
has been proposed that depression may be associated with biases in executive processes that control the functioning of memory and attention (Joormann, 2005; see Joormann & Siemer, 2011 for a review). One executive control process of particular interest for the current study is cognitive inhibition. Cognitive inhibition was a main focus for the present study. Therefore the following sections provide a detailed review of this cognitive process, how it is typically measured and how it relates to depression.

2.5.2 Cognitive inhibition. Cognitive inhibition is an executive function that contributes to maintaining focus on current goals by actively gating or removing goal-irrelevant information (Anderson & Green, 2001; Dempster & Brainerd, 1995). Theories of executive function conceptualize cognitive inhibition as having separate, but interacting functions (Friedman & Miyake, 2004; Miyake, Friedman, Emerson, Witzki, & Howarter, 2000). The first is the prevention of irrelevant information from entering working memory, which is an online, limited capacity system responsible for active maintenance and manipulation of contents that become the focus of attention (Baddeley, 1986). This cognitive inhibitory process, referred to as "interference control" (Miyake et al., 2004) is involved in selective attention and serves to reduce the saliency of external or internal information that is not relevant to one's current goal. For example, a woman who is attempting to memorize a phone number will benefit from actively blocking out sounds from her television. This aspect of cognitive inhibition protects against distraction from stimuli that could disrupt one's stream of consciousness. Another facet of cognitive inhibition involves the removal or expulsion of previously relevant information from working memory due to a shift in goals. This process is frequently referred to as updating. For instance, in order for the woman in the above
example to successfully memorize a new phone number, she must clear information relating to the old number. Another element of cognitive inhibition is set-switching and refers to the ability to flexibly switch from one mental set to another in accordance with one's goals.

The above features of cognitive inhibition refer specifically to cognitive control of attentional processes for information in working memory. Another important aspect of cognitive inhibition is intentional forgetting in long term memory. In contrast to working memory, which has a limited capacity (i.e., 5-9 items in verbal stores; Miller, 1956), long term memory does not have a limited capacity and refers to processes responsible for encoding, storage and retrieval of information (Thorn & Page, 2009). Cognitive inhibitory processes may be employed in order to deliberately disrupt retrieval or future expression of unwanted memories (Johnson, 1994). For example, a woman may benefit from intentionally forgetting emotionally upsetting details from a previous argument in order to reduce emotional arousal and focus on delivering a presentation. Evidence from behavioural and neuro-imaging studies indicate that individuals can recruit inhibitory brain functions to suppress or disrupt retrieval of unwanted or irrelevant cognitions (Anderson & Green, 2001; Anderson & Levy, 2004; Levy & Anderson, 2008). It is suggested that analogous processes involved in the selective retrieval of information in memory are involved in selective attention for objects in the environment (e.g., Anderson & Spellman, 1995). The current literature often fails to distinguish between the different functions of inhibition, which can be problematic and leads to conceptual ambiguity.
2.5.3 Cognitive inhibition and depression. There is now substantial evidence linking depression with deficits in information processing (Au Yeung, Dalgleish, Golden & Schartau, 2006; Gohier et al., 2009; Gotlib & Joormann, 2010; Joormann, 2009; Joormann, Siemer, & Gotlib, 2007), which are often apparent during and after MDEs and tend to worsen with each subsequent episode (Vanderhasselt & DeRaedt, 2009). Based on a review of the literature, Joormann (2005) hypothesized that cognitive inhibitory processes may play an important role in vulnerability for recurrent depression. A number of studies now support this hypothesis, based on depressed, remitted depressed, and dysphoric samples (see Joormann et al., 2007; Joormann & Siemer, 2011 for reviews). Two studies have also demonstrated that individuals who are vulnerable for depression based on family history demonstrated weakened cognitive inhibition (Joormann, Talbot & Gotlib, 2007; Lisiecka, Carballedo, Fagan, Connolly, Meaney, & Frodl, 2012).

Teasdale’s model provides a basis for understanding why deficits in cognitive inhibition might contribute to depression vulnerability. Specifically, poor ability to remove or block goal-irrelevant thoughts or memories from consciousness will lead to prolonged processing of negative thoughts and emotions within a neural network. For example, weak cognitive inhibition may lead to difficulty in expelling negative thoughts once they are triggered, making it more likely that the individual will become locked in a cycle of increasing negative thoughts and affect.

The following review of the current literature linking cognitive inhibition and depression/dysphoria is organized according to research relating to cognitive inhibition
in selective attention (i.e., interference control and updating) and in long-term memory (i.e., intentional forgetting), respectively.

2.5.3.1 Cognitive inhibition: selective attention. Attention refers to focalization, concentration and consciousness of stimuli, which may be external (i.e., noticing a car passing) or internal (i.e. awareness of one's thoughts) to the individual (Cowan, 1995). Possessing the ability to selectively attend to some aspects of one’s environment, while ignoring others (i.e. selective attention) is an executive function that is essential for goal-directed behaviour. Posner (1995) proposed that two processes are involved in selective attention: the activation of relevant information and the active inhibition of irrelevant information (i.e., cognitive inhibition). Thus, an individual is able to focus on one task (e.g., watching a television show) without becoming distracted by irrelevant stimuli (e.g., outside traffic noises or thinking about a hard day at work).

2.5.3.1.1 Interference control. Common paradigms used to measure cognitive inhibition as it relates to interference control are the negative priming task (Tipper & Cranston, 1985) and the negative affective priming task (NAPT; Joormann, 2004, 2006). The negative priming task is a lexical decision task that distinguishes between activation and inhibition accounts of selective attention. Participants are asked to respond to a target word while ignoring a distracter (e.g., respond to a word written in blue, while ignoring a word written in red). On some trials, the previous distracter becomes the new target (i.e., previous word written in red becomes the new target). Individuals who effectively inhibited the distracter will show delayed responding to the new target (i.e., increased latency). Most individuals demonstrate increased latency in response to target items (i.e., effective inhibition; Tipper & Cranston, 1985), however a handful of studies
have demonstrated that depressed individuals fail to exhibit the inhibition effect, suggesting general deficits in cognitive inhibition for neutral information (Frings, Wentura, & Holtz, 2007; Linville, 1996; MacQueen, Tipper, Young, Joffe & Levitt, 2000).

The NAPT (Joormann, 2004; Gotlib, Yue & Joormann, 2005) is adapted from the negative priming task to specifically examine inhibition of valenced material. Given that depression is a disorder characterized by negative processing biases (Beck, 1967; Teasdale, 1988), researchers posit that depression may be associated with deficits with inhibiting negative information, in particular (see Gotlib & Joormann, 2010 for a review; Joormann, 2004; Linville, 1996). There has been some support for the prediction that depressed or dysphoric individuals show reduced cognitive inhibition using the NAPT.

Joormann (2004) conducted a series of three studies to test the hypothesis that depression is associated with weakened cognitive inhibition for negative information. Using a sample of university students it was found that high scores on a self-report measure of depressive symptoms (i.e., dysphoria) was associated with reduced response latencies for negative, but not positive distracter items. This supported the hypothesis that dysphoria is associated with reduced inhibition of negative information. A second study, which instructed participants to either rate target words based on their affective quality (shallow encoding) or self-descriptiveness (deep encoding) further supported this hypothesis, but this effect was only evident in the self-descriptive condition. In a third study, it was found that reduced response latency for negative information (i.e., reduced inhibition) was also evident for previously depressed participants who adopted a self-
focus towards the words. Together these findings support the proposition that depression and depression vulnerability is associated with weakened cognitive inhibition. These findings were further replicated using a modified version of the NAPT which measured inhibition of emotional faces (Goeleven, De Raedt, Baert, & Koster, 2006).

There are several limitations to this research that should be noted. The NAPT is a recently developed task, thus there is limited research to verify that this experimental design truly taps cognitive inhibition in attention. Additionally, the negative affective priming effect is not always strong. For example, Joormann (2004) reported findings using a one-tailed test of significance and some studies have failed to replicate the effect (e.g., Guyitt, 2011). Despite these limitations, general findings are consistent with predictions of the DA hypothesis; that is, depressive symptoms are associated with difficulty ignoring irrelevant negative information.

2.5.3.1.2 Updating. As stated earlier, updating refers to the active removal of previously relevant information from working memory due to a change in goals (Gotlib & Joormann, 2010). It has been proposed that poor functioning of inhibitory processes that expel negative thoughts (Bower, 1981; Siemer, 2005; Teasdale, 1988) may explain why some individuals respond to negative life events with sustained negative mood states and recurrent, uncontrollable negative thoughts (Anderson & Levy, 2009; Gotlib & Joormann, 2010).

The modified Sternberg task (Joormann & Gotlib, 2008; Oberaur 2001, 2005a, 2005b) is an experimental paradigm designed to measure the updating function of cognitive inhibition. On this task, two lists of words are memorized simultaneously
followed by instructions that only one of the lists is relevant for an upcoming task. On a follow-up recognition test, participants are asked to correctly identify that the probe came from the relevant list and correctly reject distracters, which could be either novel words or words from the irrelevant list. Differences in decision latencies between responses for novel versus irrelevant probes reflect the extent to which there is residual activation of irrelevant information in working memory. Longer decision latencies for irrelevant probes thus reflect weaker inhibition of irrelevant words.

Joormann & Gotlib (2008) used a modified Sternberg task to examine differences in cognitive inhibition between depressed and never-depressed participants receiving a sad mood induction. Consistent with predictions, they found the depressed group had more difficulty expelling negative information compared to the control group experiencing a sad mood. They argue that the effect cannot be explained by changes in mood. Gotlib and colleagues reported similar findings using an “ignore/suppress” task (Gotlib, Yue, & Joormann, 2005), which is similar to the modified Sternberg task, except that it measures both the prevention and removal of irrelevant information being held in working memory. They found that dysphoric students had more difficulty updating previously relevant negative material and ignoring irrelevant material compared to non-dysphoric students. Joormann, Nee, Berman, Jonides and Gotlib (2010) replicated these findings using a depressed sample, however they found that while depressed individuals exhibited the same difficulty removing irrelevant information from working memory, they did not have difficulty ignoring irrelevant information.
De Lissnyder, Koster, Derakshan, and DeRaedt (2009) further replicated the finding that moderate to severe depressive symptoms are related to difficulties removing irrelevant information from working memory (i.e., updating). Researchers employed an affective shift task, which taps into both updating and set shifting functions of inhibition. Specifically, they found that updating, but not set-shifting, was associated with depressive symptoms. However, they noted this association disappeared after controlling for trait-rumination, suggesting that ruminative style may have been responsible for the positive results. In summary, findings from various experimental paradigms indicate that depression and depressive symptoms are associated with deficits in cognitive inhibition of negative information in attention.

2.5.3.2 Cognitive inhibition in long term memory: Intentional forgetting

Cognitive inhibition is also involved in motivated efforts to forget or block retrieval of information stored in long-term memory (see Anderson et al., 2004; Anderson & Green, 2001; Anderson & Levy, 2009; Gotlib & Joormann, 2010; Levy & Anderson, 2008). Intentional forgetting is similar to updating in selective attention except there is an attempt to override or suppress cognitions that have been encoded and stored in memory. Analogous inhibitory processes are proposed for both updating and intentional forgetting (Spellman & Anderson, 1995). Intentional forgetting is described as a conscious effort to reduce activation or stop retrieval of a thought or memory in favour of a less highly activated cognition (Anderson et al., 2004; Anderson & Green, 2001). Forgetting information stored in long-term memory may be experienced as natural decay (non-volitional forgetting; Anderson et al., 1994) or may occur as a conscious effort to push thoughts out of one’s awareness (volitional or motivated forgetting;
Anderson et al., 2004). The current study is primarily interested in volitional attempts to control thoughts.

It is contended that the neural processes involved in dismissing a current thought or memory overlap with the processes involved in terminating a motor response (Anderson et al., 2004; Anderson & Levy, 2009; Levy & Anderson, 2008; Ursin, 2005). Consider the example of a woman who knocks over a cup. After quickly reaching to catch the cup she realizes it is filled with hot coffee and stops her hand in mid-air. At the neural level, inhibitory processes work to override prepotent behavioural responses according to current goals and environmental demands (Levy & Anderson, 2008).

Neuro-imaging studies have demonstrated that the lateral prefrontal cortex (LPFC), which is generally responsible for temporal organization of behaviour (i.e. selecting appropriate responses/movements), plays an important role in interrupting motor responses (e.g., Aron, Fletcher, Bullmore, Sahakian & Robbins, 2003; de Zubicary, Andrew, Zelaya, Williams, & Dumanoir, 2000). Stimulation of this region has also been shown to interrupt movement in monkeys (Sasaki, Gemba, & Tsujimoto, 1989), providing further evidence that the LPFC is involved in the control of motor responses. The same neural processes that enable individuals to inhibit over-learned or automatic behavioural responses are thought to operate in the inhibition of cognitive responses. Thus a man can dismiss highly distressing thoughts about the recent death of his mother in order to carry on a conversation with a co-worker. Reduced ability to inhibit retrieval of these thoughts will cause greater awareness of the unwanted thoughts, which in turn will interfere with his ability to carry on a conversation.
2.5.3.2.1 Think/No Think Task. A recently developed paradigm for measuring cognitive inhibition in memory is the Think/No Think task (Anderson & Green, 2001). Specifically, the Think/No Think task involves three main phases. In the training phase participants memorize cue-target pairs (e.g., ordeal-roach), so that the first word (ordeal) becomes a reminder cue for the second word (roach). Then in a think/no think phase, individuals are asked to recall the second word (roach) in response to the previously learned cues (ordeal) on most trials (i.e., “think”), but are given instructions that for certain word cues they are to prevent themselves from retrieving the associated word (i.e., “no think”). Strict instruction is given to go beyond simply not saying the response and to attempt to prevent any memory of the to-be-forgotten words from entering awareness (i.e., stop retrieval). In the final stage individuals are asked to recall all target words in response to learned cues.

Results from this test typically show that “think” items are recalled more frequently than “no think” items (i.e., total control effect) indicating that individuals can disrupt memory for information when motivated to forget. Additionally, using a baseline comparison of initially learned word pairs that were not included in the think/no think phase, analysis typically reveals enhanced memory for “think” items (i.e., positive control effect) and importantly, impaired memory for the “no think” items (i.e., negative control effect). This is taken as evidence that participants elicit inhibitory responses to reduce accessibility of unwanted memories (Anderson et al., 2004; Anderson & Green, 2001; Anderson & Levy, 2009; Levy & Anderson, 2008).

Evidence from neuro-imaging studies provide strong support that cognitive inhibition is responsible for the negative control effect. Specifically, a number of
studies have found that “no think” trials are associated with increased activation in the LPFC and the anterior cingulate cortex (ACC; Anderson et al., 2004), which are brain regions associated with the control of behavioural responses. Thus, as hypothesized, brain regions associated with measures of inhibition on the think/no think task correspond to brain regions known to be involved in stopping prepotent behavioural responses. Importantly, activation of these control regions (i.e., LPFC and ACC) during the “no think” trials was also associated with reduced activation of the hippocampus, which is an area of the brain associated with memory retrieval. This further supports the contention that cognitive inhibition as measured by the Think-No Think task corresponds to controlled deactivation and retrieval of memories.

Additional evidence supporting the proposition that cognitive inhibition contributes to the negative control effect is derived from studies demonstrating weak inhibition (i.e., scores on the Think/No Think task) is associated with a variety of factors that characterize poor executive functioning, such as lower working memory capacity (Bell & Anderson, 2005), older age (Anderson, Reinholtz, Kuhl, & Mayr, 2011) and depression (Hertel & Gerstle, 2003). The emerging evidence thus supports the proposition that individuals can use cognitive inhibitory processes to disrupt the retrieval of memories and that this can be measured using cognitive experimental tasks like the Think/No Think paradigm.

2.5.3.2.2 Directed Forgetting Task. While the Think/No Think Task has been used to investigate cognitive inhibition in memory, the best-researched experimental paradigm measuring cognitive inhibition in memory is the Directed Forgetting Task (Bjork, 1972; Epstein, 1971). This task assesses the same cognitive inhibitory processes
as the Think/No Think paradigm. The Directed Forgetting task has been employed to assess cognitive inhibition in a variety of contexts, such as executive function decline in old age (e.g., Gamboz & Russo, 2002), Attention Deficit Hyperactivity Disorder (ADHD; e.g., White and Marks, 2004), Obsessive Compulsive Disorder (OCD; Tan, Huang, Hon, & Wu, 2007), response to traumatic stress (Zoellner, Sacks, & Foa, 2003), and more recently, depression (see Joormann, et al., 2011 for a review).

In the Directed Forgetting task cognitive inhibition is assessed through motivated efforts to forget recently learned words. The typical procedure consists of three phases. In the first phase, participants memorize a list words, which they are subsequently told are practice items that must be forgotten. In phase two, individuals memorize a second list of words that they are told to remember. Following a short distraction task, participants are given a free recall task and instructed to recall all words from the first and second list. In most cases, to-be-forgotten words are remembered less frequently compared to the to-be-remembered words (i.e., the directed forgetting effect).

There are two commonly used variations of the Directed Forgetting task that differ according to when the cue to forget is presented and the processes that are being assessed. The version described above is referred to as the list-method. That is, the cue to forget is presented after one list of words has been encoded in memory. The list method version of the Directed Forgetting task is widely used as a measure of cognitive inhibition. Although there is still some debate as to whether other cognitive processes are involved, the bulk of research suggests that this task is a valid measure of cognitive inhibition (Badsen, Badsen & Gargano, 1993; Foster & Sahakyan, 2011; Johnson, 1994;
MacLeod, 1999). In this case, impaired memory for to-be-forgotten items is believed to result from motivated attempts to disrupt retrieval.

The second variation is called the item-cue Directed Forgetting task. For this task the cue to either remember or forget is presented directly before, during, or immediately after the presentation of each word in the list (Geiselman, & Bagheri, 1985; Lehman & Bovasso, 1993; Muther, 1965; Weiner & Reed, 1969). This method of cueing is thought to involve other processes besides cognitive inhibition (Lehman, McKinley-Pace, Leonard, Thompson, & Johns, 2001; Wilson & Kipp, 1998; Woodward & Bjork, 1971). Because the cue to forget is presented in such close proximity to remembering the word, to-be-remembered and to-be-forgotten items are thought to be encoded differently. In support of this explanation, the inclusion of an unexpected recognition task for all the words presented reveals higher recall for to-be-remembered words, indicating that to-be-remembered and to-be-forgotten items did not receive the same level of encoding (Wilson & Kipp, 1998). Given that the present study focuses on cognitive inhibitory processes, the list-method version of the Directed Forgetting task is of particular importance.

2.5.3.3 Intentional forgetting and depression. While cognitive inhibition paradigms have been utilized extensively, they have only recently been applied to depression research. Initial findings suggest that depression may be associated with weakened cognitive inhibition of memory processes. Power, Dalgleish, Claudio, Tata and Kentish (2000) examined the role of cognitive inhibition in a sample of high dysphoric students using the Directed Forgetting list-method design. Given that depression is associated with negatively biased information processing (Clark et al.,
positive and negative words were presented. Additionally, in order to account for depth of processing, half of the students rated the valence of the words (i.e., shallow processing) while the other half rated the words in terms of self-descriptiveness (i.e., deep processing). Analysis indicated that high dysphoric students reported more negative than positive to-be-forgotten words compared to low dysphoric students, but this effect was only found in the “self-description” condition. These results suggest that depressed participants demonstrated negatively biased deficits with cognitive inhibition. However, this was specific to information that was processed more deeply. Hertel & Gerstle (2003) replicated these findings using a modified version of the Think/No-Think task that paired valenced cues (positive or negative) with neutral targets. There were no group differences between dysphoric and non-dysphoric students in the number of to-be-remembered items recalled, but dysphoric students recalled significantly more to-be-forgotten items, suggesting they experienced difficulty inhibiting all unwanted information.

2.5.4 Summary of cognitive inhibition and depression. Cognitive inhibition is an executive control function that involves active blocking or removal of irrelevant information from current processing (Dempster & Brainerd, 1995). It is implicated in the control of lower level processes such as attention and memory. Cognitive inhibitory processes in selective attention include interference control (i.e., preventing irrelevant information from interfering with current processing) and updating (i.e., clearing previously relevant information from working memory due to a change in goals), whereas a cognitive inhibitory process in memory is intentional forgetting, and
involves willful attempts to block or disrupt retrieval of unwanted information stored in long term memory (Joormann, 2005).

Various experimental designs have been developed to measure cognitive inhibition. The most common paradigms for measuring cognitive inhibition in selective attention are the negative priming task (Tipper & Cranston, 1985), the NAPT (Joormann, 2004, 2006), and the modified Sternberg task (Joormann & Gotlib, 2008), which use response latencies to irrelevant or previously relevant information as indices of cognitive inhibition. Typical experimental designs for measuring cognitive inhibition in long-term memory are the Think/No-Think task (Anderson & Green, 2001) and the list-method of the Directed Forgetting task (Bjork, 1972). However, the Directed Forgetting task is the most widely used and well-researched measure of cognitive inhibition.

The bulk of evidence indicates there is a link between depression and deficits in cognitive inhibition (Joormann & Siemer, 2011). However, it should be noted that experimental designs used to measure cognitive inhibition in selective attention are recent developments. Experimental designs measuring cognitive inhibition in long-term memory, such as the Directed Forgetting task (Bjork, 1972), are better researched and may thus provide more reliable indices of cognitive inhibition. It is notable that whereas distinctions are drawn between inhibitory processes involved in selective attention and long-term memory, there is considerable overlap in these various functions. In order to maintain consistency with the published research and elucidate the specific processes linking inhibition and emotion regulation deficiencies, these terms were discussed as separate constructs in this dissertation.
2.6 Cognitive Inhibition and Ruminative Style

Cognitive inhibition is an important vulnerability marker that could interact with emotion regulation processes to increase one’s risk for depression (Joormann, 2005). It has been proposed that weak inhibition might contribute to the vicious cycle of increasing negative thoughts and emotions that characterize persistent sadness (Joormann, 2005). While there is now moderately strong evidence to indicate that cognitive inhibition is related to depression and depressive symptoms (see Gotlib & Joormann, 2010; Joormann et al., 2007; Joormann & Siemer, 2011, for reviews), few studies have formally examined how inhibitory processes might impact one’s ability to repair negative affective states. Specifically, can dysfunctional inhibitory processes help explain the often uncontrollable and intrusive nature of ruminative thoughts? Understanding how cognitive inhibition might contribute to maladaptive emotion regulation associated with ruminative style can provide critical information to better understand vulnerability for depression.

As reviewed earlier, ruminative style is a risk factor for depression that is characterized by habitually responding to distress by repeatedly focusing on the causes and consequences of one’s symptoms (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2008; Thomsen, 2006). Several researchers have suggested that cognitive inhibitory processes play a central role in the occurrence of rumination (Hertel, 1997; Hester & Garavan, 2005; Joormann, 2005; Linville, 1996; Ursin, 2005). Further, it has been proposed that the commonly reported relationship between cognitive inhibition and depression may be attributable to ruminative processing (Joormann, 2005).
Teasdale's (1988) DA hypothesis provides a basis to understand how cognitive inhibition might link trait rumination and vulnerability for depression. As reviewed earlier, possessing a ruminative style contributes to a strengthening of connections between negative affect and negative cognitions within a neural network and is associated with dysfunctional schemas (Nolen-Hoeksema, 1993). According to Teasdale's (1988) model, negative schema may be triggered by the presence of a negative mood state, leading to a reciprocally reinforcing cycle of increasing negative affect and cognitions. Poor cognitive inhibition may help explain why individuals with a ruminative style have difficulty terminating ruminative thoughts, which can then spiral into a clinically depressive episode. An association between ruminative style and weak cognitive inhibition would provide the critical mediating process to elucidate why trait rumination is associated with depression vulnerability.

2.6.1 Empirical evidence linking cognitive inhibition and ruminative style.

There is now burgeoning research investigating the proposition that cognitive inhibition is a process linking ruminative style with depression (Joormann, 2005). Davis and Nolen-Hoeksema (2000) found that high trait ruminators displayed more perseverative errors on the Wisconsin Card Sorting Test (WCST; Berg, 1948) than did low trait ruminators. The WCST is a widely used measure of executive function that requires participants to sort cards into categories based on sorting principles (i.e., colour, number, shape) that are unknown to the examinee. The authors interpreted these findings as evidence that trait ruminators experience inflexibility in their thinking. Unfortunately, effect sizes were not reported so the meaningfulness of this significant difference cannot be determined. A number of studies have also demonstrated
associations between ruminative style and reduced cognitive inhibition. For example, Joormann (2006) found that trait rumination was associated with reduced ability to prevent irrelevant information from entering working memory using the NAPT. This finding remained significant after controlling for self-report depressive symptoms. Whitmer and Banich (2007) also found high trait rumination was associated with reduced inhibition (i.e., updating) after controlling for depressive symptoms. The link between cognitive inhibition and rumination was found in samples specifically selected for high and low trait rumination as well as in unselected samples. De Lissnyder et al. (2010) also replicated these findings, indicating that higher rumination was associated with difficulties updating and set-switching. Of particular note, rumination was a stronger predictor of cognitive inhibition than depressive symptoms, suggesting that the repetitive nature of rumination is closely associated with deficits in cognitive inhibition.

The studies reviewed above assess the relationship between ruminative style and cognitive inhibition. However, with the exception of the WCST, which captures concepts related to a number of domains (e.g., rule-learning, perseveration, learning from feedback, memory from previous responses), the previous studies primarily focused on cognitive inhibition in selective attention. To date, there is a paucity of research examining whether ruminative style is associated with weak cognitive inhibition in long-term memory. Given that experimental paradigms tapping cognitive inhibition in attention are relatively new and there is strong evidence linking depression and biased memory processes, it is critical that research linking cognitive inhibitory processes and ruminative style be extended to memory. There is one study to date that examined the relationship between ruminative style and cognitive inhibition in long-
term memory. Joormann and Tran (2009) found that possessing a ruminative style, assessed by a median split on the RRS, was associated with reduced ability to inhibit irrelevant negative and positive words based on the Directed Forgetting task.

Taken together these findings indicate that cognitive inhibition is associated with increased rumination in response to stressors. A notable limitation in the reviewed literature, however, is that although deficits in cognitive inhibition are proposed to be a vulnerability factor associated with trait rumination, no studies have specifically examined whether individuals high on trait rumination exhibit difficulties with cognitive inhibition outside of a depressive mood episode. Although some studies (e.g., Joormann, 2006; Joormann & Tran, 2009) have found links between rumination and cognitive processes after controlling for depressive symptoms, simply controlling for depressive symptoms may be insufficient to account for effects that may be associated with depression. Given that rumination is a symptom of depressive episodes (Nolen-Hoeksema, Stice, Wade, & Bohon, 2007), and depression is associated with disruptions in cognitive functions (Au Yeung et al., 2006; Gotlib & Joormann, 2010; Joormann, 2009; Joormann, 2007), it is important to extend these findings by specifically screening out individuals who meet criteria for a current depressive disorder. This will provide a purer measure of cognitive vulnerability associated with rumination style. Understanding mechanisms underlying ruminative style will provide valuable insights to better understand depression vulnerability.

2.7 Emotion Regulation

While several studies have established links between cognitive inhibition and the trait vulnerability factor of ruminative style, there is a paucity of research on other forms
of emotion regulation. Emotion regulation refers to the ability to actively manage one’s emotions (Gross, 2007) and encompasses all forms of emotion modulation, including attempts to increase, decrease or maintain either negative or positive emotions (Gross, 1998). Of particular interest to the current study, however, is down-regulation of negative emotions, which refers to all attempts to reverse or decrease negative emotions. Emotion regulation is particularly relevant for understanding vulnerability to depression given that sustained negative affect is the primary symptom of MDD, and chronic mood regulation deficits have been shown to contribute to all major forms of psychopathology, particularly mood disorders (Bradley, 2000; Kring & Werner, 2004).

While RST and emotion regulation both address responses to distress, RST focuses on specific trait-like responses to depressive symptoms, whereas the Emotion Regulation literature focuses on a broader array of responses and places more emphasis on the online processes involved in emotion regulation.

Teasdale’s (1988; 1998) DA hypothesis offers a much needed bridge between cognitive models (e.g., Beck, 1976) and emotion regulation accounts of vulnerability for depression. Given the presence of sad affect is associated with increased negative cognitions (Bower, 1981; Siemer, 2005; Teasdale, 1988), inability to effectively regulate negative affect states will be associated with increased processing and elaboration of negative thoughts, which may in turn increase risk for a clinically depressive episode.

Research on emotion regulation has exploded over the past few decades (see Augustine & Hemenover, 2009; Gross, 1998, 2007; Koole, 2010 for reviews). Responses to negative emotions occur at both automatic and effortful levels of processing (Gross, 2007). Such strategies can include instrumental behaviours (e.g.,
(exercising), social support behaviours (e.g., calling a friend to talk about problems), seeking physical pleasure, cognitive reappraisal (e.g., reinterpreting the causes of one’s sad mood in a more positive light), and the like (Kovacs, Rottenberg, & George, 2009).

The current study focused specifically on intentional cognitive strategies employed by individuals to terminate or down-regulate sad affect. When using cognitive strategies, individuals attempt to exert cognitive control over their thoughts or emotions. Cognitive control is a general term referring to willful attempts to influence one’s thoughts or emotions in order to effect change in one’s current mood state (Wenzlaff, 1993). There is a great deal of empirical evidence converging across both correlational and experimental studies that support the effectiveness of a number of cognitive strategies for reducing negative affect (see Augustine & Hemenover, 2009; Gross, 2007; Koole, 2010 for reviews). Although most emotion regulation strategies are employed with the goal of reversing negative affect (Gross, 2007), some strategies are more effective in achieving this goal. The strategies effective in decreasing negative affect are referred to as “adaptive” emotion regulation strategies and are generally associated with improvements in other areas of psychological functioning, such as social competence, increased feelings of happiness, and reduced symptoms of depression or anxiety (Gross, 1998, 2007).

The most widely studied adaptive strategies are cognitive reappraisal and distraction (see Augustine & Hemenover, 2009; Larsen & Prizmic, 2004, for reviews). Cognitive reappraisal is defined as “a form of cognitive change that involves construing a potentially emotion-eliciting stimulus in a way that changes its emotional impact” (Gross & John, 2004, p. 349), while distraction is “removing oneself (cognitively or
behaviourally) from the cause of a negative affect” (Augustine & Hemenover, 2009, p. 1185). A recent meta-analysis examining the effectiveness of mood regulation strategies using experimental studies found that distraction and cognitive reappraisal are the most effective mental control strategies (Augustine & Hemenover, 2009). Habitual use of cognitive reappraisal is also associated with positive outcomes such as decreased depressive symptoms ($r = -.23$), more positive emotion ($r = .35$) and less negative emotion ($r = -.47$; John & Gross, 2004).

While adaptive emotion regulation strategies may serve to decrease negative emotion, other strategies show the opposite, albeit unintended, effect of exacerbating negative affective states. These are referred to as “maladaptive” strategies. Frequent use of maladaptive strategies is particularly relevant for depression and has been shown to play a significant role in predicting psychopathology (Aldao, Nolen-Hoeksema & Schweizer, 2010). The most commonly studied maladaptive strategies are rumination and suppression (Augustine & Hemenover, 2009), which are both associated with the onset and maintenance of depression (Aldao et al., 2010; Gross & John, 2003; John & Gross, 2004). Suppression can be employed in two different ways. Emotional suppression is defined as “reducing emotional-expressive behaviour once an individual is already in an emotional state” (John & Gross, 2004, p. 1302) while thought suppression involves intentional avoidance of unwanted thoughts (Wegner, 1994).

2.7.1 Cognitive inhibition and emotion regulation. Surprisingly little work has examined the potential role of cognitive inhibition in the execution of other emotion regulation strategies. Given that many emotion regulation strategies require individuals to employ mental effort to shift their focus of awareness, it would seem reasonable that
the efficiency of executive control functions would impact upon one’s ability to regulate emotions. Several researchers (Joormann et al., 2011; Koster, De Lissnyder, Derakshan, & De Raedt, 2010; MacLeod & Bucks, 2011) are now arguing that cognitive experimental paradigms can offer particularly useful information to inform the processes involved in emotion regulation. While information processing and emotion regulation literatures have evolved separately, it is posited that our understanding of processes involved in vulnerability for depression may benefit from an integration of concepts from these two research domains.

Recently, Joormann (2010) proposed a model for linking weak cognitive inhibition with emotion regulation. In line with principles from Teasdale's DA hypothesis, it is posited that when negative thoughts are activated in response to a sad mood episode, individuals with deficient inhibition will experience both increased access to negative information in memory and difficulty removing negative thoughts from awareness, which will contribute to impaired emotion regulation.

Despite theorizing suggesting that deficient cognitive inhibition may underlie impairments with emotion regulation, there has been very little research to date that investigates these connections. In particular, the one known study that examined the link between deficient cognitive control and emotion regulation relied on a self-report measure of emotion regulation strategies (Joormann & Gotlib, 2010). Therefore no studies have explored ways in which deficient inhibitory control may predict deficient emotion regulation using an online experimental approach. The current study addressed these important gaps in the literature by examining potential links between cognitive inhibition and use of the maladaptive emotion regulation strategy of thought.
suppression. Research and theory related to thought suppression was first reviewed followed by the rationale for linking cognitive inhibition and thought suppression.

2.7.2 Thought suppression. Thought suppression is a conscious effort not to think about a specific thought or memory (Rassin, 2005). The prevailing view is that thought suppression is a maladaptive response to negative affect. Use of the strategy has been associated with a number of consequences including an increase in unwanted thoughts (Gold & Wegner, 1995; Wegner & Erber, 1992; Wegner, Schneider, Carter, & White, 1987; see Wenzlaff & Wegner, 2000 for a review), heightened physiological reactivity to emotional thoughts (Gold & Wegner, 1995; Wegner, Broome & Blumberg, 1997; Wegner, Shortt, Blake, & Page, 1990), and exacerbation of negative mood (e.g., Borton, Markowitz, & Dieterich, 2005; Geraerts, Hauer, & Wessel, 2010; see Wenzlaff & Wegner, 2000 for a review). Dispositional use of thought suppression, assessed by self-report measures, is also associated with negative consequences such as increased self-report symptoms of anxiety (Roemer & Borkovec, 1994) and depression (Aldao et al., 2010; Borton et al., 2005; Kuyken & Brewin, 1994; Wenzlaff, Wegner, & Roper, 1988), as well as increased risk for developing depressive and anxious disorders (Purdon, 1999). Moreover, habitual use of thought suppression is positively associated with ruminative style (Szasz, 2009; Watkins & Moulds, 2009; Wegner & Zanakos, 1994).

Increased attempts to control upsetting thoughts via thought suppression is also associated with an elevated frequency of intrusive thoughts (Najmi & Wegner, 2008; Rassin, 2005; Wegner & Zanakos, 1994; Wenzlaff & Wegner, 2000), which are spontaneous unwanted thoughts or images that intrude into awareness, are difficult to
control, and interfere with ongoing thoughts and behaviours (Clark, 2005). In the context of psychopathology, intrusive thoughts are typically experienced as unacceptable, and distressing cognitions (Rachman, 1978, 1981). A number of psychopathological disorders are characterized by increases in intrusive thoughts, including Obsessive-Compulsive Disorder (OCD), Post-Traumatic Stress Disorder (PTSD) as well as affective disorders such as MDD or anxiety (Clark, 2005). Thought suppression may also play an important role in the development and maintenance of intrusions and obsessions (Clark, 1992; Rachman, 1981; Wegner, 1989). In fact, cognitive-behavioural models have incorporated the use of thought suppression to explain why mental disorders become associated with distressing intrusive thoughts (Ehlers & Clark, 2000; Salkovskis, 1999; Wenzlaff et al., 1988). Given the aversive consequences associated with thought suppression, it is important to gain a better understanding of the factors determining its use, as well as individual differences that may influence one’s ability to effectively utilize this thought control strategy.

**2.7.2.1 Ironic processing theory.** Wegner proposed the ironic processing theory (Wegner, 1992, 1994) to explain the paradoxical increase of unwanted thoughts in response to thought suppression efforts. The model posits that the very initiation of thought suppression activates monitoring processes that then serve to increase accessibility to the target thought. Specifically, there are two distinct cognitive processes that work in concert during thought suppression to keep unwanted cognitions out of awareness. One, termed the operating process, actively searches for distracter thoughts, while the other, termed the monitoring process, continually operates in the background, searching for signs that thought suppression attempts have failed. Any
lapse in mental control is picked up by the monitoring system, which signals the 
operating system to kick in. The operating process is intentional, requires conscious 
effort and taxes mental capacity. In contrast, the monitoring system is automatic and 
requires very little mental capacity. Ironic processing theory proposes that failed 
thought suppression (i.e., intrusions) results when cognitive resources are depleted, 
which incapacitates the operating system, but leaves the monitoring system intact.

2.7.2.2 “White Bear” paradigm. Ironic Processing Theory was largely developed based on experimental evidence demonstrating that asking participants to 
suppress a target thought led to an increased frequency of the thought. In a seminal 
study by Wegner, Schneider, Carter, and White (1987), participants were asked to both 
express and suppress a thought about a “white bear.” Half of the participants expressed 
the thought first (i.e., initial expression) while the other half suppressed the thought (i.e., 
initial suppression). Participants rang a bell each time a thought of a white bear intruded 
into their conscious awareness in both conditions. It was discovered that participants 
instructed to suppress a target thought (i.e., “do not think about a white bear”) ironically 
experienced an increased accessibility of the thought. Specifically, there was a rebound 
effect in which initial suppression of the target thought was associated with more target 
thought verbalizations in the subsequent express condition compared to initial 
expression.

There have been various modifications to the white bear experiment. In the 
typical thought suppression experiment, individuals are given a target thought or asked 
to bring a specific memory to mind which will become the target for suppression. 
Individuals are asked to monitor the occurrences of these thoughts, typically by ringing
a bell, or pressing a key on a keyboard. In the first phase individuals are asked to think about whatever they like for five minutes (monitor only). Next, half of the participants are asked to suppress a target thought for five minutes, while the other half continues to monitor only. In the last phase, all individuals monitor their thoughts (Wegner et al., 1987; see Abramowitz, Tolin & Street, 2001 for a review). Results of these studies generally indicate that compared to individuals who simply monitored their thoughts, individuals who attempt to suppress their thoughts reported an increased frequency of intrusions. Some studies have reported increased intrusions during the suppression period itself (i.e., enhancement effect), whereas other studies find that increased intrusions are only evident following a thought suppression condition (i.e., rebound effect; see Abramowitz et al., 2001; see Wenzlaff & Wegner, 2000 for reviews).

There is now an extensive body of literature indicating that use of thought suppression is associated with reduced ability to control one’s thoughts (see Rassin, 2005). Although the original white bear paradigm has received much criticism (e.g., Purdon & Clark, 2001), various studies have replicated the basic findings using diverse research designs (e.g., Bowers & Woody, 1996; Clark, Winton, & Thynn, 1993; Lavy & Van den Hout, 1990; Salkovskis & Campbell, 1994). Of particular support for the ironic processing model, the number of intrusive thoughts reported is found to dramatically increase when conditions of cognitive load are introduced (see Wenzlaff & Wegner, 2000 for review). Cognitive load refers to any task that taxes cognitive resources. This may include time pressure, stress, or engaging in an activity that demands one’s attention (Wegner, 1992, 1994). Thus, it is posited that taxing the
operating system allows thoughts that are monitored by automatic process to dominate awareness.

Despite replication over a number of studies, the rebound effect does not appear to be a robust finding, with many researchers failing to find either enhancement or rebound (Purdon & Clark, 2000; Purdon, Rowa, & Antony, 2005; Rassin, Muris, Jong, & Bruin, 2005; Wenzlaff & Wegner, 2000). In their meta-analysis, Abramowitz et al. (2001) concluded that a number of methodological factors can influence the magnitude of the initial enhancement and rebound effects. Methodological factors that have been suggested to increase the rebound effect include longer suppression period (e.g., several days), overt (versus covert) thought monitoring techniques, online (versus retrospective) thought monitoring, and non-discrete (e.g., thoughts relating to a story) versus discrete (e.g., specific word) suppression (Abramowitz et al., 2001).

2.7.2.3 Mechanisms involved in thought suppression. Thought replacement has been considered the primary mental strategy used in thought suppression (Wegner et al., 1987; Wenzlaff & Wegner, 2000). That is, thought suppression is achieved through a thought substitution method whereby individuals replace unwanted target thoughts with a distracter thought. Numerous studies support this proposition (see Rassin, 2005; Wenzlaff & Wegner, 2000 for reviews). For example, one study found that by asking participants to think of an alternative thought (i.e., red VW car) during the thought suppression period, participants were more successful (i.e., less intrusions) with thought suppression than when participants were given no specific distracter (Wegner et al., 1987).
It has also been proposed that individual differences play an important role for determining the extent that respondents exhibit increased intrusive thoughts in response to thought suppression attempts (Rassin, 2005). Of particular interest, individuals with more symptoms of depression demonstrate greater enhancement and rebound effects when attempting to use thought suppression than non-depressed controls (Conway, Howell & Giannopoulos, 1991; Howell & Conway, 1992; Wenzlaff et al., 1988). It has been suggested that because of the predominance of negative thoughts, depressed participants are more likely to choose negative distracter thoughts, which then serve as cues for retrieval of the to-be-suppressed thought. Difficulties with attention and concentration that characterize depression (Burt, Zembar, & Niederehe, 1995) may also tax conscious processes thus resulting in an increase of intrusive thoughts.

The finding that depressed individuals are less successful in their attempts to suppress unwanted memories is particularly problematic given depression is associated with highly negative thinking (Beck, 1967) and thought suppression is a commonly used strategy among individuals with depressive symptoms (Rassin, 2005; Wenzlaff & Wegner, 2000) and ruminative style (Szasz, 2009; Wegner & Zanakos, 1994). Given the apparent relationship between use of thought suppression and the occurrence of depressive symptoms, an understanding of the mechanisms involved in thought suppression is needed. Why do some individuals have difficulty using thought suppression while others do not? Currently the specific mechanisms involved in thought suppression are not clear.

2.8 Cognitive Inhibition and Thought Suppression
The current study proposed that enduring deficits in cognitive inhibition, apparent in depressed and vulnerable (i.e., trait ruminator) populations, may be an important individual difference factor contributing to one’s ability to successfully suppress emotional thoughts. This argument is based on Teasdale’s DA hypothesis, which states difficulty disengaging from negative mood states is a vulnerability factor for depression, along with a combination of findings from other research domains. Given thought suppression plays a critical role in emotion dysregulation and the distressing experience of intrusive thoughts, it is important to understand mechanisms that may contribute to success or failure with this strategy.

As reviewed earlier, thought suppression is a maladaptive emotion regulation strategy that is characterized by attempts to prevent unwanted thoughts from becoming the focus of one’s awareness and is associated with negative consequences such as the exacerbation of negative affect (Wenzlaff & Wegner, 2000) and paradoxical increases of intrusive thoughts (Clark, 2005; Rassin, 2005). There appears to be a logical connection between the mental control evident in traditional views on thought suppression (i.e., Wegner’s concept of diverting thoughts) and the executive control functions involved in directed forgetting (i.e., Anderson & Levy’s concept of neural deactivation). Although these two bodies of literature have been developed separately, and in some cases, have been thought to contradict one another (e.g., Rassin, Merckelbach, & Muris, 2000), the current study proposed that deficits in cognitive inhibition, measured by the Directed Forgetting task, may help explain the variations in enhancement and rebound effects typically found using Wegener’s white bear paradigm.
While Wegner’s (1987) paradoxical model of thought suppression proposes that executive processes contribute to the effective use of thought suppression, little work has elucidated specific executive processes that may contribute to this effect. A few studies have found that individual differences in working memory capacity predicted differential ability to use thought suppression, with poor working memory capacity predicting increased intrusions in a white bear experiment (Bomyea & Amir, 2011; Brewin & Beaton, 2002; Brewin & Smart, 2005; Conway & Engle, 1994). This suggests that poor executive control might explain why some individuals experience increased intrusions when attempting thought suppression. This is consistent with research indicating that depression is associated with deterioration in cognitive functioning (Au Yeung et al., 2006; Gotlib & Joormann, 2010; Joormann, 2009; Joormann, 2007) and increased intrusions (Clark, 2005) and is also in line with predictions from ironic processing theory (Wegner, 1992, 1994), which predicts that depletion of resources for the operating system will lead target thoughts tagged by the monitoring system to be released into awareness.

Ironic processing theory (Wegner 1992, 1994) may also serve as a basis to link ruminative style with inefficient thought suppression. Specifically, repeated recycling of negative thoughts and memories may act as a form of "cognitive load" which could serve to tax the effortful operating system and release target thoughts identified by the monitoring system. Evidence linking ruminative style with reduced working memory capacity (Davis & Nolen-Hoeksema, 2000; Joormann, Levens & Gotlib, 2011) and deficient inhibitory processes (Joormann, 2004, 2005, 2006; Whitmer & Banich, 2007; Whitmer & Gotlib, 2012) also provides rationale to propose ruminative style may be
associated with reduced ability to employ thought suppression. Additionally, trait rumination is associated with highly negative and well-integrated negative schemas (Nolen-Hoeksema, 1993). Thus, it is possible that in addition to weak control, high accessibility of negative distracter thoughts may lead to inefficient thought suppression, as has been suggested for depressed individuals (Conway et al., 1991; Howell & Conway, 1992; Wenzlaff et al., 1988).

The current study therefore extended research to specifically focus on individual differences in cognitive inhibition ability that may contribute to successful or unsuccessful control over unwanted sad thoughts. It was predicted that depression, ruminative style and weak pre-stressor cognitive inhibition would predict increased intrusions following post-stressor thought suppression attempts.

2.8.1 Executive deficit hypothesis. The hypothesis that weak cognitive inhibition predicts increased intrusions following attempts to suppress sad stimuli is in line with predictions from a recently proposed model to explain individual differences in the experience of intrusive memories related to trauma. The executive deficit hypothesis (Levy & Anderson, 2008) posits that the capacity to control unwanted memories in the presence of reminders is a function of individual differences in executive control. That is, relatively weak executive control will predict reduced ability to suppress traumatic memories. The model posits that weakness in cognitive inhibition, in particular, is a vulnerability factor for increased intrusions following a traumatic event.

Executive deficit hypothesis was developed from evidence that there is large variability in people's ability to inhibit material using the Think/No Think task.
(Anderson & Green, 2001, reviewed earlier). Although a meta-analysis concluded that the average negative control effect (i.e., inhibition) was relatively modest (6%), there was a wide range of effects with some individuals having inhibition effects as large as 60% and others having the opposite of facilitation effects as large as 40% (Anderson et al., 2004).

A handful of studies have found support for the executive deficit hypothesis, demonstrating that individual differences in cognitive inhibition abilities predict subsequent intrusions. Koster, Soetens, Braet and De Raedt (2008) found lower scores on a self-report attentional control questionnaire predicted increased intrusions during an experimental thought suppression task. Another study by Wessel Overwijk, Verwoerd, and de Vrieze, (2008) examined this question using a pre and post-stressor design. Specifically, a number of self-report measures of cognitive inhibition were administered prior to viewing a movie clip depicting disturbing images that were a proxy to traumatic stress. Researchers found that poor updating was associated with increased latencies for movie related words on a colour naming interference task in which participants were asked to name colours while ignoring the meaning of movie-related and neutral words.

The above results support the view that cognitive inhibition, as it relates to selective attention, predicts increased intrusions. Additional work has been carried out demonstrating that cognitive inhibition is associated with increased intrusions for individuals with OCD (Bannon, Gonsalvez & Croft, 2008; Harnishfeger, 1995).

Studies linking deficits in inhibitory control with other psychological disorders that are typically associated with intrusive thoughts provide support for the hypothesis that weak cognitive inhibition will predict poor ability to suppress sad or upsetting
thoughts. To date no studies have examined whether cognitive inhibition is associated with increased intrusions within the context of depression/vulnerability or whether weak inhibitory processes are associated with increased intrusions in response to thought suppression attempts.

2.9 The Current Study

The purpose of the current study was to explore how information processing biases might be related to emotion regulation. Specifically, the study examined how deficits in cognitive inhibition might contribute to dysfunctional regulation of negative affect, which is predictive of depression. I examined whether poor ability to inhibit information in memory, measured by the list-method version of the Directed Forgetting task, was associated with an increased use of two maladaptive emotion regulation strategies, namely, rumination and thought suppression. Although information processing biases and emotion regulation have typically been considered separately, understanding how these processes interact provided important new insights into depression vulnerability.

There is accumulating empirical evidence demonstrating that ruminative style is associated with weak cognitive inhibition (e.g., De Lissnyder et al., 2010; Joormann, 2006; Joormann & Gotlib, 2008; Whitmer & Banich, 2007). Additionally, a handful of studies have demonstrated that this association is maintained after controlling for depressive symptoms (e.g., Joormann, 2006; Joormann & Tran, 2009; Whitmer & Banich, 2007). However, these studies do not adequately control for the possibility that relationships between rumination and cognitive inhibition may be attributable to the presence of depression. As reviewed earlier, there is moderately strong evidence to
suggest that depression is associated with deficits in cognitive control (see Joormann & Gotlib, 2010; Joormann & Siemer, 2011) and the disorder is associated with changes in concentration and memory (Burt et al., 1995). Simply controlling for self-report symptoms of depression does not adequately correct for these potential confounds. Thus, the current study took an important step by screening for clinical depression and testing the relationships between cognitive inhibition and depression, high rumination and low rumination separately. This improved design allowed for better separation of the effects of clinical depression and trait rumination, as a vulnerability factor for the disorder.

Additionally, many of the studies reviewed examine cognitive inhibition in the context of selective attention and rely on fairly new experimental tasks. Given the majority of research focuses on the relationship between depression and processes involved in selective attention, it is advantageous to examine cognitive inhibition in the context of long-term memory. There is robust evidence for a memory bias in depression (see Mathews & MacLeod, 2005 for a review) and experimental paradigms, such as the Directed Forgetting task (Bjork, 1972), have been extensively tested over the past three decades. This dissertation expanded upon research by Joormann and Tran (2009), which demonstrated that ruminative style predicted reduced cognitive inhibition on a Directed Forgetting task. However, the current study examined participants who were depressed and high or low ruminators separately. Particular focus was placed on cognitive inhibition for negative and positive self-referent words, given that depression has been associated with enhanced negative and/or reduced positive processing biases (Beck, 1976; Clark et al., 1999).
An additional goal of the current study was to examine whether weak cognitive inhibition is a mechanism contributing to failed attempts at thought suppression. Do baseline cognitive inhibition scores on a Directed Forgetting task predict one’s ability to effectively suppress emotionally charged thoughts using a modified version of the white bear paradigm? While there has been research showing that directed forgetting predicts self-reported intrusions in OCD and PTSD (Bannon et al., 2008; Wessel et al., 2008, respectively), no research has examined whether poor performance on the Directed Forgetting task predicts increased intrusions in response to depressing/upsetting material. It was predicted that the effects of cognitive inhibition on thought suppression attempts would be most pronounced in the depressed and high ruminator groups, given there are proposed deficits in cognitive inhibition within these groups.

In order to examine the interplay between reduced cognitive inhibition and emotion regulation, the current study utilized a sample of 218 individuals recruited from university and community populations. Three groups were formed, depressed/high ruminator, high ruminator/nondepressed, and low ruminator nondepressed, with Group the main independent variable for the statistical analyses. Group selection was based on results from a diagnostic screening (SCID-I) and RRS scores and allowed for a clearer distinction between ruminative processes associated with a current depressive episode versus trait vulnerability for rumination. Respondents completed a battery of questionnaires and a baseline measure of mood, which were followed by a Directed Forgetting task to measure cognitive inhibition for negative and positive adjectives. All participants were shown a short sad movie clip to induce a sad mood state, followed by a second mood assessment. Then individuals were randomly assigned to one of two
mood regulation conditions. Half of the participants were assigned to a suppression condition, whereas the other half were assigned to a control (monitor only) condition. Then all participants monitored their thoughts for two separate five minute intervals. The number of movie-related thoughts that participants reported throughout the task (intrusions) provided an index for difficulty suppressing emotional thoughts. A final mood rating was obtained as another index of emotion regulation success between groups, along with measures of perceived difficulty with thought suppression.

Figure 1 below provides an overview of the current study. Specifically, it was proposed that trait vulnerability associated with ruminative style would be associated with biased information processing (i.e., deficient inhibitory control). The deficient inhibitory control subsequently contributes to inefficient emotion regulation and persistent sadness, increasing one's risk for developing a clinically depressive episode. This provided the conceptual basis for current hypotheses. It is notable that no assumptions about the causal nature of the relationship between ruminative style and cognitive inhibition were made because this research and theory are in their infancy. Thus, the predicted association between trait vulnerability and inhibition is depicted using a bi-directional arrow in the figure below.

2.10 Hypotheses

_Hypothesis 1 (Cognitive Inhibition Hypothesis)_

The low ruminator group was expected to demonstrate more effective cognitive inhibition than the high ruminator and depressed groups. It was hypothesized that:

_The low ruminator group would recall more negative and positive words in the remember condition versus forget condition in contrast to the high ruminator group._
Figure 1. Overview of the Current Study
and depressed groups, who would exhibit equivalent recall of forget and remember negative words only.

**Hypothesis 2 (Intrusions Hypothesis)**

The depressed and high ruminator groups who demonstrated weak inhibition for negative information were expected to exhibit more intrusions during thought suppression attempts compared with the low ruminator group. It was hypothesized that:

*Within the first time interval (T1), individuals in the low ruminator group would experience fewer movie related thoughts (i.e., intrusions) in the suppression condition compared to the monitor only condition. In contrast, depressed and high ruminator individuals, with higher CII-N scores, would experience more intrusions in the suppression compared to the monitor only condition.*

**Hypothesis 3 (Rebound hypothesis)**

The depressed and high ruminator groups with weak cognitive inhibition for negative information were expected to exhibit more frequent intrusions following thought suppression attempts compared with the low ruminator group. It was hypothesized that:

*Within the second time interval (T2) individuals who initially suppressed would experience more intrusions at T2 compared to those in the monitor only condition. Individuals in the depressed and high ruminator groups, with higher CII-N scores, would experience the highest number of intrusions.*

**Hypothesis 4 (Mood Hypothesis)**

Depressed and high ruminator groups with weak inhibition for negative information were expected to exhibit reduced recovery from a sad mood state compared with the low ruminator group. It was hypothesized that:

*Depressed and high ruminator participants in the suppression condition who exhibited higher CII-N scores would demonstrate the greatest deterioration in sad affect following the thought monitoring task, whereas low ruminator individuals in the monitor only condition would exhibit an improvement in affect, independent of CII-N scores.*

**2.11 Exploratory Analyses.**
Given very little is known about how cognitive inhibition relates to emotion regulation (Joormann, 2010), exploratory analyses were conducted to establish relationships between cognitive inhibition and habitual use of adaptive and maladaptive emotion regulation strategies. Thus the relationships between cognitive inhibition (CII-N and CII-P) and habitual use of two maladaptive emotion regulation strategies (i.e., thought suppression and emotion suppression), as well as one adaptive strategy (i.e., cognitive reappraisal), were explored in the current study. Habitual use of emotion regulation strategies was measured using validated self-report scales. This extended initial findings by Joormann and Gotlib (2010) who demonstrated that reduced use of habitual cognitive reappraisal was associated with weak cognitive inhibition using the NAPT.
3.0 Methods

3.1 Participants

A total of 222 respondents participated in the current study, however four participants were excluded from analysis due to computer malfunction on the experimental task, leaving a total of 218 participants in the sample. Participants were recruited through the introductory psychology pool ($n = 119; 54\%$), ads placed on Kijiji ($n = 65, 29.8\%$), posters placed around the university campus ($n = 25, 11.5\%$), university counselling services ($n = 2; 0.9\%$), and word of mouth ($n = 1, 0.5\%$; see Appendix A). Posters and kijiji ads specifically targeted individuals who were experiencing difficulties with mood in an effort to recruit respondents who were depressed. Additionally, in an effort to boost the ample size for the depressed group, participants endorsing current depressive symptoms were recruited through university residences ($n = 6, 2.8\%$). Specifically, students were administered the BDI-II in exchange for a slice of pizza. Participants who scored above 16 on the BDI-II and who consented to be contacted participated in the study. Of the participants recruited through residence screening, three participants were classified as depressed. Respondents recruited through kijiji, poster ads, residence, counselling services, and word of mouth were given $10 for compensation, while students recruited through the introductory psychology pool were given the option of one course credit or $10.

Some analyses investigated group differences between individuals who were clinically depressed, vulnerable for depression (i.e., non-depressed/high ruminators) and non-vulnerable for depression (i.e., non-depressed/low ruminators), which were labelled depressed, high ruminator and low ruminator groups, respectively. The depressed group
(n = 25) was selected based on Diagnostic and Statistical Manual of Mental Disorders-fourth edition (DSM-IV; American Psychological Association, 1994) criteria using the Structured Clinical Interview, Non-Patient, Research Version (SCID-I-N/P; SCID-I-N/P; First, Spitzer, Gibbon, Williams, & Janet, 2002). The high ruminator group (n = 49) was defined by individuals who did not meet criteria for clinical depression on the SCID-I (First et al., 1997) and who scored at or above the 66th percentile on the RRS (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 1993). Finally, the low ruminator group (n = 74) was defined by individuals who did not meet criteria for clinical depression on the SCID-I and scored at or below the 33rd percentile on the RRS. Use of the top and bottom third of the sample has been recommended given no cut off scores are available for the RRS. No participant who met diagnostic criteria for major depressive episode also scored in the low ruminator range on the RRS. Thus a depressed/low ruminator group could not be formed for this study. This is consistent with research that indicates rumination is also a symptom of depressive states (Nolen-Hoeksema et al., 2008).

3.2 Materials

3.2.1 Structured Diagnostic Interview (SCID-I-N/P). The SCID-I is widely used in both research and clinical settings and is considered the gold standard for diagnostic assessment (Shear et al., 2000). It is a semi-structured interview that systematically assesses Axis I disorders based on DSM-IV criteria (APA, 1994). Standardized wording of questions is employed, and extensive training is required in order to use this measure. Research on the SCID-I indicates it provides more valid diagnoses than less structured clinical intake interviews (First et al., 1997).
Additionally, semi-structured interviews are the best method for producing replicable, valid diagnoses (Basco et al., 2000; Segal, 1997). Administration of the SCID-I was limited to current and past depression, given the focus of the current study. Several studies have shown that the Depression Module of the SCID-I exhibits good reliability, with inter-rater reliability coefficients ranging from .66-.90 (Lobbestael, Leurgans, & Arntz, 2010; Segal, Kabacoff, Hersen, Van Hasselt, Ryan, 1995; Zanarini et al., 2000).

3.2.2 Ruminative Response Scale (RRS). Trait rumination was assessed using the 22-item Ruminative Response Scale (RRS; Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 1993; See Appendix B). The RRS is a subscale of the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991), which is a 71-item self-report instrument measuring thoughts, feelings and behaviours respondents typically engage in during depressive mood states. It contains four subscales, which include rumination, distraction, problem solving and dangerous behaviours. The rumination subscale (RRS) measures the extent to which individuals respond to depressive affect by repeatedly focusing on the symptoms, causes and consequences of depressed mood. Items are rated on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always).

The RRS exhibits strong psychometric properties and is used extensively to study rumination. The internal consistency of the RRS in the current study was excellent (Cronbach's α = .94). Previous research has also demonstrated the RRS exhibits good construct validity through moderate to high correlations between the RRS and other measures of negative affectivity, pessimism and depressive symptoms (Nolan et al., 1998; Nolen-Hoeksema et al., 1993). In addition the RRS exhibits predictive validity for the onset of major depressive episodes over a period of several months (Just
& Alloy, 1997). The RRS is relatively stable over time, with test-retest intervals ranging from a few weeks (coefficients = .48-.68) to several months (coefficients = .62-.80; Just & Alloy, 1997; Nolan et al., 1998; Nolen-Hoeksema et al., 1994; Nolen-Hoeksema & Morrow, 1991). While reliability is somewhat lower in samples that experienced significant changes in mood (Bagby et al., 2004), test-retest coefficients on the RRS are significant even after controlling for depressive symptoms (Bagby et al., 2004; Just & Alloy, 1997; Nolen-Hoeksema et al., 1994).

3.2.3 Beck Depression Inventory- Second Edition (BDI-II). Depressive symptoms were measured using the Beck Depression Inventory- Second Edition (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report measure of the intensity and frequency of depressive symptoms. It is an updated version of the Beck Depression Inventory and was designed to more closely reflect DSM-IV diagnostic criteria for major depressive disorder (DSM-IV; American Psychiatric Association, 1994). Items are weighted from 0-3 based on symptom severity, yielding a maximum score of 63. The internal consistency of the BDI-II in the current study was excellent (Cronbach's α = .93). The BDI-II has good construct validity, demonstrating moderate to high correlations with other measures of depression in both student (e.g., Beck et al., 1996; Dozois, Dobson & Ahnberg, 1998) and clinical samples (e.g., Beck et al., 1996; Dozois et al, 1998; Steer, Clark, Beck, & Ranieri, 1999). Test-retest reliability is also high, with correlations of .93 and .96 for time intervals ranging from 1-12 days (Beck et al., 1996; Sprinkle et al., 2002, respectively).

3.2.4 White Bear Suppression Inventory (WBSI). Dispositional use of thought suppression was measured using the White Bear Suppression Inventory (WBSI;
Wegner & Zanakos, 1994; see Appendix C). The WBSI is the most commonly used self-report measure of attempts to avoid unpleasant thoughts. The scale contains 15-items that are rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores reflect a greater tendency to use thought suppression. Wegner and Zanakos (1994) argued that repetitive attempts to control thoughts should result in hyper-vigilance for the occurrence of unwanted thoughts, as well as more depressive and anxious symptoms. The WBSI demonstrated excellent internal consistency in the current study (Cronbach's $\alpha = .90$). The measure has adequate construct validity, demonstrating moderate to high correlations with obsessional thinking ($r = .38-.40$), anxiety ($r = .53-.54$), depressive symptoms ($r = .44-.52$) and emotional avoidance ($r = .58$; Palm & Strong, 2007; Wegner & Zanakos, 1994). The WBSI also has adequate stability, with a test-retest reliability coefficient of .80 over a 12 week interval (Muris et al., 1996).

There has been some debate over the factor structure of the WBSI. Wegner and Zanakos (1994) reported a single factor solution using a principal axis extraction with varimax rotation, which accounted for 55% of the variance. This single-factor structure was replicated in a number of studies (e.g., Muris et al., 1996). However, some researchers argue the WBSI taps into two separate dimensions, which reflect thought suppression attempts and intrusive thoughts (e.g., Rassin, 2003; Schmidt et al., 2009). Specifically it is argued that higher scores on the WBSI represent failed attempts at thought suppression. Using item response theory (IRT), Schmidt and colleagues (2009) found that an intrusions factor, but not a suppression factor, was associated with increased depressive and anxiety symptoms. However, using the same IRT procedure,
but allowing items to inter-correlate, Palm & Strong (2007) found that 6 items, which contained content relating to both the use of suppression and the experience of intrusions, were particularly effective at predicting outcomes such as worry, obsessional thinking, depressive symptoms, and emotional avoidance. Additionally, Muris and colleagues (1996) found that a corrected version of the WBSI, which removed all 6 items pertaining to intrusions, maintained moderate to high correlations with depression ($r = .52$), anxiety ($r = .53$), obsession-compulsion ($r = .30$) and another measure of intrusive thoughts ($r = .36$). This study also found the full version of the WBSI predicted increased intrusive thoughts following a 12 week interval, as well as increased intrusions using the white bear experimental paradigm. The bulk of evidence thus suggests that the one factor solution for the WBSI is a valid measure of chronic thought suppression. Thus, the full measure was used in the current study.

3.2.5 Emotion Regulation Questionnaire (ERQ). The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003; see Appendix C) was used as a self-report measure of dispositional use of cognitive reappraisal and suppression strategies to regulate mood states. The scale contains 10 items rated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). High scores on the cognitive reappraisal subscale reflect frequent attempts to regulate emotions by altering one’s thoughts about a situation (e.g., “when I want to feel less negative emotion I change the way I am thinking about it”), whereas high scores on the suppression subscale reflect frequent attempts to prevent expression of emotion (e.g., “I control my emotions by not expressing them”).
The ERQ yields a 2 factor solution, based on both exploratory (Gross & John, 2003) and confirmatory (Gross & John, 2003; Melka, Lancaster, Bryant, & Rodriguez, 2011) factor analysis and the two subscales appear to be independent ($r = .01$, Gross & John, 2003; Melka et al., 2011; Moore, Zoellner, & Mollenholt, 2008). Previous research has demonstrated the ERQ exhibits adequate construct validity, with the reappraisal subscale exhibiting moderate to high positive correlations with measures of positive affect, coping, adaptive personality traits as well as negative correlations with depression symptoms. The suppression subscale is conversely related to increased negative affect, maladaptive personality traits, and increased depressive and anxious symptoms (Gross & John, 2003; John & Gross, 2004; Moore et al., 2008). Additionally, the measure shows adequate test-retest reliability over a 3 month interval (alpha = .69 for both scales; John & Gross, 2003).

The internal consistency of the ERQ Total Score was minimally acceptable (Cronbach's $\alpha = .68$). The cognitive reappraisal subscale exhibited good internal consistency (Cronbach's $\alpha = .86$), but the internal consistency for the suppression subscale was poor (Cronbach's $\alpha = .54$) and was lower than the range of .68-.83 reported in previous studies (John & Gross, 2003; Moore et al., 2008). Follow up analyses revealed that the reliability of the suppression subscale was substantially improved (Cronbach's $\alpha = .71$) by removing item 4 ("when I am feeling positive emotions, I am careful not to express them"). Removal of all other items resulted in a worsening of the internal consistency. Given that item four is qualitatively different from the other suppression items (i.e., it is the only item that refers to suppression of positive emotions) and its removal resulted in substantially improved internal consistency, a decision was
made to exclude item 4 from calculation of the ERQ Suppression subscale and Total Score.

3.2.6 Control of Unwanted Thought Scale (CUTS). The control of unwanted thoughts scale (CUTS; Rhyno, Clark & Purdon, 2003; see Appendix C) is a self-report instrument measuring perceived difficulty controlling unwanted thoughts (e.g., “I have unwanted thoughts”, “my unwanted thoughts can make it difficult to concentrate”) as well as negative reactions to poor control over thoughts (“I get really down on myself for not having control over my unwanted thoughts”, “unwanted thoughts can make me feel guilty”). The scale contains 40-items, which are rated on a 5 point Likert scale ranging from 0 (disagree/not applicable) to 4 (strongly agree). The CUTS was used as a validity check for the Directed Forgetting task to confirm that self-reported difficulty controlling thoughts corresponded with deficits in cognitive inhibition. The scale yields moderate associations with a measure of cognitive control strategies ($r = .34$) and is strongly related to habitual use of thought suppression ($r = .64$; Rhyno et al., 2003). The Cuts also predicts obsessional thinking ($r = .64$) above and beyond depressive and anxious symptoms (Rhyno et al., 2003). Reliability analysis demonstrated the internal consistency of the CUTS in the current study was excellent (Cronbach's $\alpha = .97$).

3.2.7 Visual Analogue Mood Rating Scales. Visual analogue scales (VAS) were employed at various points throughout the study to measure baseline mood as well as changes in mood state (see Appendix D). A VAS is a continuous scale that is commonly used to measure momentary changes in subjective attitudes or mood state. Respondents were presented with a list of mood terms (i.e., sad, happy, and depressed) along with 3 filler adjectives (i.e., spontaneous, curious, and lazy) and asked to indicate
the extent to which they endorse each item. Filler items were intended to help conceal
the purpose of measuring changes in mood. Each adjective corresponded to a 100mm
horizontal line, which was presented on a computer screen. Each adjective had anchors
0 (not at all) and 100 (extremely) at either end. Respondents were asked to drag the
mouse along the line to indicate the extent to which they are experiencing a given mood
at that moment. The distance between the beginning of the line and the marked vertical
line represented the participant’s score for that item. VASs are advantageous measures
of mood because they are quick and easy to administer, and are more sensitive to subtle
variations than discrete instruments such as Likert scales (Grant et al., 1999; Reipes &
Funke, 2008). Mood VASs have also exhibited high correlations with well-validated
mood rating scales (Maruff, Wood, & McArthur, 1994), thereby supporting their
construct validity.

3.2.8 Directed Forgetting Task. The list-method version of the Directed
Forgetting task (Bjork, 1972) was employed as a commonly used measure of cognitive
inhibition in memory. Specifically the list-method Directed Forgetting task assesses
inhibitory processes that are involved in motivated efforts to forget information. All
participants were instructed to memorize a list of 20 words. After the words were
committed to memory, an instruction stated the words were for practice purposes only
and were to be forgotten (i.e., forget condition). A second list of 20 words was then
presented, and participants were again instructed to remember the words. Following a
two minute distraction period, participants were instructed to recall as many words as
possible from either list.
The two lists of words (Lists A and B, see Appendix E) were counterbalanced in order to control for order effects. Each list contained 10 negative and 10 positive self-referent adjectives for a total of 40 words. Additionally, in order to ensure words were encoded deeply, participants were asked to rate each word for self-descriptiveness on a 5-point Likert scale from 1 (not at all characteristic of me) to 5 (completely like me). The words used in the current study were obtained from a list used in the self-referent encoding task (Derry & Kuiper, 1981; see Guyitt, 2011).

Participants were given the following instructions prior to presentation of the first list of words:

Please do your best to remember the following 20 words. You may be asked to recall them at a later time. After each word is presented, please rate how much the word describes you from 1 (not at all characteristic of me) to 5 (completely characteristic of me). Press NEXT to begin.

Each word was presented one at a time in the center of a computer screen for three seconds. Following the presentation of each word a prompt asked participants to rate the given word for self-descriptiveness on a scale from 1 (not at all characteristic of me) to 5 (completely characteristic of me). There was a five second interval following the presentation of the last word from the first list. This delay was followed by a “forget cue” which prompted participants to forget all of the words in the previously learned list. Instructions for the forget cue were as follows:

The previous list was for practice purposes only. Please make every effort to forget all the words in the previous list as they will interfere with memory for the upcoming list of words. Press NEXT to continue.

After participants pressed the next button a screen appeared with a remember cue for the second list. The instructions to remember the second list of 20 words were identical to the initial instructions asking them to remember the first list of words. Again, each
word was presented in the center of the computer screen for three seconds and a prompt to rate self-descriptiveness appeared after the presentation of each word. Participants were shown a blank screen for five seconds after the last word was presented. This delay was followed by a prompt asking participants to count backwards from 200 out loud for a period of two minutes. Respondents were asked to record the number they stopped at. This was intended to serve as a distraction task in order to reduce recency effects. Finally, participants were given recall instructions asking them to recall any words presented earlier, regardless of which list they were from. Instructions were as follows:

For the next 5 minutes please remember as many words as you can that were presented on the screen. Please try your best to recall ALL words presented, regardless of earlier instructions to forget certain words. All words presented are considered relevant. Please provide your answers in the space below.

Participants were given five minutes to enter as many words as they could recall on the computer. Recall for the first list of words is labelled the “forget” condition while recall for the second list of words is labelled the “remember” condition. The “directed forgetting effect” is defined as the difference between the number of words recalled in the “remember” versus “forget” conditions. For the purposes of the current study, a cognitive inhibition index was calculated based on proportional scores to measure relative cognitive inhibition ability. Specifically, the Cognitive Inhibition Index-negative (CII-N) measures ability to inhibit negative information, and the Cognitive Inhibition Index-positive (CII-P) measures ability to inhibit positive information. The CII-N is calculated by dividing the number of to-be-forgotten negative words recalled by the total number of negative words recalled plus one. Higher scores on the CII-N reflect deficits in cognitive inhibition of negative information, while lower scores reflect
successful inhibition. The same formula is used for CII-P scores except that negative words are replaced with positive words.

3.2.9 Sad mood induction (Stepmom). A six minute clip from the movie *Stepmom* was employed as a sad mood induction procedure. This clip has been successful for inducing sad mood in previous studies (e.g., Guyitt, 2011). Instructions prior to the movie stated:

The following film depicts a mother who is talking to her young children about dying. Please pay close attention to the characters and imagine how you would feel if your own mother or someone else who is very close to you was dying. Try your best to concentrate on this feeling. Press NEXT to begin.

The movie clip depicted a mother who is terminally ill and talking to her two young children about dying. The scene is set at Christmas time and the mother gives her children presents (i.e., a cape and a quilt) with photographs stitched in them to help the children remember happy times together. The emotion in the film builds with the mother first talking to her younger son, who has little understanding of what is happening and then closing with the mother and her older daughter hugging and crying together.

3.2.10 Positive mood induction (Mr. Bean). A six minute clip from the popular British comedy television show, Mr. Bean, was employed as a positive mood induction procedure. Previous studies have successfully induced positive emotions in participants using scenes from this show (e.g., Joormann, & Siemer, 2004). The main character, Mr. Bean is a childlike man who finds himself in many unusual situations as he attempts to find solutions to everyday activities. In the clip, Mr. Bean takes a trip to a public swimming pool. He is confused by many simple tasks, such as jumping off a high diving board. At the end of the clip he loses his swimming trunks after jumping
into the pool. Out of embarrassment he attempts to hide behind a pole, only to be observed by a group of school girls and a nun with shocked expressions. Instructions stated:

The following film depicts a man exploring a public swimming pool for the first time. Please pay close attention to the characters and imagine how you would feel if you were at the swimming pool watching. Try your best to concentrate on this feeling. Press NEXT to continue.

3.2.11 Thought monitoring task. The thought monitoring task is a variation of Wegner and colleagues' (1987) white bear suppression experiment and assessed thought suppression for emotionally upsetting material. Half the participants \( n = 108 \) were randomly assigned to a suppression condition, whereas the other half \( n = 110 \) were randomly assigned to a monitor only condition. Instructions in the suppression condition were as follows:

Please take a moment to notice your thoughts. A thought can be experienced as words or images (pictures). We now ask that for the next 5 minutes you try your best not think about anything relating to the movie. It is important that you make every effort to push any thoughts relating to the movie out of your mind. However, it is possible that thoughts or images from the movie will pop into your mind from time to time. Please press the spacebar each time a thought or image from the movie enters your mind.

Instructions for the monitor only condition stated:

Please take a few minutes to notice your thoughts. A thought can be experienced as words or images (pictures). You may think about whatever you like, which may or may not include thoughts about the movie you just watched. If you happen to think about the movie please press the spacebar each time a thought about the movie enters your mind.

After the first five minute interval, all participants were instructed to monitor their thoughts for a follow up five minute interval. In the suppression condition instructions stated:
For the next 5 minutes, we ask that you take a few minutes to notice your thoughts. You may now think of whatever you like, which may or may not include thoughts about the movie you just watched. If you happen to think about the movie please press the spacebar each time a thought about the movie enters your mind.

Participants in the monitor only condition received the same instructions as the suppression group, except the first sentence was replaced with “For the next 5 minutes we ask you to continue to notice your thoughts” and the word “now” was omitted from the second sentence.

The above paradigm provided a between-subjects measure of thought suppression ability. Thought suppression success was measured by the frequency of movie-related thoughts recorded (intrusions). Ineffective suppression was reflected by higher movie related intrusions at T1 (i.e., enhancement effect) or T2 (i.e., rebound effect). The enhancement effect measures actual suppression ability, whereas the rebound effect denotes the consequences of ineffective suppression.

3.2.12 Manipulation checks. Following the experimental thought suppression task participants were asked to indicate how much effort they exerted to suppress movie-related thoughts, using a scale ranging from 1 (no effort at all) to 10 (a great deal of effort), along with a scale assessing how difficult it was to suppress movie-related thoughts, ranging from 1 (not at all difficult) to 10 (extremely difficult). Additionally, an open-ended question inquired about participants’ beliefs about the purpose of the study to ensure the cover story was believed (see Appendix F).

3.3 Procedure

Participants completed an informed consent form (see Appendix F) and a participant information sheet (see Appendix G) at the beginning of the study. They
were told that the current study investigates "the role of mood and memory in movie watching," which served as a cover story to disguise the real purpose of the movie which was to induce a sad mood state. Examination of responses to the manipulation check revealed the cover up story was generally successful. Specifically, of those participants who provided responses \((n = 208)\), a very small minority indicated they were aware the purpose of the movie clips was to induce a sad or happy mood state \((n = 2; 1\%)\). However, most participants indicated they believed the study was investigating changes in mood. Specifically, the majority of participants indicated they believed the study examined associations between movies/external stimuli and changes in mood \((n = 126; 60.6\%)\), followed by general assessment of mood \((n = 21; 10\%)\), associations between mood and memory \((n = 17; 8\%)\), the association between mood and control of thoughts \((n = 6; 2.9\%)\), and one's ability to regulate mood \((n = 4; 2\%)\). Additionally, participants provided hypotheses that were independent of mood, which included measurement of thought control \((n = 12; 6\%)\) and other \((n = 20; 10\%)\). Therefore, caution should be taken when interpreting responses related to mood given participants were generally aware the study was investigating fluctuations in emotion. It should be noted, however, that information provided in participant answers and from informal conversations after completion of the study suggest participants did experience true feelings of sadness and happiness.

In order to reduce a potential carry-over effect from other questionnaires, participants completed the RRS scale first, along with a questionnaire assessing demographic information (see Appendix B and C, respectively). Next current and past depression modules from the SCID-I were administered to classify individuals into
depressed and non-depressed groups. The supervisor of this project, Dr. David Clark was available for consultation to ensure accuracy of diagnoses. Following the SCID-I interview, respondents completed a package of questionnaires, including the BDI-II, WBSI, CUTS, and ERQ. The initial questionnaire booklet took approximately 20-30 minutes to complete.

Next, all students were set up on a computer in a quiet room to complete the experimental portion of the study. First, individuals were presented with a set of VASs to assess baseline mood. Next, participants completed the Directed Forgetting task, which required participants to memorize lists of positive and negative self-referent words and rate them for self-descriptiveness. Next, participants were given a sad mood induction, using a six minute movie clip from the film *Stepmom*. Following the clip, participants completed a second set of VASs, along with filler questions relating to their attitude towards the movie. The filler questions prompted participants to rate how much they liked the movie, how interested they are in watching the full movie, and whether they found the actors believable on a scale from 1 (not at all) to 10 (extremely; See Appendix I). Next, half of the participants were assigned to the suppression condition and the other half were assigned to the monitor only condition and asked to monitor movie-related thoughts (see Appendix J). This was followed by a third set of VASs as well as self-report ratings of perceived effort and difficulty suppressing movie-related thoughts. A six minute comedic film clip from the movie *Mr. Bean* was next shown in order to counteract any lingering feelings of sadness and to bolster the cover story. Following administration of the comedic movie clip, participants completed a fourth set of VASs. Finally, participants were asked to provide open-ended responses to the
question “what do you think the purpose of the study was?” which served as a last manipulation check (see Appendix F). Participants were debriefed upon completion of the study (see Appendix K).
4.0 Results

4.1 Data Screening and Conditioning

Four participants were deleted due to computer malfunction, leaving a final sample size of 218. One participant had more than 20% missing data on the CUTS, thus total sample mean substitution was used for a CUTS score. Additionally, two participants had missing data on the year of university variable, thus mode substitution was used to replace scores for these participants. There was no other missing data on any of the pre-experimental questionnaires or computer-related tasks.

The pre-experimental questionnaires were first screened for univariate outliers (i.e., scores greater than 3 SDs from the mean). There were two outliers on the BDI-II ($z$ score = 3.11 and 4.1). All outliers were adjusted to be one raw score higher or lower than the most extreme score falling within the normal distribution for that variable. This procedure is recommended by Tabachnick and Fidell (2007) in order to maximize power while reducing the influence of outliers. There were no univariate outliers on any of the other pre-experimental questionnaires. Inspection of the data revealed that the BDI-II variable was positively skewed (i.e., skewness divided by its standard error = 6.91), which indicated individuals scored in the lower range of scores on the BDI-II compared with the higher range. This was expected and reflects the low proportion of individuals in the population who endorse depressive symptoms. Thus, no correction to the distribution was made. All other pre-experimental questionnaires were normally distributed based on SD, skewness, and kurtosis scores. Additionally, visual inspection indicated the assumption of linearity was met in all cases.
The sad and happy VAS ratings over the four time periods were next examined for univariate outliers. There were two outliers for the happy VAS at T3 (z scores = 3.02) and two for the happy VAS at T4 (z scores = -3.6). There was also two univariate outliers for sad VAS at T4 (z scores = 3.15 and 4.12). Examination of the data indicated that for one participant extreme scores on the happy VAS at T3, and the sad and happy VAS at T4 were likely due to high levels of depression. Responses for all other outliers appeared to be random, therefore, outliers were reassigned values that were one raw score higher or lower than the most extreme score falling within the normal distribution for that variable.

Assumptions of normality were next tested for each of the sad and happy VASs based on skewness and kurtosis scores (i.e., skewness/kurtosis divided by its standard error term is less than or equal to 3; Tabachnick & Fidell, 2007). Examination of the data revealed mild skewness and kurtosis for some variables. Specifically, sad VAS at T1 and T3 was positively skewed (i.e., skewness divided by its standard error = 3.59, 7.39, respectively) and sad VAS at T4 was negatively skewed (i.e., skewness divided by its standard error = -5.2). Sad VAS at T1 also demonstrated a somewhat flat distribution (i.e., kurtosis divided by its standard error = -3.18). Happy VAS at T2 demonstrated peaked distributions (i.e., kurtosis divided by its standard error = -3.21, respectively). Square root, log, and inverse transformations were applied for each of the VASs across the four time periods. These transformations generally led to a worsening in the distributions, thus a decision was made to retain the raw scores for analysis.

Next, the thought suppression variables (i.e., thoughts at T1 and T2, difficulty and effort ratings) were inspected for violations of assumptions. Examination of the
scores revealed there were three outliers for T1 thoughts (z scores = 3.61, 3.74, and 12.52) and three outliers for T2 thoughts (z scores = 3.06, 4.53, and 9.75). There were no other outliers for the thought suppression variables. Inspection of the data revealed the outliers were from the depressed group, which likely contributed to extreme scores. The three outliers for T1 Thoughts and two outliers for T2 thoughts were reassigned values that were one raw score higher or lower than the most extreme score for that variable, falling within the normal distribution. One outlier for T2 thoughts was left unchanged since the score was continuous with the rest of the distribution and fell within the cut-off of 3.29 SDs recommended by Tabachnick and Fidell (2007).

The thought suppression variables were next examined for normality assumptions. Both T1 and T2 thoughts were highly skewed (i.e., skewness divided by its standard error = 15.08, and 13.08, respectively), with flat distributions (i.e., kurtosis divided by its standard error = 24.63, and 16.8, respectively). Three separate transformations were attempted (i.e., log, square root, and inverse). The log transformations resulted in the best solution, and corrected for difficulties with both skewness and kurtosis on the T1 and T2 Thoughts variables. For ease of interpretability, raw scores were utilized if there was no difference in the findings of the relevant analyses, whereas log-transformed variables were utilized when differences emerged. Difficulty and effort ratings were normally distributed and visual inspection suggested there were no problems with non-linearity for any of the thought suppression variables.

Finally, scores on the directed forgetting task were examined for univariate outliers and normality. There was one outlier for the List 2 (i.e. to-be-remembered list) variable (z score = 3.18), two outliers for the List1_neg (i.e., to-be-forgotten negative
words) variable (z scores = 3.14 and 3.77) and one outlier for the List2_neg (i.e., to-be-remembered negative words) variable (z score = 4.07). The outliers for List 2 and List1_neg were left unchanged since they were continuous with the rest of the distribution and were within the cut-off of 3.29 recommended by Tabachnick and Fidell (2007). The outlier on the List2_neg variable was reassigned a value that was one score lower than the most extreme score within the distribution given the score was more extreme and discontinuous with the distribution.

4.2 Participant Characteristics

The overall sample mean age was 23.37 (SD = 8.01, range = 16-56). Descriptive statistics for participant characteristics are presented in Table 1. There was a higher proportion of females. The majority of participants self-identified as Caucasian, whereas a minority of participants self-identified as Asian, Aboriginal, Black, or Other. There was variability in the number of years participants attended university, with a mixture of students from first year, second year, third year, fourth year, and greater than four years of university participating. Additionally, approximately 16% of participants indicated they were not currently attending post-secondary school.

4.2.1 Analysis of Gender. A chi square analysis determined there was significantly more women compared with men in the sample, $\chi^2 (1, 217) = 16.51, p < .001$. Correlations between gender and outcome variables of interest (i.e., CII, T1 and T2 Thoughts, and sad mood recovery) were run to assess the potential need to include gender as a factor in the proposed models (See Table 2). Males were coded as 0 and females were coded as 1. Analyses for difficulty and effort ratings included only those individuals who were assigned to the suppression condition ($n = 108$) since these were
the only individuals who were asked to suppress their thoughts. A review of the analysis revealed that gender was unrelated to cognitive inhibition, T1 and T2 thoughts, or effort ratings. However, gender demonstrated a significant positive association with difficulty ratings and sad mood recovery. A decision was made to include gender as a variable in any models with sad mood recovery and difficulty ratings as the DV.

4.2.2 Analysis of University Attendance. Correlational analyses were conducted to determine associations between university attendance (1 = attending university, 0 = not currently attending university) and outcome variables of interest (i.e., CII, T1 and T2 Thoughts, and sad mood recovery, effort, and difficulty ratings) in order to assess the potential need to control for university attendance in the models. Analyses for effort and difficulty level included only those individuals who were assigned to the suppression condition. Unfortunately, no information was collected to determine whether individuals who indicated they were not currently attending university had previous post-secondary education. Results are presented in Table 2. There were no significant associations evidenced. Thus, university attendance was not included as a covariate in any of the subsequent analyses.

4.3 Descriptive Statistics

4.3.1 Pre-Experimental Questionnaires. Descriptive statistics for the pre-experimental questionnaires (i.e., RRS, WBSI, BDI-II, ERQ-reappraisal, ERQ-suppression, and CUTS) are presented in Table 3 and correlational analyses between these measures is presented in Table 4. Descriptive statistics for the CII are also presented in Table 3. Consistent with previous research (Nolen-Hoeksema et al., 2008; Rhyno, 2008; Rhyno et al., 2003), the RRS exhibited strong positive correlations with
the BDI-II, WBSI, and CUTS. Additionally, the CUTS was strongly and positively associated with both the BDI-II and WBSI. Somewhat surprisingly, the ERQ reappraisal and suppression subscales were not significantly associated with any of the other measures, which was contrary to previous research by Joormann and Gotlib (2010) who found the RRS was negatively associated with the ERQ suppression subscale.

4.3.2 Thought Control Variables. Correlational analyses were also used to examine patterns of relationships between the cognitive control measures (i.e., CII and CUTS) and thought suppression variables (i.e., T1 and T2 thoughts, effort and difficulty ratings), which were broken down by suppression condition (i.e., suppress, monitor only). A review of the results, presented in Table 5, revealed a negative association between CII and T1 thoughts within the suppression condition. CII was unrelated to T1 thoughts in the monitor only condition or with T2 thoughts, regardless of condition. This indicated that, contrary to the predictions, which hypothesized weak cognitive inhibition would be associated with increased intrusions at T1 and T2 during thought suppression attempts, superior cognitive inhibition was associated with more movie-related intrusions, and was unrelated to movie-related intrusions following initial thought suppression attempts.

Perceived difficulty with cognitive control, as measured by the CUTS, was positively associated with T1 and T2 thoughts, regardless of assignment to suppression or monitor only conditions. Thus, individuals who reported difficulty and distress with controlling unwanted thoughts were more likely to actually endorse more movie-related intrusions during the thought monitoring task. Interestingly, there was also a significant negative association between the CUTS and sad mood recovery, which was only evident
in the suppression condition. Thus, whereas perceived difficulty controlling thoughts was associated with increased movie-related intrusions in response to both suppression and thought monitoring, reduced recovery from sad mood was only evident for those individuals who were attempting to suppress movie-related thoughts.

A review of the results also demonstrated that, contrary to predictions, there were negative associations between CII and both effort and difficulty ratings, for those individuals who were assigned to the suppression condition. In contrast, there was a positive correlation between CUTS and both effort and difficulty ratings for those individuals who were instructed to suppress movie-related thoughts. Therefore, results suggested that contrary to predictions, efficient inhibition was associated with increased effort and difficulty with suppression efforts. However, as would be expected, self-reported difficulty and distress in controlling unwanted thoughts was associated with higher ratings of self-reported effort and difficulty with thought suppression.

4.3.3 Mood Variables. Descriptive statistics for the sad and happy VASs at T1, T2, T3, and T4 are presented in Tables 6 and 7, respectively. A discussion of differences in sad and happy VASs across time is provided in a later section.

4.4 Creation of Experimental Groups.

Experimental groups were created that included both depressed and nondepressed individuals scoring within the top or bottom third of the sample on the RRS. The three groups of interest for the study were the depressed/high ruminator ($n = 25$), nondepressed/high ruminator ($n = 49$), and nondepressed/low ruminator ($n = 74$) groups, herein referred to as the depressed, high ruminator and low ruminator groups, respectively.
4.5 Validity of SCID Diagnosis for Depression.

To determine the concurrent validity of the SCID depression diagnosis, the experimental groups were compared on the BDI-II and VASs. A one-way ANOVA revealed there were significant group differences on the BDI-II, $F(2, 145) = 136.80, p < .001, \eta^2_p = .65$. Least significant differences (LSD) post hoc comparisons indicated that all groups differed from one another. Means and standard deviations on the BDI-II by group are presented in Table 3. The depressed group exhibited the highest BDI-II scores, followed by the high ruminator group, and then the low ruminator group (all $p$'s < .001).

Two one-way ANOVAs also examined group differences on T1 sad and happy VASs (i.e., baseline sadness and happiness ratings). There were significant group differences on both sad and happy VASs, $F(2, 145) = 23.66, p < .001, \eta^2_p = .25; F(2, 145) = 30.43, p < .001, \eta^2_p = .30$, respectively. LSD post hoc comparisons for T1 sad VAS demonstrated that all groups differed significantly from one another. Specifically, the depressed group reported the highest rating of sadness, followed by the high ruminator group, and then the low ruminator group ($ps < .001$; See Table 6). The depressed group also demonstrated the lowest T1 happy VAS, with the high ruminator group falling in the mid-range, and the low ruminator group demonstrating the highest T1 happy VAS ratings ($ps < .001$, See Table 7). Together, findings support the validity of the SCID diagnostic classification of depression.

4.6 Descriptive Statistics for the Experimental Group Sample.

Chi square analyses were conducted to determine whether there were demographic differences between the experimental groups. Analyses revealed there
were significant gender differences, χ²(1, 147) = 14.39, p < .001. Pairwise comparisons were used to investigate the source of group differences, which applied Bonferroni corrections to adjust for the three group comparisons (i.e., α = .02). A review of the results revealed a higher proportion of females in the high ruminator group compared with the low ruminator group, χ²(1) = 13.58, p < .001, whereas there were no gender differences between the depressed group and either the high or low ruminator groups. There were no group differences based on age, F(4, 213) = 1.01, p = .40, ethnicity, χ²(16) = 26.08, p = .05, or years of university, χ²(36) = 29.33, p = .78. Thus, a decision was made to include gender as a covariate for all analyses.

4.6.1 Pre-Experimental Questionnaires – Experimental Group Sample.

Descriptive statistics for the CII and pre-experimental questionnaires (i.e., RRS, BDI-II, WBSI, ERQ-reappraisal, ERQ-suppression and CUTS) are presented in Table 3 and correlations between the measures are presented in Table 4. Both analyses are based on the experimental group sample of 148 participants scoring in the top and bottom third of the sample on the RRS. A review of the results demonstrated that the pattern of associations evidenced using the overall sample was replicated with the experimental group sample.

Two one-way ANOVAs were conducted to determine whether the experimental groups differed on the measures of thought control (i.e., WBSI, and CUTS). A review of the analyses revealed significant group differences on both the WBSI and CUTS, F(2, 145) = 33.08, p < .001, η² = .31, and F(2, 145) = 120.32, p < .001, η² = .62, respectively. LSD post-hoc comparisons revealed that both the depressed and high ruminator groups had significantly higher WBSI scores compared with the low
ruminator group \( (ps < .001) \), whereas the depressed and high ruminator groups did not differ from one another \( (p < .001) \). This finding is consistent with previous research linking thought suppression with ruminative style (Erskine et al., 2007; Rude et al., 2007; Szasz, 2009), an association evident in both nondepressed and depressed individuals. In addition, LSD post hoc comparisons demonstrated that each of the experimental groups differed from one another on the CUTS. Specifically, the depressed group exhibited the highest CUTS scores, followed by the high ruminator group, and then the low ruminator group \( (ps < .001) \). This indicates both depressed and nondepressed high ruminators exhibited perceived difficulty controlling unwanted thoughts compared with low ruminator individuals who perceived less difficulty controlling these thoughts.

4.7 Verification of the Negative and Positive Mood Induction, Reactivity, and Recovery.

4.7.1. Experimental Group differences in Mood Induction. Two separate repeated measures ANOVAS were employed to investigate the success of the sad and happy mood inductions for participants in the experimental group sample \( (n = 148) \). Time \( (T_1, T_2, T_3, T_4) \) was the within-subject factor and sad and happy VASs were the dependent variables. Pairwise comparisons were used to follow up significant differences in VAS scores across time intervals. Descriptive statistics for sad and happy VASs across time are presented in Tables 6 and 7, respectively.

Examination of the ANOVA results for the sad VASs revealed the assumption of sphericity was violated (Mauchley's test), \( \chi^2 (5) = 47.06, p < .001 \), thus degrees of freedom were corrected using Greenhouse Geisser \( (e = .82) \). There was a main effect of
time, $F(2.47, 363.47) = 212.90, p < .001, \eta_p^2 = .59$, with significant linear, $F(1, 147) = 140.58, p < .001, \eta_p^2 = .49$, quadratic, $F(1, 147) = 283.46, p < .001, \eta_p^2 = .66$, and cubic trends, $F(1, 147) = 198.47, p < .001, \eta_p^2 = .57$ (See Figure 2). Pairwise analyses were utilized to follow up significant differences between sad VASs across time intervals. The linear trend indicated that sad VASs were lower at T4 ($M = 17.35, SD = 20.96$) compared with T1 ($M = 29.45, SD = 28.11$), demonstrating that individuals reported less sadness at the completion of the study compared with baseline. The quadratic trend indicated that sad VASs were higher following the sad mood induction at T2 ($M = 67.22, SD = 25.74$) compared with both T1 ($p < .001$) and T3 ($M = 31.37, SD = 24.35, p < .001$), whereas T1 and T3 scores did not significantly differ from one another ($p = .29$). These findings indicated the sad movie clip was successful in inducing sad affect. Additionally, the thought monitoring task appeared to be effective for modulating sad affect following the sad mood induction, with sad VASs returning to baseline following this task. The cubic trend indicated that the sad VASs increased from T1 to T2, returned to baseline at T3, and subsequently dropped below baseline sadness at T4. Analyses thus suggested the sad mood induction was successful.

Examination of the ANOVA results for the happy VASs indicated the assumption of sphericity was violated (Mauchley's test), $\chi^2 (5) = 29.58, p < .001$, thus degrees of freedom were corrected using Greenhouse Geisser ($\varepsilon = .89$). There was a main effect of time, $F(2.68, 393.51) = 119.34, p < .001, \eta_p^2 = .45$, with significant linear, $F(1, 147) = 71.29, p < .001, \eta_p^2 = .33$, quadratic, $F(1, 147) = 228.51, p < .001, \eta_p^2 = .61$, and cubic trends, $F(1, 147) = 58.06, p < .001, \eta_p^2 = .28$ (See Figure 3). Post
Figure 2. Sad VAS scores at Time 1, Time 2, Time 3, and Time 4.
Figure 3. Happy VASs at Time 1, Time 2, Time 3, and Time 4
hoc analyses were conducted using pairwise comparisons. The linear trend indicated that happy VASs were higher at T4 ($M = 70.81, SD = 20.10$) compared with baseline at T1 ($M = 61.00, SD = 22.02, p < .001$). The quadratic trend indicated there was a drop in happy VASs at T2 ($M = 37.66, SD = 19.72$) compared with T1 and T3 ($M = 55.59, SD = 18.92, ps < .001$). This indicates that the sad mood induction was successful in reducing positive affect. Additionally, this pattern suggested the thought monitoring task was an effective strategy for repairing positive affect. The cubic trend indicated that happy VASs dropped from baseline at T2, and subsequently increased at both T3 and T4. Together, these findings supported the validity of the positive mood induction.

4.7.2 Experimental Group differences in reactivity and recovery from sad mood induction. Examination of differences in reactivity and recovery from the sad mood induction were explored as a further manipulation check. Reactivity to the sad mood induction (i.e., ipsative changes in mood in response to the sad movie-clip) was labelled “sad mood reactivity” and was represented by a change score (i.e., sad VAS at T2 minus T1). Higher scores indicated greater reactivity to the sad mood induction. Descriptive statistics for sad mood reactivity by experimental group are presented in Table 8. There were significant group differences in sad mood reactivity, $F(2, 145) = 7.66, p = .00$, $\eta_p^2 = .10$. LSD post hoc comparisons revealed the depressed group was less reactive to the sad mood induction than the high and low ruminator groups ($p = .01$ and $p < .001$, respectively), whereas there was no difference in sad mood reactivity between high and low ruminator groups ($p = .34$).

Experimental group differences in recovery from the sad mood induction were explored by examining change scores (i.e., sad VAS T2 minus T3) that represented the
extent to which individuals' sad mood dropped following the thought monitoring task, (labelled “sad mood recovery”). Higher scores indicated greater recovery. Descriptive statistics for sad mood recovery by experimental group are presented in Table 8. Analyses from the one-way ANOVA revealed significant group differences in sad mood recovery, $F(2, 145) = 3.73, p = .03, \eta^2_p = .05$. LSD post hoc comparisons demonstrated that the depressed group exhibited less recovery from T2 (following the sad mood induction) to T3 (following the thought monitoring task) compared with both the high and low ruminator groups ($ps = .01$ and .02, respectively). In contrast, the high and low ruminator groups did not differ significantly from one another ($p = .56$).

Finally, group differences in reactivity to the positive mood induction were explored using change scores (T3 minus T3 sad VASs; labelled “positive mood reactivity”). Descriptive statistics for positive mood reactivity by experimental group are presented in Table 8. A review of the results demonstrated that there were significant group differences in positive mood reactivity, $F(2, 145) = 3.43, p = .04, \eta^2_p = .04$. LSD post hoc comparisons revealed that the high ruminator group was less reactive to the positive mood induction compared with both the depressed and low ruminator groups ($ps = .03$), whereas the depressed and low ruminator groups did not differ ($p = .63$).

4.8 Analysis of words recalled for the directed forgetting task (Hypothesis 1).

As described previously, Hypothesis 1 predicted the low ruminator group would recall more negative and positive words in the remember condition versus the forget condition, in contrast to the high ruminator and depressed groups, who would exhibit equivalent recall of forget and remember negative words only.
Participants were presented with both list A and B, which contained 10 positive and 10 negative words each (40 words in total). The lists were counterbalanced so that half the participants saw list A first and the other half saw list B first. Memory for list A (positive and negative) and list B (positive and negative) were tested for equivalence using paired sample t-tests. Descriptive statistics are presented in Table 9 by experimental group. A review of the analyses indicated that memory for the two lists was not equivalent. Specifically, fewer words were recalled from list A negative compared with list B negative ($p = .02$). Likewise, fewer words were recalled from list A positive compared with list B positive ($p = .02$). Given that list A and B were counterbalanced, the differences between the lists were not expected to be problematic.

A 2 (list) x 2 (valence) x 3 (group) mixed factor ANOVA was performed to test the first hypothesis. List (forget, remember) and valence (negative, positive) were within-subject factors, whereas group (depressed, high ruminator, low ruminator) was the between-subjects factor. The dependent variable was number of words recalled. Results from the repeated measures ANOVA are presented in Table 10. The Levene’s tests for the between-subjects variables were non-significant, indicating that the assumption of homogeneity of variance was met. Box’s $M$ was also non-significant, indicating the assumption of equivalence between covariance matrices was met, Box’s $M = 28.35, F (20, 22031.21) = 28.35, p = .14$. Analyses revealed a significant main effect of list, such that more words were recalled from the remember condition compared with the forget condition. Thus, the directed forgetting effect was evident, demonstrating that overall, individuals were able to successfully inhibit to-be-forgotten words. There was also a main effect of valence, which demonstrated more positive
words were recalled compared with negative words. Additionally, there was a
significant two-way interaction for list x group. There were nonsignificant findings for
all of the other main and interaction effects.

LSD post hoc analyses for the list x group interaction revealed partial support for
Hypothesis 1 (see Figure 4). Specifically, the high ruminator group did not differ in the
number of words recalled from the remember and forget conditions, whereas the low
ruminator group recalled more words from the remember condition compared to the
forget condition. Contrary to predictions, the depressed group also recalled more words
from the remember condition compared to the forget condition. Thus, the results
indicate that both the depressed and low ruminator groups demonstrated effective
cognitive inhibition (i.e., the directed forgetting effect), whereas the high ruminator
group demonstrated deficiencies in cognitive inhibition (i.e., failure to demonstrate the
directed forgetting effect). The failure to find a significant three-way interaction for
group x valence x list indicates the relative inability of the high ruminator group to
inhibit to-be-forgotten words was not dependent on valence. Therefore, subsequent
analyses focused on cognitive inhibition, independent of valence.

4.9 Creation of the Cognitive Inhibition Index variable.

The cognitive inhibition index (CII) was defined as a proportional score to
represent individuals’ performance on the Directed Forgetting Task. Given previous
analyses demonstrated that valence did not influence group differences in inhibition
ability, scores were collapsed across valence. Thus, all predictions for Cognitive
Inhibition-Negative (CII-N) and Cognitive Inhibition-Positive (CII-P) were adjusted to
reflect overall inhibition ability (i.e., CII) by collapsing across valence. The cognitive
Figure 4. Group x list interaction for predicting number of words recalled on the Directed Forgetting Task.
To test the validity of the CII variable, a univariate ANOVA was utilized to examine whether group differences in memory for to-be-forgotten and to-be-remembered words persisted when using this proportional score. Experimental group (depressed, high ruminator, low ruminator) was the independent factor and CII was the dependent variable. CII group differences were expected, with the depressed and high ruminator groups exhibiting higher CII compared with the low ruminator group. The Levene’s test was non-significant, $F(2, 145) = 2.35, p = .10$. Analyses revealed there were no significant group differences in CII, $F(2, 145) = 1.74, p = .18, \eta^2_p = .02$. This indicated the experimental groups did not differ from one another when utilizing the proportional score for inhibition ability, which controls for general memory recall. Therefore, analysis suggested the continuous measure of cognitive inhibition was less sensitive to group differences compared with the univariate ANOVA design. Although there were no group differences using the CII, a decision was made to proceed with this more conservative measure of cognitive inhibition since previous studies have utilized proportional scores based on the directed forgetting task (e.g., MacRae, Bodenhausen, Miln, & Ford, 1997).

4.10 Analysis of Total Negative Thought Intrusions (Hypotheses 2 and 3).

As presented previously, Hypothesis 2 posited that within the first time interval (T1) individuals in the low ruminator group would experience fewer movie-related thoughts (i.e., intrusions) in the suppression condition compared to the monitor only condition. In contrast, depressed and high ruminator individuals, with higher CII-N scores would experience more intrusions in the suppression compared to the monitor only condition. According to Hypothesis 3, participants who initially suppressed would
experience more intrusions at T2 compared to those in the monitor only condition. Moreover, individuals in the depressed and high ruminator groups, with higher CII-N scores, would experience the highest number of intrusions. As stated previously, CII-N was replaced with predictions for the overall score on cognitive inhibition (CII) collapsed across valence for both Hypotheses 2 and 3.

A 2 (time) x 3 (group) x 2 (condition) x 1 (CII) repeated measures ANOVA with continuous and categorical predictors was employed to test Hypotheses 2 and 3. Time (T1, T2) was a within-subjects factor. Group (depressed, high ruminator, low ruminator) and condition (suppress, monitor only) were between-subjects factors, and CII was a between-subjects continuous predictor. The dependent variable was frequency of movie-related thoughts. Since initial data screening indicated that the thoughts variables were skewed, preliminary analyses were run for both raw and log transformed scores. Log transformation was retained in the subsequent analyses because the pattern of results from the ANOVA differed using raw versus log transformed scores. Initial analyses demonstrated that gender did not contribute significantly to the pattern of findings, thus it was not included as a covariate in the final model, which is presented below.

Descriptive statistics for the log transformed and raw scores for T1 and T2 thought scores are presented in Tables 11 and 12, respectively, which are broken down by group (n = 148). Box’s $M$ was nonsignificant, Box’s $M = 26.18, F(15, 23167.74) = 1.67, p = .05$, indicating the assumption of equivalence of covariance matrices was met. Levene’s test was nonsignificant for T1 thoughts, $F(5, 142) = 1.12, p = .35$, however, it was significant for T2 thoughts, $F(5, 142) = 3.03, p = .01$. This indicated the
assumption of homogeneity of variance was not met for T2 thoughts. Given the low $f_{\text{max}}$ value (3.03), this was not considered problematic for analysis (Tabachnick & Fidell, 2007).

Results of the ANOVA are summarized in Table 13. Results of the analyses revealed significant main effects for time, such that more thought intrusions were reported at T1 compared with T2. There was also a main effect of group. Post hoc analysis using pairwise comparisons demonstrated that both the depressed and high ruminator groups exhibited a higher number of thought intrusions compared with the low ruminator group, whereas the depressed and high ruminator groups did not significantly differ from one another. Analyses also revealed a significant main effect of CII, which was qualified by a time x CII interaction. Follow up correlational analyses revealed CII was negatively associated with thought intrusions at T1 ($r = -0.27$, $p < .001$), but was not associated with thought intrusions at T2 ($r = -0.05$, $p = .55$). Thus, the direction of the relationship between CII was opposite to what was predicted. Specifically, more efficient cognitive inhibition was associated with more intrusions, which was evident during the first time interval. All other analyses yielded non-significant findings. Therefore, while there was no indication that condition (suppress or monitor only) interacted with any of the variables to predict intrusion frequency, evidence suggested participants reported more intrusions if they were in the depressed or high ruminator groups, compared with those in the low ruminator group. Additionally, more efficient inhibition was associated with heightened intrusions, which was only evident during the first time interval.

4.11 Analysis of Sad Mood Recovery (Hypothesis 4)
As indicated previously, it was predicted in Hypothesis 4 that depressed and high ruminator participants in the suppression condition who exhibited higher CII-N scores would demonstrate the greatest deterioration in sad affect following the thought monitoring task, whereas low ruminator individuals in the monitor only condition would exhibit an improvement in affect, independent of CII-N scores. Once again, CII-N was replaced with the overall score on cognitive inhibition (i.e., CII) given that valence was not found to be significant for the directed forgetting task. High scores on the CII represented poor inhibition, while low scores represented successful inhibition. Initial analysis revealed gender did not significantly contribute to the model, thus it was not included as a covariate in the final model.

A 3 (group) x 2 (condition) x 1 (CII) one-way ANOVA with continuous and categorical predictors was conducted to test Hypothesis 4. Group (depressed, high ruminator, low ruminator) and condition (suppress, monitor only) were between-subject factors and CII was a continuous independent predictor. The dependent variable was sad mood recovery (i.e., T2 minus T3 sad VASs). Pairwise comparisons were utilized to follow up significant effects. A summary of results is presented in Table 14.

Analysis revealed a significant main effect of group, such that the depressed group exhibited reduced recovery from the sad mood induction compared with the high ruminator and low ruminator groups. The high and low ruminator groups did not differ significantly in sad mood recovery. Follow-up correlational analyses revealed a positive association between CII and sad mood recovery within the suppression condition ($r = .29, p = .03$), but non-significant associations in the monitor only condition ($r = -.08, p = .53$). This indicated that, contrary to predictions, weaker cognitive inhibition was
associated with greater recovery following the thought monitor task, which was only evident for those individuals who initially suppressed their thoughts. There was a significant two-way interaction for group x CII, which demonstrated that CII was positively associated with recovery from sad mood within the low ruminator group ($r = .28, p = .01$), but was unrelated to sad mood recovery in the high ruminator and depressed groups. This suggested that, contrary to predictions, weak inhibition was associated with increased recovery from sad mood following a thought monitoring task for those individuals who were low on trait-rumination, but did not impact recovery for individuals who were classified as depressed or high ruminators. All of the other main and interaction effects were non-significant.

4.12 Exploratory Analyses

4.12.1 The relationship between CII, group, and self-reported thought suppression. An exploratory analysis was conducted to examine whether CII or experimental group predicted self-reported effort and difficulty level in suppressing movie-related thoughts as an additional measure of thought suppression ability. A 3 (group) x 1 (CII) MANOVA with continuous and categorical predictors was conducted. Self-reported effort and difficulty ratings were the dependent variables, whereas group (depressed, high ruminator, low ruminator) was a between-subjects factor and CII was a continuous independent predictor. Only those individuals who were assigned to the suppression condition ($n = 77$) were included for analyses since effort and difficulty level are specific to suppression efforts. Box’s $M$ was nonsignificant, suggesting equality of covariance matrices, Box’s $M = 9.27, F (6, 13588.54) = 1.47, p = .19$. The Levene’s tests for both difficulty and effort ratings were significant, $F (2, 74) = 5.27, p$
=.01, and $F (2, 74) = 5.11, p = .01$, suggesting the assumption of homogeneity of variance was not met in both cases. Given ANOVA is robust to violations of homogeneity of variance and the $f_{\max}$ values were low, the significant Levene’s tests were not considered problematic for analysis. The results of the MANOVA revealed a main effect of group, Wilks Lambda = .81, $F (4, 140) = 3.80, p = .01, \eta^2_p = .10$, and CII, Wilks’ Lambda = .86, $F (1, 70) = 5.93, p = .00, \eta^2_p = .15$. The two-way interaction for group x CII was nonsignificant. Tests of between-subjects effects revealed a significant main effect of group for difficulty, $F (2, 71) = 8.00, p = .00, \eta^2_p = .18$, but not effort ratings, $F (2, 71) = 3.15, p = .05, \eta^2_p = .08$. Additionally, there was a significant effect of CII for both difficulty, $F (1, 71) = 11.86, p = .00, \eta^2_p = .14$, and effort ratings, $F (1, 71) = 7.30, p = .01, \eta^2_p = .09$.

Pairwise comparisons revealed that both the depressed ($M = 7.00, SD = 1.96$) and high ruminator groups ($M = 5.46, SD = 2.89$) reported higher difficulty ratings compared to the low ruminator group ($M = 4.06, SD = 2.63, ps = .00$ and .01, respectively. The depressed and high ruminator groups did not differ significantly in difficulty ratings ($p = .23$). Follow-up correlational analysis demonstrated there was also a significant negative relationship between CII and difficulty rating ($r = -.34, p = .00$) as well as a negative association between CII and effort rating ($r = -.31, p = .01$). This indicated that more successful inhibition was associated with increased perceptions of effort and difficulty on the thought suppression task.

4.12.2 Re-testing Hypotheses 1-4 using the overall sample. For exploratory purposes, analyses for Hypotheses 1 through 4 were re-examined utilizing the full
sample \((N = 218)\). Specifically, the RRS was included as a continuous independent predictor and participants were grouped based on depression classification of depressed \((n = 30)\) versus nondepressed \((n = 188)\), which was labelled “depression status.” This data analytic design allowed for the examination of potential interactions between depression status and ruminative style for predicting inhibition (Hypothesis 1), intrusions (Hypotheses 2 and 3), and mood recovery (Hypothesis 4) using a continuous measure of trait rumination. Moreover, the previous experimental group analyses resulted in a 30% loss of individuals who scored in the mid-range on the RRS. It was thus considered important to run supplementary analyses on the full sample in order to more accurately model the full range of ruminative scores.

To examine how depression status and ruminative style interact to predict inhibition ability (Hypothesis 1), a 2 (list) x 2 (valence) x 2 (depression status) x 1 (RRS) repeated measures ANOVA was conducted with continuous and categorical predictors. List (forget, remember) and valence (negative, positive) were within-subjects variables, whereas depression status (depressed, nondepressed) was a between-subjects dichotomous predictor, and RRS was a between-subjects continuous predictor. The dependent variable was number of words recalled on the directed forgetting task. RRS was centred to improve interpretability.

Descriptive statistics for the words recalled on the directed forgetting task are presented in Table 15 and the results of the repeated measures ANOVA are presented in Table 16. Box’s \(M\) was nonsignificant, indicating equivalence of covariance matrices, Box’s \(M = 38.97, F (30, 37660.18) = 38.97, p = .17\). The Levene’s tests were also nonsignificant for each of the within subjects conditions, including list1_negative, \(F (4,
$F(4, 213) = 1.06, p = .38$, list1_positive, $F(4, 213) = 1.60, p = .18$, list2_negative, $F(4, 213) = 1.05, p = .38$, and list2_positive, $F(4, 213) = 1.52, p = .20$. This indicated the assumption of homogeneity of variance was met in all cases. Examination of the results revealed a significant main effect for list, which demonstrated there was higher recall for to-be-remembered words compared with to-be-forgotten words. There was also a main effect of valence, which indicated there was greater recall for positive versus negative words. All other main and interaction effects were nonsignificant. Thus, both the directed forgetting effect (i.e., greater recall for to-be-remembered versus to-be-forgotten words) and valence effect (i.e., greater recall for positive versus negative words) evidenced using the experimental group sample was replicated using the overall sample. However, there was no evidence to suggest ruminative style, depression status, or their interaction term differentially predicted inhibition ability.

Next, analyses re-testing Hypotheses 2 and 3 utilizing the full sample ($N = 218$) were conducted. A 2 (time) x 2 (depression status) x 2 (condition) x 1 (RRS) x 1 (CII) repeated measures ANOVA with continuous and categorical predictors was utilized. Time (T1, T2) was a within-subject predictor, depression status (depressed, nondepressed) and condition (suppress, monitor only) were between-subjects factors, and RRS and CII were continuous independent predictors. The dependent variable was frequency of movie-related thoughts. Descriptive statistics based on log transformed scores and raw scores are reported in Table 17 and 18, respectively. The results of the repeated measures ANOVA are presented in Table 19.

A review of the analysis revealed a significant main effect of time, which indicated that thought frequency was higher at T1 compared with T2. There was also a
significant two-way interaction for group x CII. All other main and interaction effects were nonsignificant. To follow up the two-way interaction for group x CII, correlational analysis was utilized. A review of the results demonstrated that within the nondepressed group, CII was not significantly associated with T1 thoughts \( (r = .07, p = .33) \) or T2 thoughts \( (r = -.01, p = .90) \). However, within the depressed group, there was a significant negative association between CII and Thoughts at T1 \( (r = -.53, p < .001) \) and nonsignificant associations for thoughts at T2 \( (r = -.25, p = .18) \). Therefore, consistent with findings from the experimental group sample \( (n = 148) \), and contrary to the initial hypotheses, during the first time interval, depressed individuals with more efficient inhibition exhibited higher movie-related intrusions compared with nondepressed participants, independent of their inhibition ability.

Finally, analyses were run to re-test Hypothesis 4, using the overall sample \( (N = 218) \). A 2 (depression status) x 2 (condition) x 1 (RRS) x 1 (CII) univariate ANOVA with continuous and independent predictors was conducted. The dependent variable was sad mood recovery (i.e., sad VAS at T2 minus sad VAS at T3). The Levene’s test was significant, \( F(3, 214) = 3.46, p = .02 \), indicating that the assumption of homogeneity of variance was not met. Given that the \( f_{max} \) value was low (i.e., 3.46), this was not considered problematic (Tabachnick & Fidell, 2007). Descriptive statistics are presented in Table 20, and a summary of the ANOVA results is presented in Table 21. A review of the analyses revealed there was a significant three-way interaction for depression status x CII x RRS, \( F(1, 202) = 5.82, p = .02, \eta_p^2 = .03 \). All other main and interaction effects were nonsignificant.
To follow up the three-way interaction, two separate regression analyses were employed for each of level of the depression status variable (i.e., depressed, nondepressed). Each equation included RRS and CII at the first step and their interaction term at the second step. The dependent variable in both cases was sad mood recovery. Predictor variables were centred in order to improve interpretability. A review of the analyses revealed nonsignificant findings for CII, RRS, and their interaction term within both depressed \((n = 30)\) and nondepressed \((n = 188)\) samples. There was a nonsignificant effect for the RRS x CII interaction term within the depressed and nondepressed samples. It is notable that the tolerance level for the RRS x CII interaction in this analysis was very low (tolerance = .08) within the depressed sample, indicating difficulties with multicollinearity. Examination of the data indicated there was extremely little variation in RRS scores within the depressed sample, with the majority (25 out of 30) scoring in the top 66\(^{th}\) percentile on the measure.

4.12.3 Predicting cognitive control from emotion regulation strategies.

Exploratory analyses based on the overall sample was conducted to examine the extent to which habitual use of adaptive and maladaptive emotion regulation strategies predicted cognitive control. Prior to running the regression analyses, multivariate outliers were examined. Two participants were identified through malhalobis distance as multivariate outliers with \(p < .001\). One individual was from the depressed group and one was from the high ruminator group. These individuals were subsequently deleted from further analysis for a final \(N\) of 216. This method of treating multivariate outliers is recommended by Tabachnick and Fidell (2007). There were no outliers based on Cook’s Distance scores.
Two separate regression equations were run to explore the extent to which emotion regulation strategies predict cognitive control. In the first equation, the predictors at step 1 were gender and BDI-II and the predictors at step 2 were WBSI, RRS, ERQ-Reappraisal, and ERQ-suppression variables. The dependent variable was CII, with lower scores reflecting successful inhibition and higher scores reflecting poor inhibition. The second regression equation was identical except the dependent variable was the CUTS, which represented perceived difficulty with cognitive control. Additionally, in the second equation, CII was added into the second step as another predictor of cognitive control given CII was of primary interest to the present study.

Tables 22 and 23 present the results of the regression equations for predicting CII and CUTS, respectively. With CII as the dependent variable, analysis revealed nonsignificant findings at step 1, $F(2, 213) = 1.26, p = .29, R^2 = .01$ and at step 2, $F(4, 209) = 2.15, p = .08, R^2$ change $= .04$. The full model accounted for only 4% of the variance in CII, indicating the model did a poor job of predicting CII. With CUTS as the dependent variable, regression analyses revealed significant findings at step 1, $F(2, 213) = 101.30, p < .001, R^2 = .48$. The variables in Step 1 accounted for 48% of the variance in the CUTS variable. The model was also significant at step 2, $F(5, 208) = 33.23, p < .001, R^2$ change $= .23$, accounting for an additional 23% of the variance in CUTS, above and beyond the effects of gender and depressive symptoms. The full model accounted for 71% of variance in CUTS scores.

Examination of the model indicated that the BDI-II, RRS, and WBSI were significant positive predictors of CUTS, whereas gender, ERQ-suppression, ERQ-reappraisal and CII demonstrated nonsignificant relationships. This indicated
individuals with higher scores on self-reported depression symptoms, ruminative style, and thought suppression reported more perceived difficulty and distress associated with control of unwanted thoughts.
5.0 Discussion

5.1 Overview of Findings

Trait rumination has long been known to be a vulnerability factor in major depression. Several mechanisms have been proposed to explain the depressogenic nature of rumination. This dissertation explored whether rumination confers vulnerability to depression by provoking weak or maladaptive emotion regulation processes. Specifically, the regulatory processes investigated were cognitive inhibition and thought suppression. It was proposed that individuals displaying high trait rumination would exhibit poorer recovery from an induced sad mood state because of weak cognitive inhibition and reduced ability to effectively utilize the emotion control strategy of thought suppression. To investigate these cognitive-emotive deficits in rumination, 218 participants completed a directed forgetting task and were randomly assigned to thought suppression or monitor only conditions after watching a six minute sad movie induction. Mood rating scales were administered at four separate time periods to track reactivity and recovery from induced sad mood. In order to disentangle the influence of depression and ruminative style, a select group of high and low vulnerability individuals \( n = 148 \) with extreme scores on the RRS were divided into experimental groups (i.e., depressed/high ruminator, \( n = 25 \); high ruminator/nondepressed, \( n = 49 \); low ruminator/nondepressed, \( n = 74 \)), labeled depressed, high ruminator and low ruminator groups, respectively.

Analyses revealed that predictions linking ruminative style with weakened cognitive inhibition were generally supported. Specifically, while the low ruminator group exhibited normal inhibition for to-be-forgotten words, the high ruminator group demonstrated weakened inhibitory control for to-be-forgotten words. Contrary to
predictions, there was no evidence of weak cognitive inhibition for the depressed group. Additionally, contrary to hypotheses, there was no evidence to suggest negatively valenced words were more difficult to inhibit compared with positively valenced words, for any of the groups.

Examination of sad mood ratings revealed that, overall, participants reported heightened sadness in response to the sad mood induction, and a reduction in sadness following the thought monitoring task. Exploration of reactivity and recovery from the sad mood induction demonstrated that the depressed group exhibited blunted reactivity to the sad mood induction compared with low ruminator and high ruminator groups. However the low and high ruminator groups exhibited equivalent reactivity to the sad mood induction, suggesting these groups did not differ in the severity of sadness experienced in response to a stressor. The depressed group also exhibited less recovery from the sad mood induction following the thought monitoring task compared with both low and high ruminator groups. Surprisingly, the high and low ruminator groups did not differ in rates of recovery from the sad mood induction following the thought monitoring task. While not formally hypothesized, this was unexpected given rumination is associated with prolonged processing of negative thoughts and emotions (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2008). This will be discussed in a later section of this dissertation.

Predictions linking ruminative style with ineffective use of thought suppression were largely unsupported by experimental data from the thought monitoring task. Ruminative style was not associated with differential ability to suppress emotional thoughts on the thought monitoring task. Of particular note, the current study did not
replicate either enhancement or rebound effects using a modified version of the white
bear paradigm, which limited the conclusions that could be drawn about the association
between inhibition and suppression ability. However, ruminative style was strongly
associated with more frequent use of thought suppression based on self-report
questionnaire data. Additionally, despite negative findings for frequency of movie-
related intrusions, ruminative style was associated with self-reported difficulty with
suppression on the thought monitoring task, which was not attributable to differences in
effort. Thus, while experimental findings did not support a link between ruminative
style and increased frequency of intrusions using thought suppression, self-report data
suggested individuals who exhibited trait rumination used thought suppression more
frequently and perceived more difficulty with suppression attempts.

Predictions for a link between weak cognitive inhibition and increased intrusions
on the thought suppression task were also largely unsupported. Again, conclusions
about relationships between inhibition and suppression ability were limited by the
inability to demonstrate enhancement or rebound effects on the modified white bear
task. Despite nonsignificant differences between suppression and monitor only
conditions, a number of interesting findings emerged. Contrary to predictions, efficient
cognitive inhibition was associated with higher movie-related intrusions overall. This
indicated that individuals adept at inhibiting goal-irrelevant information in memory
reported more movie-related intrusive thoughts, independent of assignment to
suppression or monitor only conditions. Efficient inhibition was also associated with
perceptions of greater effort and difficulty with thought suppression. These findings
were surprising given it was hypothesized that weak cognitive inhibition would
contribute to more movie-related intrusions in the thought suppression condition. These findings will be discussed in detail in a later section.

Analyses examining fluctuations in mood also demonstrated that weak inhibition was associated with increased recovery from a sad mood induction when individuals were required to suppress movie-related thoughts. This was surprising given the expectation that weak inhibitory control would lead to less effective use of thought suppression, and hence poorer recovery from a sad mood episode. Interestingly, whereas predictions that weak inhibition would be associated with inefficient thought suppression were not supported using the experimental measure of inhibition (i.e., CII), perceived difficulty with cognitive control, measured by the CUTS (Rhyno et al., 2003), was associated with reduced recovery from a sad mood induction within the suppression condition. This supported initial hypotheses that difficulties with cognitive control would predict inefficient thought suppression. Thus, it may be the case that perceived difficulty with cognitive control is more important for maintaining sadness than actual cognitive control ability. This was suggested by Purdon and Clark (2001).

It should also be noted that low ruminators with efficient inhibition exhibited heightened recovery from a sad mood induction, regardless of assignment to suppress or observe movie-related thoughts. Therefore, enhanced control over thoughts during thought suppression may be a benefit for individuals who are nonvulnerable for depression. Future research is clearly needed to clarify these unexpected findings. There was no interaction between experimental group, condition, and inhibition, which suggested these factors did not combine to predict recovery from sad mood.
Exploratory analyses examining the extent to which emotion regulation strategies (i.e., ruminative style, thought suppression, cognitive reappraisal, and emotion suppression) predicted difficulties with cognitive control revealed these strategies were generally poor predictors of cognitive inhibition, as measured by performance on the Directed Forgetting task. However, emotion regulation strategies were better predictors of perceived difficulty controlling unwanted thoughts measured using the CUTS. After controlling for depressive symptoms, ruminative style and self-reported habitual use of thought suppression were significant positive predictors of perceived difficulty controlling unwanted thoughts and accounted for 24% of the variance beyond additional effects of depressive symptoms and gender.

5.2 What Effect Does Rumination Have on Mood Reactivity and Recovery?

While no formal predictions were made, examination of reactivity and recovery from sad mood induction was examined for each group. All groups exhibited increased sadness ratings in response to the sad mood induction, and a reduction in sadness following the thought monitoring task. Interestingly, there were no differences between the high and low ruminator groups for either reactivity to a sad mood induction or recovery following the 10 minute thought monitoring task. Teasdale's (1988) DA hypothesis may help to elucidate these findings. The DA hypothesis suggests that individuals who are vulnerable to depression should experience increased cognitive reactivity (i.e., shift in negative thinking) in response to a stressor, which is attributed to the activation of underlying negative schemas. However, the DA hypothesis also proposes that individuals who are vulnerable to depression do not differ from non-vulnerable individuals based on the intensity of sadness they experience, but rather in
difficulty disengaging from negative thoughts and emotions. Thus, instead of conceptualizing these findings as an indication of increased reactivity for high ruminators, it may better be considered that low ruminators exhibited equally strong emotional responses to the upsetting stimuli.

It is more difficult to understand why ruminative style was not associated with slowed recovery from the sad mood episode. Trait rumination, characterized by prolonged processing of negative thoughts and emotions, is a vulnerability factor for depression (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2008). Therefore it is unclear why the high ruminator group mimicked the non-vulnerable low ruminator group in terms of both reactivity and recovery to an induced sad mood state. It is interesting to note, however, that the high ruminator group exhibited reduced reactivity in response to a later positive mood induction. This finding is consistent with theorizing to suggest that trait ruminators exhibit difficulty inhibiting previously relevant information (e.g., negative thoughts and emotions) in order to attend to novel information (e.g., comedic material). Thus, while there were no direct discrepancies between low and high ruminators in recovery from sad mood, reduced reactivity to incoming positive material provided some support that ruminative style contributes to persistent negative affect.

The depressed group exhibited blunted reactivity to a stressor (i.e., sad movie clip), as well as reduced recovery from sad mood compared to low ruminator and high ruminator groups. This is consistent with research suggesting that major depression is associated with disruptions to the hypothalamic-pituitary-adrenal axis (HPA), which is responsible for production of stress hormones in response to environmental stressors.
(e.g., Burke, Davies, Otte, & Mohr, 2005; Peeters, Nicolson, Berkhof, Delespaual, & De Vries, 2003). A meta-analysis examining the effects of naturally occurring or experimentally induced stressors found depressed participants experienced reduced increases in stress hormones in response to stressors compared to nondepressed counterparts. This study also concluded that depressed participants exhibit slowed recovery from stressors (Burke et al., 2005). It is argued the higher baseline sadness disrupts the HPA feedback loop for novel stressors as a way of preserving homeostasis and resources. Therefore, the reduced recovery of the depressed group evidenced in the present study may be a reflection of neuro-biochemical shifts associated with depression as opposed to skill with thought monitoring.

5.3 Do Ruminators Exhibit Weak Cognitive Inhibition?

5.3.1 Overview of findings linking ruminative style with weak cognitive inhibition. A major aim of this dissertation was to establish a link between ruminative style and weak cognitive inhibition. Uncontrollable negative thoughts are a cardinal symptom of depression. However, in addition to being a symptom of depression, prolonged processing of negative thoughts and emotions serves as an important vulnerability factor for depression (Dozois & Dobson, 2001; Nolen-Hoeskema et al., 1993; Nolen-Hoeksema et al., 2008; Teasdale, 1988). As reviewed earlier, recent theorizing by Joormann (2005; 2010) suggests poor ability to expel or inhibit negative cognitions activated during a sad mood episode will lead to prolonged processing of these negative thoughts, which can further strengthen the associations between the negative thoughts and emotions to heighten accessibility of depressive thoughts. In the present study it was proposed that, in addition to weak cognitive inhibition associated
with clinical depression, individuals who exhibit trait rumination in a nondepressed state would also demonstrate weak inhibitory control for contents stored in memory.

Overall, findings from the current study supported a link between ruminative style and weak cognitive inhibition in memory. However, there were negative findings for the suggested link between depression and cognitive inhibition. Additionally, while it was hypothesized that deficits with cognitive inhibition would be specific to negative self-referent information, there was no evidence to suggest depressed or high ruminator participants experienced more difficulty inhibiting negative compared to positive words. A detailed discussion of these findings is presented below.

5.3.2 Is weak cognitive inhibition dependent on valence? Contrary to predictions, participants in the depressed and high ruminator groups did not exhibit difficulty inhibiting negative versus positive self-referent words. This finding was contrary to recent research, which suggests deficits in cognitive inhibition are specific to negative material for dysphoric/depressed (Goeleven et al., 2006; Joormann, 2004; Joormann & Gotlib, 2010; Joormann, Levens, & Gotlib, 2011; Lau, Christensen, Hawley, Gemar, and Segal, 2007) and high ruminator (De Lissynder et al., 2010; De Lissynder, Koster, & De Raedt, 2012; Joormann, 2006) samples. It is argued that information processing biases for negative information contribute to difficulty with down-regulation of emotion (Joormann, 2010; Joormann & Siemer, 2011). This is consistent with cognitive models of depression (i.e., Beck's schema model; Beck, 1976; Clark et al., 1999), which propose depression vulnerability is associated with negatively biased information processing.
Thus, it is unclear whether negative findings were unique to the current study or represent a meaningful effect. It is notable that several studies have found deficits in cognitive control for individuals high on trait rumination when utilizing neutral stimuli (e.g., Davis & Nolen-Hoeksema, 2000; Whitmer & Gotlib, 2012). Induction of rumination has also been found to be associated with reduced cognitive inhibition of neutral stimuli (Philippot & Brutoux, 2008; Watkins & Brown, 2002; Whitmer & Gotlib, 2012), demonstrating that activation of ruminative processing is associated with weakened cognitive control. Additionally, the one other study to assess cognitive inhibition using the list method directed forgetting task also found high ruminative style was associated with deficits in cognitive inhibition for both positive and negative material (Joormann & Tran, 2009).

The inconsistency of the findings for the role of valence in the literature warrants further investigation. One possibility, suggested by the author of the present study, is that ruminative style is associated with overall deficits in cognitive control, which are independent of valence. However, given that individuals possessing a ruminative style demonstrate a preference for recycling personally relevant negative thoughts (Nolen-Hoeksema et al., 2008) and typically endorse highly negative self-schemas (Nolen-Hoeksema et al., 2008), the impact of this global processing deficit should be most apparent for negative material. Repeated recycling of negative thoughts and memories will strengthen connections between these thoughts, making them more highly accessible (Dozois & Dobson, 2001; Nolen-Hoeksema, 1993). Thus, the negativity bias found in some studies may reflect this tendency. It is also notable that a number of studies cited as producing an inhibition effect for negative material report marginally
significant findings, which are not significant at the traditional alpha of .05 (Joormann, 2006; Lau et al., 2007). Following a brief acknowledgement that findings are nonsignificant, the articles often proceed to describe findings as if they are of clinical significance. Thus, a closer examination of the research suggests the effect of valence may be weaker than initially presumed.

Another interesting finding was an overall preferential recall for positive versus negative words, which was independent of group status. Thus, contrary to typical findings (see Matt et al., 1992 for review), the depressed group did not exhibit a negativity bias. It is not clear why the depressed group did not demonstrate the negativity bias or even-handed recall typically found in the literature. One study by Power and colleagues (2000), which also employed the list-method Directed Forgetting task with dysphoric participants reported a similar pattern of findings. That is, the dysphoric group evidenced an overall positivity bias. The authors suggested the unexpected findings resulted from shallow processing of words since participants were asked to rate each word for pleasantness. In line with this hypothesis, a follow up study, which required participants to rate each word for self-descriptiveness, demonstrated that depressed and dysphoric participants exhibited even-handed recall for positive and negative words, a finding that is more consistent with the literature (Matt et al., 1992).

It is possible the positivity bias in the current study resulted from shallow processing of the words presented. However, participants were asked to rate each word for self-descriptiveness, which is a recommended methodology to engage deeper processing (e.g., Power et al., 2000). Thus, this explanation seems unlikely. Another possibility is the positive words selected were more memorable or salient compared to
the negative words. Although there was an attempt to match based on word length and familiarity, pilot testing was not conducted. Future studies replicating this study design would be essential to clarify this unexpected finding.

5.3.3 Ruminative style and weak cognitive inhibition in memory. Findings from the current research suggest that trait rumination is associated with deficient inhibitory control. This builds on previous research linking ruminative style with dysfunctional inhibitory processes in selective attention (Joormann, 2004, 2005, 2006; Lau et al., 2007; Whitmer & Banich, 2007) to suggest that trait ruminators also exhibit difficulties deactivating previously relevant information in memory in order to accommodate a change in goals. Thus, once a pattern of thoughts is activated (e.g., themes of failure), individuals who tend to ruminate will find it more difficult to disrupt or inhibit retrieval of cognitions associated with failure in order to focus on new information or alternative patterns of thinking. Attempts to focus on new information will be met with heightened intrusions of past memories with themes of failure, which would then serve to maintain the sad mood episode. This contrasts with dysfunctional inhibitory processes in selective attention, which involve difficulty ignoring incoming information related to themes of failure (i.e., interference control) or expelling thoughts about failure held in short-term working memory (i.e., updating). While undoubtedly these functions are linked, exploration of the various processes involved in cognitive inhibition is vital to understanding the exact role inhibition plays in perpetuating ruminative processes and increasing risk for depression. Knowledge of the various interacting inhibitory processes will be important for development of appropriate and effective interventions.
To the author's knowledge, there is only one other study that explored the relationship between ruminative style and intentional forgetting using the list-method Directed Forgetting task (Joormann & Tran, 2009). Results from the current study support and extend these findings. Specifically, across both studies ruminative style was associated with deficits in intentional forgetting. Additionally, valence (negative versus positive) did not influence inhibitory processing for trait ruminators, supporting the negative findings for the role of valence in the current study. However, there were notable methodological differences between the two studies. First, while Joormann and Tran (2009) controlled for self-reported depressive symptoms, there was no measure of clinical depression for comparison. The current dissertation thus provided valuable information to clarify that the link between ruminative style and dysfunctional intentional forgetting was evident in individuals who were not clinically depressed. This supported the proposal that weak cognitive inhibition is a vulnerability factor associated with perseverative processing of negative thoughts and memories and not merely a symptom of clinical depression. Additionally, Joormann and Tran (2009) required participants to rate words on the Directed Forgetting task for pleasantness, which may have contributed to a shallow processing of words, as suggested by Powers et al. (2000). In contrast, the current study asked participants to rate words for self-descriptiveness, which presumably should engage deeper processing (Power et al., 2000). Given the aim of assessing inhibition in long-term memory, it is critical that experimental tasks encourage deeper processing in order to ensure words are adequately encoded.
In summary, the current study offered important extensions to previous research linking ruminative style with weak inhibitory processes by demonstrating that dysfunctional inhibition was associated with ruminative style as a vulnerability marker of depression versus a symptom of a current depressive episode. Additionally, it was demonstrated that beyond difficulties managing information in working memory, deficits with inhibitory control were extended to difficulties controlling the contents stored in long term memory. Finally, the results call into question the contention that deficits are specific to negative information processing, but rather suggest inhibitory deficits may represent a more global difficulty controlling thoughts and memories. However, more research is needed to clarify this finding.

5.4 Is Clinical Depression Associated with Weak Cognitive Inhibition?

A review of the literature linking depression and inhibition is warranted given the negative findings for the depressed group in the current study. There is now a large body of research linking depression with deficits in cognitive inhibition (see Joormann et al., 2007; Joormann & Siemer, 2011 for review). However, other studies have also failed to demonstrate deficits in cognitive inhibition using dysphoric (De Lissnyder et al., 2012; Power et al., 2000; Wong & Moulds, 2008) and depressed (Dumont, 2000) samples.

One important factor for consideration is the variety of paradigms utilized to capture cognitive inhibition. It is now generally accepted that cognitive inhibition can be broken down into interacting, but distinct functions (Harnishfeger, 1995; Joormann & Gotlib, 2010; Miyake et al., 2000). As reviewed in detail elsewhere, the broader construct of cognitive inhibition may refer to attention control functions, such as
prevention of unwanted information from entering awareness (i.e., interference control),
the removal of information from short-term working memory due to a shift in goals
(i.e., updating), or switching mental sets due to a change in goals (i.e., set switching).
Alternatively, cognitive inhibition may refer to a disrupted retrieval of information
stored in long-term memory (i.e., intentional forgetting).

As with research on ruminative style, the vast majority of studies linking
cognitive inhibition and depression/dysphoria are specific to selective attention (Årdal &
Hammer, 2011; Frings et al., 2007; Gohier et al., 2009; Gotlib et al., 2005; Joormann,
2004; Joormann & Gotlib, 2008; Joormann & Gotlib, 2010; Joormann et al., 2010;
Zetsche D’Avanzato, & Joormann, 2012; Zetsche & Joormann, 2011). Additionally, for
the studies that focus on long-term memory processes, most studies that employed a
Directed Forgetting paradigm utilized the item-cue version of the task (Cottencin, Gruat,
Thomas, Devos, Goudemand, & Consoli, 2008; Wingenfeld, Terfehr, Meyer, Löwe, &
Spitzer, 2012). There is strong evidence to suggest the item-cue version of the Directed
Forgetting task measures differential encoding of to-be-forgotten and to-be-
remembered words, and not cognitive inhibition (Harnishfeger, 1995; Miyake et al.,
2000). Thus, the evidence to date provides little direction for predicting specific links
between depression and cognitive inhibition in long-term memory.

There is only one study to the author's awareness, which employs the list version
of the Directed Forgetting task with dysphoric and depressed samples (Power et al.,
2000). Two experiments were run using dysphoric samples, and one using a clinically
depressed sample recruited from an inpatient unit. The first study failed to demonstrate
deficits with intentional forgetting for the dysphoric group. However, the authors
attributed the lack of significant findings to shallow processing since participants were required to rate words based on pleasantness. Two follow-up experiments were conducted, which required participants to rate self-descriptiveness for positive and negative adjectives. Analyses demonstrated the expected deficits in intentional forgetting for both dysphoric and depressed samples. Thus, the one study that employed the same list-method Directed-Forgetting design that was utilized in the present study, demonstrated mixed findings for an association between depression and impaired intentional forgetting. It should also be noted that the depressed sample (i.e., inpatients) used by Power et al. (2000) represents the severe range of depression. There is some evidence to suggest overall deficits with executive control are more pronounced in severely depressed individuals (e.g., Harvey et al., 2004). Thus, positive findings from the Power et al. (2000) study may not generalize to a broader range of the depressed population.

It is possible that depressed participants in the present study did not engage in deep processing of words. Another possibility is ruminative style plays a stronger role in the association between dysphoria and cognitive inhibition than previously considered. A number of studies have demonstrated that the link between ruminative style and reduced cognitive inhibition remains stable after controlling for the effects of self-reported depressive symptoms. For example, utilizing the list-method Directed Forgetting task that was employed in the present study, Joormann and Tran (2009) found trait rumination was associated with deficits in cognitive inhibition, which remained stable after controlling for self-report depressive symptoms. Likewise, examining cognitive control in attention, De Lissynder et al. (2010) found that, whereas
depression symptoms were not related to cognitive inhibition deficits in general, ruminative style was associated with deficits in both cognitive inhibition and set switching, which remained stable after co-varying out the effects of depressive symptoms.

Other studies utilizing experimental induction of rumination further support the important role of ruminative processes in reproducing the link between dysphoria and deficits in cognitive control. Specifically, Watkins and Brown (2002) assigned depressed and healthy control participants to either distraction or rumination conditions, which was followed by a random number generator task that measured executive control. Analyses revealed no differences between depressed and healthy controls on cognitive control following the distraction condition. However depressed participants, but not healthy controls, exhibited deficits in executive control following the rumination condition. Philipott and Brutoux (2008) further replicated these findings utilizing a stroop task that assessed deficits in cognitive inhibition. Additionally, Whitmer and Gotlib (2012) found depression to be associated with deficits in set switching following a rumination, but not a distraction, condition. This further supports the contention that ruminative processing is a key contributor to the difficulties noted with depression and executive control.

Together, these findings suggest ruminative processes may play an important role in the link between depression and deficits with cognitive inhibition. However, further research is needed to support this viewpoint. Given the strong association between rumination and depression, both as a symptom and a vulnerability factor, it is possible the association between weak cognitive control established in the literature may
result, in part, from underlying ruminative processes evident in clinically depressed individuals.

5.5 Do Ruminators Show More Deleterious Effects of Thought Suppression?

Findings from the current study make a noteworthy contribution to the existing literature on thought suppression and trait rumination. Whereas many researchers have speculated on a potential association between the two constructs (Gold & Wegner, 1995; Erber & Wegner, 1996; Martin & Tesser, 1996), surprisingly little empirical research has been conducted to establish these connections. The strong positive correlation between ruminative style and habitual use of thought suppression ($r = .66$) evidenced in the current study supports and extends previous findings (Erskine, Kvavilashvil, & Kornbrot, 2007; Rude, Maestas, & Neff, 2007; Szasz, 2009).

In addition, the current study took an initial step to explore whether ruminative style predicted increased difficulty on an experimental thought suppression task. To the author’s knowledge, this is the first attempt to establish links between trait rumination and online suppression of distressing thoughts using a modified version of the white bear paradigm. Although there were negative findings for the association between ruminative style and intrusions during or immediately following thought suppression, self-report accounts demonstrated that high ruminators perceived the task of suppressing emotional movie-related thoughts more difficult than did low ruminators. The failure to replicate either enhancement or rebound effects on the thought suppression task precludes any firm conclusions about thought suppression ability for high and low ruminators. However at minimum, the self-report data suggests that trait rumination is
associated with perceived difficulty with thought suppression as well as more frequent use of this maladaptive strategy.

It was proposed that, consistent with Wegner's ironic processing model (Wegner, 1992, 1994), ruminative style may serve as a form of cognitive load, which undermines the effectiveness of thought suppression attempts. Rumination requires cognitive resources to continually recycle negative thoughts and is associated with reduced working memory capacity (Brewin & Beaton, 2002), as well as weaker executive control (see Joormann, 2005; Joormann and Siemer, 2011 for review). The current study did not support the predictions that dysfunctional inhibitory mechanisms associated with trait rumination contributed to actual thought suppression ability. Therefore, despite positive findings linking ruminative style with inhibitory deficits, this did not translate into a reduced ability to implement thought suppression. It may be that the self-focus characteristic of ruminative style (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2008) leads to increased distress in response to perceived difficulty with thought suppression efforts. The distress may then serve to further fuel increased efforts to suppress thoughts. This would support the finding that trait rumination was associated with habitual use of thought suppression. Purdon and Clark (2001) have suggested appraisals of failure in thought suppression attempts may be more closely tied to distress than actual success with the strategy.

How do these findings fit with the literature? Currently, two explanations proposed for the relation between ruminative style and thought suppression. Martin and Tesser (1996) posit that persistent negative thoughts associated with ruminating cause individuals to use thought suppression as a form of escape, while Erber and Wegner
(1996) propose the opposite, that rumination represents a rebound effect following failed attempts at thought suppression. Although these explanations provide opposing views on why habitual use of rumination and thought suppression are related, they do not address how ruminative style may undermine attempts at thought suppression or perceptions of success with the strategy.

It is important to gain a full understanding of the ways in which ruminative style and thought suppression interact given their depressogenic nature and tendency to be used in tandem. Szasz (2009) found that both ruminative style and habitual use of thought suppression were associated with depression; however, ruminative style completely mediated the association between thought suppression and depression. In contrast, a longitudinal study by Wenzlaff and Luxton (2003) found that among groups of high and low suppressors with low levels of rumination, high suppressors who experienced high levels of stress over a 10 week time interval reported the highest levels of rumination. The authors concluded that when cognitive control is undermined by stress, thought suppression fuels rumination. Thus, the available research provides support for both explanations.

In all likelihood there is a reciprocal relationship between thought suppression and rumination. More research is clearly needed to disentangle these relationships. The current study suggested that in addition to the high concordance between use of both rumination and thought suppression, trait ruminators demonstrated more perceived difficulty using this strategy. For trait rumination, the combination of increased frequency and perceived difficulty using thought suppression likely represents a
powerful source of distress that may help explain the heightened risk for depression associated with this emotion regulation style.

5.6 Is Reduced Ability To Use Thought Suppression Associated With Weak Cognitive Inhibition?

5.6.1 Overview of findings. The present study took an initial step to explore whether weak inhibitory processes in long-term memory might help explain poor ability to suppress unwanted thoughts. Specifically, did weak inhibitory control predict ability to effectively suppress negative thoughts during an induced sad mood state? Unfortunately, the present study did not replicate either enhancement or rebound effects typically cited for the white bear paradigm (Rassin, 2005; Wenzlaff & Wegner, 2000). Since there were no differences in endorsement of movie-related thoughts for individuals assigned to either suppression or monitor only conditions, it is difficult to draw conclusions about potential links between cognitive inhibition and thought suppression ability.

Despite the equivalence between the suppression and monitor only conditions, the finding that efficient cognitive inhibition was associated with overall increases in endorsement of movie-related thoughts for the depressed group was unexpected and worthy of discussion. Initial hypotheses predicted weak cognitive inhibition would undermine cognitive control, resulting in increased movie-related thoughts during or directly following thought suppression attempts. This was based on Wegner's (1992; 1994) ironic processing theory, which states that cognitive load should tax higher order control mechanisms leading to increased intrusions. It was also based on previous research linking reduced working memory capacity with increased difficulty with
thought suppression (Brewin & Beaton, 2002; Brewin & Smart, 2005). Thus, it is puzzling that the relation between efficient cognitive inhibition and increased movie-related thoughts was most pronounced for the depressed group, who were expected to exhibit the most difficulty with cognitive inhibition and movie-related intrusions.

One suggestion posed for these seemingly contradictory findings is that individuals with efficient cognitive control are better equipped to remain focused on the goal of monitoring movie-related thoughts. In support of this suggestion, a study by Wessel et al. (2008) also revealed similar findings. Specifically, the study examined associations between baseline inhibition (updating/monitoring) and frequency of intrusions following a stressful film clip, which was a proxy for trauma. Contrary to hypotheses, weak inhibitory control was associated with increased self-reported intrusions on a diary task lasting 48 hours after the initial experiment. The authors concluded individuals who exhibit efficient updating/monitoring abilities are better able to remain focused on the task of attending to movie-related intrusions over an extended time period. Following this reasoning, it may be understandable why depressed individuals with enhanced inhibition ability exhibited heightened movie-related cognitions in the present experiment. Given depression is associated with high distractibility and increased self-focus (Clark et al., 1999; Gotlib & Joormann, 2010), it is possible the depressed participants with weak inhibitory control became distracted by more salient self-focused memories or thoughts, resulting in reduced attendance to movie-related thoughts.

Self-report measures of suppression effort and ability also help to shed light on the unexpected findings that efficient inhibition was associated with heightened movie-
related thoughts. Specifically, efficient inhibition was associated with higher self-reported effort and difficulty ratings on the thought monitoring task. This supports the contention that participants with efficient inhibition were more attuned to the task of monitoring their thoughts. Additionally, the self-report measure of distress and difficulty with thought control (i.e., CUTS) demonstrated the expected pattern of associations, indicating that individuals who perceived themselves as experiencing difficulty and distress in controlling unwanted thoughts in general, also exhibited more frequent movie-related intrusions, and reported exerting greater effort and experiencing more difficulty with the thought suppression task. Of particular importance, whereas there was a positive association between CUTS and movie-related thoughts in both suppression and monitor only conditions, a significant association between perceived difficulty controlling thoughts and reduced recovery from the sad mood induction was only evidenced for those individuals who were assigned to the suppression condition. Together, the pattern of findings from the CII and CUTS suggest that perceptions of difficulty controlling unwanted thoughts, rather than actual inhibition ability, may be of greater relevance for distress in response to thought suppression efforts. This is consistent with explanations offered by Purdon and Clark (1999).

It is also unclear the extent to which the unexpected findings for CII are related to the study design, which utilized non-personally relevant stimuli for suppression. For example, would efficient cognitive inhibition be associated with difficulty with thought suppression for personally relevant emotional material? Wegner's ironic processing model (1992, 1994) suggests weak control should undermine the effectiveness of the operating system and thus, to-be-forgotten thoughts should be more easily detected by
the automatic monitoring system. Future research could benefit from inclusion of a methodological design that requires participants to suppress personally relevant and emotionally charged thoughts or memories to assess the impact of inhibitory control in memory.

5.6.2 A critical review of the white bear paradigm. The failure of the current study to replicate the basic findings of the white bear paradigm warrants further comment. The seminal study by Wegner and colleagues (1987) has spurred a great deal of interest in the topic of thought suppression, with numerous studies employing variations of the paradigm (see Rassin, 2005; Smári, 2001; Wenzlaff & Wegner, 2000 for reviews). The study of thought suppression has gained popularity over the past two decades, and has been implicated in the etiology of various forms of psychopathology, including depression, generalized anxiety disorder (GAD), post-traumatic stress disorder (PTSD), and obsessive compulsive disorder (OCD; see Purdon, 1999 for a review).

Despite its popularity, support for ironic processing theory using the white bear paradigm has been inconsistent. A meta-analysis by Abramowitz and colleagues (2001) found that across 44 studies there was only a weak rebound effect and a nonsignificant initial enhancement effect in most studies. Reviews of the white bear suppression literature for general psychopathology (Purdon, 1999) and OCD samples (Purdon & Clark, 2000; Smári, 2001) also concluded that support for the enhancement and rebound effects is mixed.

Various authors have provided suggestions for improving the likelihood of replicating the paradoxical increase of unwanted thoughts following suppression attempts. These include longer time intervals, use of groups of words for targets as
opposed to single word targets, and imposition of cognitive load (e.g., stress, cognitively demanding task; Abramowitz et al. 2001). However, the present study made every effort to follow these recommendations, through use of lengthier time intervals for thought monitoring (i.e., 10 minutes total), and the request that participants suppress a group of related thoughts (i.e., any movie-related thoughts) rather than a single target word. Despite these efforts, positive findings were not obtained.

While there appears to be clinical relevance for research on thought suppression, reliance on the white bear paradigm to capture thought suppression may be problematic. Although several studies have replicated the basic findings (i.e., enhancement and/or rebound effects; Rassin, 2005; Wenzlaff & Wegner, 2000), numerous studies have failed to replicate these effects using similar designs (e.g., Kelly & Kahn, 1994; Mercklebach et al., 1991; Muris et al., 1996; Purdon & Clark, 2001; see Purdon, 1999 for a review). This is particularly problematic given a publication bias that favours significant differences.

A major criticism of the white bear paradigm is the overt method of reporting intrusions (e.g., Purdon, 1999; Smári, 2001). Specifically, participants are asked to press a space bar, ring a bell, or verbally report when they perceive an intrusion of the target. This method increases salience of the target thought, and engages other processes, such as motor control, which can introduce other sources of error. Future studies may benefit from alternative measures of thought intrusions.

5.7 Is Weak Cognitive Inhibition Associated With Impairments In Habitual Emotion Regulation?
Despite recent theorizing by Joormann (2010) that proposes weak inhibitory processes may contribute to impaired ability to use cognitively demanding emotion regulation strategies, there is scant research to date that explores this issue. Therefore, an additional goal for the current study was to establish patterns of relationships between inhibition in memory and habitual use of adaptive and maladaptive emotion regulation strategies.

There is one known study that examined the associations between cognitive inhibition and habitual use of emotion regulation strategies (i.e., cognitive reappraisal and emotion suppression). Based on samples of depressed, remitted depressed and never depressed individuals, researchers found that dysfunctional inhibitory control for negative material was associated with decreased use of cognitive reappraisal and increased use of emotion suppression (Joormann & Gotlib, 2010). These findings remained significant after controlling for depressive symptoms. The authors concluded that weak ability to control the contents of working memory leads to a decreased tendency to select regulation strategies that are more cognitively demanding. In turn, this contributes to less frequent use of potentially adaptive strategies, such as cognitive reappraisal and increased use of more passive, maladaptive strategies such as emotion suppression.

Inclusion of the ERQ provided an opportunity to replicate the study by Joormann and Gotlib (2010) to further test Joormann's (2010) model which contends that weak inhibition leads to decreased use of cognitive reappraisal and increased use of emotional suppression. Negative findings in the current study may suggest the association between inhibition and both cognitive reappraisal and emotion suppression is specific to
selective attention. Alternatively, the established link between inhibition and both cognitive reappraisal and emotion suppression reported by Joormann and Gotlib (2010) may not be robust. Of particular note, the ERQ suppression subscale demonstrated low reliability in the present study, which required the removal of one item. This calls into question the reliability of the measure, at least in the current context. Clearly more research is needed to better understand purported links between executive control and emotion regulation.

5.8 Methodological Strengths and Weaknesses

5.8.1. Strengths. There are a number of strengths to the current research design that should be highlighted. This was the first known study to investigate the role of cognitive inhibition, ruminative style and online thought suppression using the white bear paradigm in a single experiment. While there has been a call for research to investigate how weak executive control may extend to emotion regulation approaches other than ruminative style (Joormann, 2010; MacLeod & Bucks, 2011), there has been a paucity of empirical studies conducted to date. It is becoming evident that emotion regulation strategies are not employed in isolation (Gross, 2007). Given the high concordance between ruminative style and habitual use of thought suppression (Erskine et al., 2007; Rude et al., 2007; Szasz, 2009), as well as the depressogenic nature of both of these emotion regulation styles, it is critical that research begin to elucidate underlying processes associated with these maladaptive strategies.

The current study also utilized a powerful design by including a depressed sample to help disentangle the influence of depressive symptoms from rumination. Given the high overlap between ruminative style and dysphoria (e.g., $r = .68$ in the
current study), it is difficult to tease apart contributions from ruminative processing versus cognitive deficits associated with depression. For example, concentration difficulties, negative information processing biases and sleep disturbances that characterized depressive episodes (Clark et al., 1999) might inflate the relation between ruminative style and inhibitory deficits. Inclusion of a depressed group for comparison allowed for a distinction between ruminative processing that results from depressive symptomatology, versus more stable, trait-like ruminative processing that is reflective of vulnerability for future development of the disorder. This study design allowed for the discovery of a particularly interesting finding that trait rumination in a nondepressed state was associated with weak cognitive inhibition, whereas current depression was not. This may help to elucidate the frequent links between inhibition and dysphoria noted in the literature.

Additionally, use of experimental measures of emotion regulation provided rich data regarding the patterns of relationships between cognitive inhibition and online emotion regulation. MacLeod and Bucks (2011) have cogently argued that future research aimed at elucidating emotional dysfunction could benefit greatly from employment of cognitive-experimental designs. Specifically, they note that sole reliance on self-report measures are vulnerable to demand and response biases (e.g., Lawson, MacLeod, & Hammond, 2002), whereas utilization of well-developed, experimental paradigms can reduce demand characteristics and allow for a controlled investigation of emotional responses based on clearly defined predictions of human behaviour. While the overlap between emotion regulation and cognitive information processing biases are clear, surprisingly little research to date has made use of these
well-developed paradigms to better understand emotion regulation processes. The current study thus employed an experimental approach to measure cognitive control and incorporated a measure of online emotion regulation (i.e., the thought monitoring task).

An additional strength of the present study design was the employment of self-report measures to compliment and elucidate data gleaned from experimental tasks. For instance, use of self-report difficulty and effort levels for thought suppression attempts provided a context from which to interpret negative findings for the white bear paradigm (i.e., frequency of movie-related intrusions), and suggested ruminative style may be associated with perceived versus actual difficulty with the strategy. Likewise, the self-report measure of cognitive control supplemented scores derived from the directed forgetting task. In both cases, the self-report data were critical to elucidate negative findings from the experimental designs.

Investigation of the ways in which self-report and experimental evidence support and contradict one another can provide valuable information to help understand mechanisms contributing to persistent sadness and depression vulnerability. Several researchers have suggested perceived difficulties with emotion regulation or executive control may be a more potent contributor to persistent negative affect than actual ability (Elliott, Sahakian, McKay, & Herrod, 1996; Purdon & Clark, 2001). In the present study perceived difficulty with cognitive control was associated with thought suppression difficulty, whereas scores on an experimental measure found opposing effects. Additionally, although trait ruminators reported perceptions of increased difficulty on a thought suppression task, performance on the thought monitoring task did not suggest true deficits. Discrepancies between self-report and experimental measures
of emotion regulation may provide valuable information to better understand mechanisms underlying depression vulnerability and suggest further processes that could be targeted for treatment.

5.8.2 Weaknesses. Despite the many strengths of the current study, there were notable limitations. First, there were some potential difficulties with the thought suppression task. For instance, for practical reasons the entire experiment was conducted within one session, which ranged from 1 to 1.5 hours in duration. The thought monitoring paradigm was among the final tasks to be completed; therefore, fatigue may have been a confounding factor. The negative findings for differences in frequency of intrusions between suppression and monitor only conditions may have reflected distractibility and mental exhaustion as opposed to true similarity between the conditions. Additionally, while use of longer time intervals has been recommended in order to enhance rebound or enhancement effects on the thought suppression task (Abramowitz et al., 2001), it is possible the 10 minute interval utilized in the current study was too long, and contributed to negative findings. The original paradigm was developed over 30 years ago. Thus, with the increased reliance on technology and enhanced value placed on multi-tasking and quick delivery of information, the prospect of sitting quietly for several minutes to focus on thoughts may be less feasible now than it was years ago. In support of this, informal verbal comments from students following the experiment suggested there were high levels of boredom and many students reported they could not focus for that length of time. As reviewed earlier, the validity of the white bear paradigm has also been called into question. Future replications of this study
could benefit from use of shorter time intervals and inclusion of alternative experimental measures of thoughts suppression (e.g., sentence unscrambling tasks).

Another potential difficulty was the close proximity between administration of the SCID interview and measurement of inhibitory capabilities. The study's aim was to measure baseline cognitive inhibition and then predict thought suppression performance following an induced sad mood state. However, SCID questions are designed to probe depressive symptoms and experiences, which may have led to an increase in sadness for some individuals. Thus, scores on inhibitory control may have reflected reduced cognitive flexibility due to a sad mood state versus enduring differences in cognitive control between groups. It should be noted, that there was approximately 20 minutes in which participants were asked to complete questionnaires prior to the Directed Forgetting task. Additionally, significant increases in sadness following a sad mood induction, as well as a return to baseline sadness ratings following a 10 minute emotion regulation task (i.e., thought monitoring task) suggested sad mood was not likely to be a confound for inhibition results. Finally, the consistency between findings from the current study and other studies linking weak cognitive inhibition with ruminative style (e.g., Joormann & Tran, 2009) provided further support for the internal validity of the experiment.

There are noted benefits to including mood rating scales throughout the study to capture fluctuations in affect; however, it is possible the frequency of administrations contributed to biased responding. Specifically, participants were asked to complete VASs on four occasions. Although it was necessary to present these scales directly following sad and happy mood clips, the saliency of these clips may have provided
demand characteristics encouraging participants to provide answers consistent with the researcher's hypotheses. However, this difficulty was anticipated and every attempt was made to reduce this bias. For example, utilizing the cover story that the researcher was interested in how mood influences memory for movies was intended to divert attention away from potential guesses that the movie was intended to induce a specific mood state. Additionally, filler VAS items (i.e., lazy, energetic, and curious) were included to help reduce the influence of biased responses for sad VASs. The manipulation check at the end of the study suggested the majority of students indicated they were aware the study investigated changes in mood states, however approximately 1% of students specifically identified that the purpose of the movie clips was to induce specific mood states. Additionally, the inclusion of six items on each VAS, and the presence of cognitively demanding tasks between mood measurements would likely make it difficult for participants to recall responses from previous VAS scales. Thus, while some caution is warranted for interpreting information from the VASs, there is evidence to suggest they served as valid measures of mood fluctuation.

Finally, there are some potential difficulties with the self-report measures of emotion regulation and thought control. Unfortunately, the order in which these questionnaires (i.e., BDI-II, WBSI, ERQ, CUTS, respectively) appeared in the booklet was not counterbalanced. Thus, there is the potential for order effects to have influenced responding. In the present study, ERQ subscales were not associated with depressive symptoms. This contrasted with findings from Gross and John (2003), which revealed positive associations between emotional suppression and depression (inverse for cognitive reappraisal). It is possible that order effects contributed to negative
findings. Furthermore, the ERQ demonstrated relatively low reliability (Cronbach's $\alpha = .68$), which also may have contributed to inconsistent findings.

5.9 Future Directions

5.9.1 New research directions. Results from the present dissertation offer suggestions for future research. While significant associations were found between ruminative style and weak inhibitory processes in memory, the overall effect was quite small, accounting for only 5% of the variance in inhibition. More research is clearly needed to clarify the exact nature of executive control deficits. Is the difficulty with inhibition specific or more global in nature? Associations between ruminative style and executive control deficits have been identified across a number of separate, but overlapping functions, with numerous studies having demonstrated that ruminative style is associated with impaired inhibitory mechanisms in selective attention (e.g., Joormann, 2004, 2006; Whitmer & Banich, 2007), set shifting (e.g., Davis & Nolen-Hoeksema, 2000), and reduced working memory capacity (e.g., Brewin & Beaton, 2002). The growing body of literature suggests poor executive control may underlie difficulties in terminating ruminative thoughts, however it remains unclear which mechanisms are of primary importance. Miyake et al. (2000) suggest that each of the inhibitory control mechanisms (i.e., set shifting, updating, intentional forgetting) may contribute differently to the execution of other higher order functions, such as planning, problem solving, or in this case, emotion regulation. Thus it is important to research the role of each of these functions in order to better understand how they contribute to difficulties with cognitive control.
Future studies may benefit from inclusion of multiple measures of executive control in the same design (e.g., working memory capacity, inhibition in selective attention and memory). There are a number of studies that have employed batteries of neurocognitive tests for depressed samples (e.g., Elliott et al., 1996; Harvey et al., 2004). However this type of research design is sorely lacking from research specifically linking ruminative style with executive control deficits. Inclusion of a range of well-validated measures of executive control and working memory may help to tease apart aspects of inhibition that are specific to difficulties with prolonged processing of negative thoughts and memories associated with ruminative style. Additionally, there are inconsistencies in findings on the role that valence plays in inhibitory difficulties. Use of stimuli with positive, neutral and negative target words would be particularly useful to clarify these inconsistencies.

Experiment studies that assess the extent that executive control predicts online emotion regulation represents another particularly useful line of research. To date, rumination is the only emotion regulation strategy to be experimentally induced in relation to cognitive inhibition. While the present dissertation took an initial step to measure the extent that cognitive inhibition predicted performance on a thought suppression task, findings were inconclusive. Future studies could benefit from inclusion of alternative measures of online thought suppression using paradigms such as sentence unscrambling, which are less biased by overt reporting of intrusions. Experimental induction of cognitive reappraisal may also represent an interesting opportunity to explore the relationship between cognitive inhibition and other cognitively demanding emotion regulation strategies. It has been suggested that poor
ability to control the contents of working memory may lead to the rejection of adaptive, but cognitively demanding strategies such as cognitive reappraisal, which are associated with improved recovery from sad mood episodes and increased resilience for depression (Gross & John, 2003; Joormann & Gotlib, 2010). Although there were negative findings for the relationship between cognitive inhibition and habitual use of cognitive reappraisal in the current study, it remains possible that poor inhibitory control is predictive of difficulties using this strategy. An experimental task requiring participants to reappraise upsetting material from a film clip would offer a useful design.

5.9.2 Interventions addressing weak inhibition. Although specification is lacking, growing evidence suggests depression and ruminative style are associated with weak inhibitory mechanisms that contribute to emotion dysregulation. More research identifying the precise functions contributing to uncontrollable negative thoughts associated with this maladaptive coping style will provide groundwork from which to develop effective interventions as well as a basis from which to test the mechanisms underlying treatment efficacy. Two potentially useful treatments for targeting uncontrollable negative thoughts associated with trait rumination are mindfulness-based cognitive therapy (Segal, Williams, & Teasdale, 2002) and attention training. Both are outlined below.

5.9.1.1 Mindfulness. Mindfulness is "paying attention in a particular way: on purpose, in the present moment and non-judgmentally" (Kabat-Zinn, 1994, p.4). A main focus of mindfulness practice is the cultivation of one's attention to the present moment. It has been suggested that mindfulness meditation may be particularly useful for addressing ruminative processing since it targets attentional control. Rather than
focusing on changing specific negative thoughts, mindfulness encourages a shift in style or process of thinking.

A recent study by Greenberg, Reiner, and Meiran (2013) examined the effectiveness of mindfulness using an experimental design in which half of the participants were assigned to a mindfulness condition involving seven separate two hour mindfulness training sessions and a half day mindfulness retreat, whereas half were assigned to a wait list control. Two cognitive functions were assessed. The first was inhibition in selective attention, which was measured using the backward inhibition task (Mayr & Keele, 2000), an executive control function linked with depressive rumination (Whitmer & Banich, 2007; Whitmer & Gotlib, 2012). The other cognitive measure involved ability to tag information in episodic memory as irrelevant but it was not expected to relate to depressive rumination. Analyses indicated the mindfulness group exhibited significant reductions in overall sad mood and anxiety symptoms. Importantly, the mindfulness group also exhibited improved attentional control on the backward inhibition task, whereas there was no difference on the episodic memory task. This finding shows that inhibition may contribute to persistent negative affect and that mindfulness might ameliorate cognitive inhibition effects.

Another study by Zeidan, Johnson, Diamond, David, & Goolkasian (2010) found similar results utilizing a brief mindfulness training condition. A student sample was recruited from posters on campus with half of the participants assigned to a mindfulness condition, consisting of four separate 20 minute training sessions, while the other half were assigned to an active control group (i.e. listen to a 20 minute book on tape). Both groups demonstrated reductions in self-reported negative affect; however, only the
mindfulness group exhibited significant improvement in executive control functions such as verbal fluency, working memory and inhibition in selective attention. Therefore, evidence from the available experimental studies suggest this intervention targets improvement of inhibitory functioning, and offers a potentially useful strategy for trait ruminators who struggle with persistent negative thoughts that are difficult to control. Evidence from correlational research, which demonstrates that seasoned mindfulness practitioners exhibit improved attentional functioning compared to matched non-mindfulness meditators, (van den Hurk, Giommi, Gielen, Speckens, & Barendrget, 2010) provides additional support for the contention that mindfulness practice improves inhibitory control. It is notable, however, that there have been some inconsistencies in the literature. There are mixed results linking ruminative style and inhibition for studies using the stroop task (see Greenberg et al., 2005 for a review). More research is clearly needed in order to identify the specific mechanisms involved. However initial evidence suggests this may be a useful intervention for treatment of depressive rumination.

Mindfulness may serve as an adjunct to other effective strategies such as cognitive behavioural therapy (CBT), which seeks to transform the underlying negative schemas (Beck et al., 1976; Clark et al., 1999). Thus, together CBT and mindfulness strategies could help to reduce the impact of negative priming by reconstructing underlying negative schemas (i.e., CBT) and reducing the strength of associations between negative content and affect by shifting one's attention away from previously relevant negative thoughts (i.e., mindfulness).
5.9.1.2 Attentional Training. Another intervention that has shown some promise is attentional training. This intervention utilizes computer programs to provide feedback about which targets to attend (e.g., neutral) and which to avoid (e.g., negative). In a study by MacLeod et al. (2002), nonvulnerable individuals were trained to selectively attend to either neutral or negative information, followed by a stressful anagram task. Results demonstrated those assigned to the negative condition reported higher stress following the stressful task compared to those trained to attend to neutral information. Wells and Beevers (2010) extended this research using a dysphoric sample to reveal that individuals assigned to an attention training condition demonstrated reduced depressive symptoms after a 4 week period compared to matched participants assigned to a no training control condition. The training involved four sessions teaching participants to attend to neutral information while ignoring negative information on a computer task. Owens, Koster and Derkashan (2013) found that a dysphoric sample assigned to an attentional control condition exhibited improved working memory capacity and inhibitory control compared to matched individuals assigned to a no training condition. Together these findings provide new evidence to suggest attentional training exercises may lead to improved executive control functioning, which may generalize and serve to buffer against depression vulnerability. This intervention may be particularly useful for trait ruminators who struggle to control the contents of working memory and long term memory. However, more research is needed to determine whether the changes in executive functioning have long-term effects.
6.0 Conclusions

The present dissertation is an extension to the burgeoning research that suggests the depressogenic nature of trait rumination may be attributable, in part, to weak inhibitory control. Weak inhibitory control may provide an explanation for the often uncontrollable nature of ruminative thoughts often reported by depressed individuals. Thus, when experiencing sad mood episodes, individuals who are trait ruminators may struggle to forget previously relevant thoughts related to the triggering mood, which then intrudes into awareness and prolongs the sad mood state. Although it was expected that poor inhibitory control would be specific to negative information, results indicated difficulties may be evident at a more global level, since trait ruminators exhibited equivalent difficulty inhibiting both positive and negative information. In addition, the current findings indicate that inhibitory deficits were not attributable to cognitive symptoms specific to a current depressive episode. In fact trait rumination may play a more important role in inhibitory control than depression. More research is needed in order to better understand this finding. Study designs employing clinically depressed samples, measures of ruminative style, and multiple measures of executive control could be particularly illuminating in this regard.

Based on principles from the DA hypothesis and recent theorizing by Joormann (2010), an initial step was also taken to investigate ways in which ruminative style may further confer vulnerability for depression through a reduced ability to effectively suppress unwanted thoughts. This is the first known study to explore overlaps between ruminative style, inhibition and online thought suppression. It was expected that weak cognitive inhibition associated with trait rumination would predict poor ability to
suppress emotional thoughts associated with an experimentally induced sad mood state. Contrary to predictions, inhibitory control did not impact actual or perceived ability to suppress thoughts on an experimental task. In fact, enhanced inhibitory control was associated with heightened movie-related intrusions, which was independent of whether individuals were asked to suppress or simply monitor thoughts. This suggests that inhibition may be associated with increased vigilance in thought monitoring that may, under certain circumstances, contribute to less effective emotion regulation.

Interestingly, while trait rumination did not impact thought suppression ability, it was associated with perceived difficulty with suppression of distressing thoughts, as well as habitual use of thought suppression to regulate mood states. Together these findings suggest that the perceived difficulties with thought suppression that were associated with ruminative style may be more closely related to the self-reflective nature of individuals who habitually ruminate and feel distress in response to failed attempts to control thoughts, rather than to inhibitory deficits per se.

Overall, there was some support for the contention that inhibitory control may underlie deficits with emotion regulation associated with depression vulnerability. Specifically, findings suggest a potential mechanism to target in interventions treating ruminative symptoms. Future research will benefit from further clarification of the role of inhibition with other common emotion regulation strategies (e.g., cognitive reappraisal). Moving forward, studies that seek to clarify which executive control mechanisms are primarily responsible for the prolonged processing of negative thoughts associated with trait rumination and depression will be particularly useful. In the meantime, it is apparent that cognitive vulnerability models of depression should include
weak cognitive inhibition as a possible mediating process in predisposition to depression.
Table 1

*Participant Characteristics for Overall and Experimental Group Samples*

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Full Sample (N = 218)</th>
<th>Experimental Group Sample (n = 148)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>180</td>
<td>82.6</td>
</tr>
<tr>
<td>Asian</td>
<td>16</td>
<td>7.3</td>
</tr>
<tr>
<td>Aboriginal</td>
<td>5</td>
<td>2.3</td>
</tr>
<tr>
<td>Black</td>
<td>9</td>
<td>4.1</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>3.7</td>
</tr>
<tr>
<td>Year University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>82</td>
<td>37.6</td>
</tr>
<tr>
<td>2</td>
<td>39</td>
<td>17.9</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td>14.7</td>
</tr>
<tr>
<td>4+</td>
<td>31</td>
<td>14.3</td>
</tr>
<tr>
<td>other</td>
<td>34</td>
<td>15.6</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>79</td>
<td>36.2</td>
</tr>
<tr>
<td>Female</td>
<td>139</td>
<td>63.8</td>
</tr>
</tbody>
</table>

*Note.* Year University = year of university. Other = individuals who are not currently attending university.
Table 2

*Correlations between Gender, University Attendance and Outcome Variables – Overall Sample*

<table>
<thead>
<tr>
<th></th>
<th>CII$^a$</th>
<th>Thoughts T1$^a$</th>
<th>Thoughts T2$^a$</th>
<th>Sad Mood Recovery$^a$</th>
<th>Effort$^b$</th>
<th>Difficulty$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.05</td>
<td>.08</td>
<td>.11</td>
<td>.19**</td>
<td>.19</td>
<td>.21*</td>
</tr>
<tr>
<td>University</td>
<td>-.00</td>
<td>.03</td>
<td>-.05</td>
<td>.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* CII = Cognitive Inhibition Index; Thoughts T1 and Thoughts T2 = frequency of movie related thoughts at time 1 and 2, respectively; Sad mood recovery = sad VAS at T2 minus sad VAS at T3. Effort = self-report effort with thought suppression. Difficulty = self-reported difficulty with thought suppression. Correlations for Effort and Difficulty include only those individuals who were assigned to the thought suppression condition. Logarithmic transformations have been applied to T1 and T2 thoughts.

***p < .001, **p < .01, *p < .05.

$^aN = 218$. $^bn=108$
Table 3

*Descriptive Statistics for Pre-Experimental Questionnaires and CII for Overall Sample and by Experimental Group*

<table>
<thead>
<tr>
<th>Group</th>
<th>CII</th>
<th>CUTS</th>
<th>RRS</th>
<th>WBSI</th>
<th>BDI-II</th>
<th>ERQ-reappraisal</th>
<th>ERQ-suppression</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall Sample a</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M</em></td>
<td>.38</td>
<td>56.60</td>
<td>46.81</td>
<td>51.06</td>
<td>11.77</td>
<td>24.62</td>
<td>11.93</td>
</tr>
<tr>
<td><em>SD</em></td>
<td>.15</td>
<td>35.71</td>
<td>14.59</td>
<td>12.39</td>
<td>9.82</td>
<td>8.19</td>
<td>4.51</td>
</tr>
<tr>
<td><strong>Depressed b</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M</em></td>
<td>.36</td>
<td>102.92</td>
<td>67.28</td>
<td>61.28</td>
<td>28.80</td>
<td>21.20</td>
<td>12.40</td>
</tr>
<tr>
<td><em>SD</em></td>
<td>.14</td>
<td>25.37</td>
<td>7.30</td>
<td>12.13</td>
<td>6.57</td>
<td>9.31</td>
<td>4.70</td>
</tr>
<tr>
<td><strong>High Ruminator c</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M</em></td>
<td>.41</td>
<td>77.37</td>
<td>62.18</td>
<td>57.02</td>
<td>14.08</td>
<td>24.82</td>
<td>12.47</td>
</tr>
<tr>
<td><em>SD</em></td>
<td>.16</td>
<td>31.77</td>
<td>7.16</td>
<td>10.89</td>
<td>8.95</td>
<td>7.10</td>
<td>4.29</td>
</tr>
<tr>
<td><strong>Low Ruminator d</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M</em></td>
<td>.37</td>
<td>26.12</td>
<td>31.19</td>
<td>43.59</td>
<td>4.86</td>
<td>25.45</td>
<td>11.84</td>
</tr>
<tr>
<td><em>SD</em></td>
<td>.12</td>
<td>17.58</td>
<td>4.18</td>
<td>11.32</td>
<td>3.65</td>
<td>9.11</td>
<td>4.44</td>
</tr>
</tbody>
</table>

*Note.* CUTS = Control of Unwanted Thoughts Scale. RRS = Ruminative Response Scale. WBSI = White Bear Suppression Inventory. ERQ-reappraisal and ERQ-suppression = Emotion Regulation Scale - reappraisal and suppression subscales, respectively. CII = cognitive inhibition index.

aN = 218. b n = 25. c n = 49. d n = 74.
Table 4

Correlations Between CII, CUTS and Initial Questionnaires for Overall Sample and by Experimental Group Sample.

<table>
<thead>
<tr>
<th></th>
<th>CII</th>
<th>CUTS</th>
<th>BDI-II</th>
<th>RRS</th>
<th>WBSI</th>
<th>ERQ-reap</th>
<th>ERQ-supp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CII</td>
<td>-.03</td>
<td>-</td>
<td>.07</td>
<td>-.01</td>
<td>.00</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>CUTS</td>
<td>-</td>
<td>.69***</td>
<td>.76***</td>
<td>.67***</td>
<td>- .02</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>-</td>
<td>-</td>
<td>.68***</td>
<td>.47***</td>
<td>-.13</td>
<td>.13</td>
<td></td>
</tr>
<tr>
<td>RRS</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.56***</td>
<td>-.09</td>
<td>.08</td>
<td></td>
</tr>
<tr>
<td>WBSI</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-.04</td>
<td>.11</td>
<td></td>
</tr>
<tr>
<td>ERQ-reap</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.15*</td>
<td></td>
</tr>
<tr>
<td>Selected Sample</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CII</td>
<td>.02</td>
<td>-</td>
<td>.11</td>
<td>.07</td>
<td>.06</td>
<td>.08</td>
<td>.08</td>
</tr>
<tr>
<td>CUTS</td>
<td>-</td>
<td>.73***</td>
<td>.83***</td>
<td>.71***</td>
<td>-.03</td>
<td>.10</td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>-</td>
<td>-</td>
<td>.75***</td>
<td>.52***</td>
<td>-.14</td>
<td>.12</td>
<td></td>
</tr>
<tr>
<td>RRS</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.63***</td>
<td>-.11</td>
<td>.08</td>
<td></td>
</tr>
<tr>
<td>WBSI</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-.05</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>ERQ-reap</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>.11</td>
<td></td>
</tr>
</tbody>
</table>

Note. Selected Sample = experimental group sample. CUTS = Control of Unwanted Thoughts Scale; BDI-II = Beck Depression Inventory, 2nd Edition; RRS = Ruminative Response Scale; WBSI = White Bear Suppression Inventory; ERQ-reap and ERQ-supp= Emotion Regulation Questionnaire - reappraisal and suppression subscales, respectively.

***p < .001, **p < .01, *p < .05.

aN = 218; b n=148
Table 5

Correlations between CII, CUTS, and Thought Suppression Variables by Condition -

*Overall Sample*

<table>
<thead>
<tr>
<th></th>
<th>T1 Thoughts</th>
<th>T2 Thoughts</th>
<th>Sad Mood Recovery</th>
<th>Difficulty</th>
<th>Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppress*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CII</td>
<td>-.21*</td>
<td>-.17</td>
<td>.18</td>
<td>-.26**</td>
<td>-.22*</td>
</tr>
<tr>
<td>CUTS</td>
<td>.27**</td>
<td>.37***</td>
<td>-.26**</td>
<td>.39***</td>
<td>.30**</td>
</tr>
<tr>
<td>Monitor Onlyb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CII</td>
<td>-.10</td>
<td>.07</td>
<td>-.06</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CUTS</td>
<td>.31**</td>
<td>.21*</td>
<td>.07</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Note.* T1 and T2 Thoughts = number of movie-related intrusions. Sad Mood Recovery = sad VAS at T2 minus sad VAS at T3. Difficulty and Effort = self-reported difficulty and effort with thought suppression, respectively. Correlations for effort and difficulty not reported within the monitor only group. T1 and T2 Thoughts are log transformed.

***p < .001, **p < .01, *p < .05

*an = 108. b*n = 110.*
Table 6

Descriptive Statistics for Sad VASs at T1, T2, T3, and T4 for Overall Sample and by Experimental Group

<table>
<thead>
<tr>
<th></th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>27.69</td>
<td>68.72</td>
<td>31.29</td>
<td>15.83</td>
</tr>
<tr>
<td>SD</td>
<td>27.22</td>
<td>24.14</td>
<td>23.11</td>
<td>19.28</td>
</tr>
<tr>
<td>Depressed b</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>56.04</td>
<td>72.92</td>
<td>49.40</td>
<td>31.08</td>
</tr>
<tr>
<td>SD</td>
<td>23.83</td>
<td>26.37</td>
<td>26.44</td>
<td>24.76</td>
</tr>
<tr>
<td>High Ruminators c</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>33.51</td>
<td>72.35</td>
<td>32.35</td>
<td>23.86</td>
</tr>
<tr>
<td>SD</td>
<td>28.30</td>
<td>22.79</td>
<td>23.13</td>
<td>22.64</td>
</tr>
<tr>
<td>Low Ruminators d</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>17.77</td>
<td>61.91</td>
<td>24.63</td>
<td>8.41</td>
</tr>
<tr>
<td>SD</td>
<td>22.05</td>
<td>26.58</td>
<td>21.32</td>
<td>13.13</td>
</tr>
</tbody>
</table>

Note. T1, T2, T3, T4 = sad VAS ratings at time 1, 2, 3, and 4, respectively.

aN = 218. b n = 25. c n = 49. d n = 74.
Table 7

Descriptive Statistics for Happy VASs at T1, T2, T3, and T4 for Overall Sample and by Experimental Group

<table>
<thead>
<tr>
<th></th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>61.59</td>
<td>37.08</td>
<td>56.06</td>
<td>71.98</td>
</tr>
<tr>
<td>SD</td>
<td>21.48</td>
<td>21.10</td>
<td>18.52</td>
<td>19.60</td>
</tr>
<tr>
<td>Depressed&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>37.40</td>
<td>26.56</td>
<td>40.32</td>
<td>59.80</td>
</tr>
<tr>
<td>SD</td>
<td>20.32</td>
<td>16.96</td>
<td>21.52</td>
<td>22.68</td>
</tr>
<tr>
<td>High Ruminator&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>58.51</td>
<td>36.80</td>
<td>51.61</td>
<td>70.00</td>
</tr>
<tr>
<td>SD</td>
<td>19.43</td>
<td>19.57</td>
<td>17.17</td>
<td>20.78</td>
</tr>
<tr>
<td>Low Ruminator&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>70.62</td>
<td>41.99</td>
<td>63.80</td>
<td>75.05</td>
</tr>
<tr>
<td>SD</td>
<td>17.44</td>
<td>19.36</td>
<td>14.93</td>
<td>17.34</td>
</tr>
</tbody>
</table>

Note. T1, T2, T3, T4 = happy VAS ratings at time 1, 2, 3, and 4, respectively.

<sup>a</sup>N = 218.  <sup>b</sup>n = 25.  <sup>c</sup>n = 49.  <sup>d</sup>n = 74.
Table 8  

Descriptives for Sad Mood Reactivity, Sad Mood Recovery and Positive Mood Reactivity for Overall Sample and by Experimental Group  

<table>
<thead>
<tr>
<th></th>
<th>Sad Mood Reactivity</th>
<th>Sad Mood Recovery</th>
<th>Positive Mood Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Sample&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( M )</td>
<td>41.02</td>
<td>37.42</td>
<td>15.46</td>
</tr>
<tr>
<td>( SD )</td>
<td>30.72</td>
<td>25.50</td>
<td>18.83</td>
</tr>
<tr>
<td>Depressed&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( M )</td>
<td>16.88</td>
<td>23.52</td>
<td>18.32</td>
</tr>
<tr>
<td>( SD )</td>
<td>29.69</td>
<td>23.69</td>
<td>17.97</td>
</tr>
<tr>
<td>High Ruminator&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( M )</td>
<td>38.84</td>
<td>40.00</td>
<td>8.49</td>
</tr>
<tr>
<td>( SD )</td>
<td>32.91</td>
<td>27.07</td>
<td>20.47</td>
</tr>
<tr>
<td>Low Ruminator&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( M )</td>
<td>44.14</td>
<td>37.27</td>
<td>16.23</td>
</tr>
<tr>
<td>( SD )</td>
<td>28.46</td>
<td>24.71</td>
<td>17.55</td>
</tr>
</tbody>
</table>

*Note.* Sad Mood Reactivity = sad VAS at T2 minus T1 sad VAS. Sad Mood Recovery = sad VAS T2 minus sad VAS at T3. Positive Mood Reactivity = sad VAS T3 minus sad VAS at T4.  

<sup>a</sup><sub>N = 218</sub>.  
<sup>b</sup><sub>n = 25</sub>.  
<sup>c</sup><sub>n = 49</sub>.  
<sup>d</sup><sub>n = 74</sub>. 


Table 9

Descriptive Statistics for Number of Words Recalled on Directed Forgetting Task for Overall Sample and by Experimental Group

<table>
<thead>
<tr>
<th></th>
<th>List 1</th>
<th>List 2</th>
<th>List 1 neg</th>
<th>List 1 pos</th>
<th>List 2 neg</th>
<th>List 2 pos</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall</strong>^a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M</em></td>
<td>4.81</td>
<td>6.41</td>
<td>2.06</td>
<td>2.75</td>
<td>2.84</td>
<td>3.56</td>
</tr>
<tr>
<td><em>SD</em></td>
<td>2.56</td>
<td>2.70</td>
<td>1.57</td>
<td>1.57</td>
<td>1.49</td>
<td>1.66</td>
</tr>
<tr>
<td><strong>Depressed</strong>^b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M</em></td>
<td>4.44</td>
<td>6.64</td>
<td>1.80</td>
<td>2.64</td>
<td>3.04</td>
<td>3.60</td>
</tr>
<tr>
<td><em>SD</em></td>
<td>2.40</td>
<td>3.59</td>
<td>1.44</td>
<td>1.66</td>
<td>1.93</td>
<td>1.98</td>
</tr>
<tr>
<td><strong>High Ruminator</strong>^c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M</em></td>
<td>5.39</td>
<td>5.92</td>
<td>2.33</td>
<td>3.06</td>
<td>2.55</td>
<td>3.37</td>
</tr>
<tr>
<td><em>SD</em></td>
<td>2.80</td>
<td>2.14</td>
<td>1.83</td>
<td>1.65</td>
<td>1.28</td>
<td>1.44</td>
</tr>
<tr>
<td><strong>Low Ruminator</strong>^d</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>M</em></td>
<td>4.68</td>
<td>6.54</td>
<td>2.15</td>
<td>2.53</td>
<td>2.93</td>
<td>3.59</td>
</tr>
<tr>
<td><em>SD</em></td>
<td>2.44</td>
<td>2.54</td>
<td>1.56</td>
<td>1.35</td>
<td>1.46</td>
<td>1.56</td>
</tr>
</tbody>
</table>

Note. List 1 = number of to-be-forgotten words recalled. List 2 = number of to-be-remembered words recalled. List 1 neg = number of to-be-forgotten negative words recalled. List 1 pos = number of to-be-forgotten positive words recalled. List 2 neg = number of to-be-forgotten negative words recalled. List 2 pos = number of to-be-remembered positive words recalled.

^a*N* = 218. ^b*n* = 25. ^c*n* = 49. ^d*n* = 74.
Table 10

Summary of Repeated Measures ANOVA for Predicting Number of Words Recalled by List, Valence, and Experimental Group – Experimental Group Sample

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>.23</td>
<td>2</td>
<td>.11</td>
<td>.02</td>
<td>.98</td>
<td>.00</td>
</tr>
<tr>
<td>Error</td>
<td>658.40</td>
<td>145</td>
<td>4.54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Subjects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List</td>
<td>71.00</td>
<td>1</td>
<td>71.00</td>
<td>33.93***</td>
<td>&lt;.001</td>
<td>.19</td>
</tr>
<tr>
<td>List x Group</td>
<td>16.83</td>
<td>2</td>
<td>8.42</td>
<td>4.02*</td>
<td>.02</td>
<td>.05</td>
</tr>
<tr>
<td>Error (list)</td>
<td>303.92</td>
<td>145</td>
<td>2.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valence</td>
<td>53.88</td>
<td>1</td>
<td>54.25</td>
<td>35.23***</td>
<td>.00</td>
<td>.20</td>
</tr>
<tr>
<td>Valence x Group</td>
<td>2.05</td>
<td>2</td>
<td>1.02</td>
<td>.67</td>
<td>.51</td>
<td>.01</td>
</tr>
<tr>
<td>Error (valence)</td>
<td>221.71</td>
<td>145</td>
<td>1.53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List x Valence</td>
<td>.03</td>
<td>1</td>
<td>.03</td>
<td>.02</td>
<td>.90</td>
<td>.00</td>
</tr>
<tr>
<td>List x Valence x Group</td>
<td>1.51</td>
<td>2</td>
<td>.76</td>
<td>.50</td>
<td>.61</td>
<td>.01</td>
</tr>
<tr>
<td>Error (List x Valence)</td>
<td>220.44</td>
<td>145</td>
<td>1.52</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Group = depressed, high ruminator, and low ruminator groups. List = forget and remember conditions on the directed forgetting task. Valence = positive and negative words on the directed forgetting task.

$n = 148$. Depressed ($n = 25$), high ruminator ($n = 49$), low ruminator ($n = 74$).

***$p < .001$, **$p < .01$, *$p < .05$
Table 11

Number of Movie-Related Thoughts at T1 and T2 by Condition and Experimental Group

Based on Log Transformed Scores – Experimental Group Sample

<table>
<thead>
<tr>
<th>Condition and Group</th>
<th>T1 Thoughts</th>
<th>T2 Thoughts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Suppress&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.09 (.46)</td>
<td>.89 (.34)</td>
</tr>
<tr>
<td>High Ruminator&lt;sup&gt;d&lt;/sup&gt;</td>
<td>.97 (.38)</td>
<td>.71 (.40)</td>
</tr>
<tr>
<td>Low Ruminator&lt;sup&gt;e&lt;/sup&gt;</td>
<td>.75 (.32)</td>
<td>.43 (.28)</td>
</tr>
<tr>
<td>Monitor Only&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed&lt;sup&gt;c&lt;/sup&gt;</td>
<td>111 (.46)</td>
<td>.80 (.23)</td>
</tr>
<tr>
<td>High Ruminator&lt;sup&gt;d&lt;/sup&gt;</td>
<td>1.05 (.33)</td>
<td>.66 (.42)</td>
</tr>
<tr>
<td>Low Ruminator&lt;sup&gt;e&lt;/sup&gt;</td>
<td>.72 (.40)</td>
<td>.50 (.37)</td>
</tr>
</tbody>
</table>

Note. Thoughts T1 and Thoughts T2 = number of movie-related thoughts reported on the thought monitoring task at time 1 and 2, respectively. Suppress and Monitor Only = suppression and monitor only conditions on the thought monitoring task. Logarithmic transformations were applied to the thought variables.

<sup>a</sup>n = 77. <sup>b</sup>n = 71. <sup>c</sup>n = 25. <sup>d</sup>n = 49. <sup>e</sup>n = 74.
Table 12

Number of Movie-Related Thoughts at T1 and T2 by Condition and Experimental Group

Based on Raw Scores – Experimental Group Sample

<table>
<thead>
<tr>
<th>Condition and Group</th>
<th>T1 Thoughts</th>
<th>T2 Thoughts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Suppress&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed&lt;sup&gt;c&lt;/sup&gt;</td>
<td>16.92 (13.41)</td>
<td>9.31 (8.52)</td>
</tr>
<tr>
<td>High Ruminator&lt;sup&gt;d&lt;/sup&gt;</td>
<td>11.46 (8.40)</td>
<td>6.46 (6.49)</td>
</tr>
<tr>
<td>Low Ruminator&lt;sup&gt;e&lt;/sup&gt;</td>
<td>6.08 (4.59)</td>
<td>2.26 (2.06)</td>
</tr>
<tr>
<td>Monitor Only&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed&lt;sup&gt;f&lt;/sup&gt;</td>
<td>18.92 (20.81)</td>
<td>6.58 (7.41)</td>
</tr>
<tr>
<td>High Ruminator&lt;sup&gt;g&lt;/sup&gt;</td>
<td>13.65 (12.59)</td>
<td>5.96 (6.75)</td>
</tr>
<tr>
<td>Low Ruminator&lt;sup&gt;h&lt;/sup&gt;</td>
<td>6.72 (6.87)</td>
<td>3.44 (4.07)</td>
</tr>
</tbody>
</table>

Note. T1 and T2 Thoughts = number of movie-related thoughts on the thought monitoring task at time 1 and 2, respectively. Suppress and Monitor Only = suppression and monitor only conditions on the thought monitoring task.

<sup>a</sup>n = 77. <sup>b</sup>n = 71. <sup>c</sup>n = 13. <sup>d</sup>n =26. <sup>e</sup>n = 38. <sup>f</sup>n= 12. <sup>g</sup>n=23. <sup>h</sup>n= 36.
Table 13

*Summary of Repeated Measures ANOVA for Predicting Frequency of Movie-Related Intrusions by Group, Condition, and CII - Experimental Group Sample*

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>(Mean Square)</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>5.56</td>
<td>2</td>
<td>2.77</td>
<td>15.16***</td>
<td>$p &lt; .001$</td>
<td>.18</td>
</tr>
<tr>
<td>Condition</td>
<td>.08</td>
<td>1</td>
<td>.08</td>
<td>.44</td>
<td>.51</td>
<td>.00</td>
</tr>
<tr>
<td>CII</td>
<td>2.36</td>
<td>1</td>
<td>2.39</td>
<td>12.90***</td>
<td>$p &lt; .001$</td>
<td>.09</td>
</tr>
<tr>
<td>Group x condition</td>
<td>.14</td>
<td>2</td>
<td>.07</td>
<td>.39</td>
<td>.68</td>
<td>.01</td>
</tr>
<tr>
<td>Group x CII</td>
<td>.78</td>
<td>2</td>
<td>.39</td>
<td>2.14</td>
<td>.12</td>
<td>.03</td>
</tr>
<tr>
<td>Condition x CII</td>
<td>.45</td>
<td>1</td>
<td>.45</td>
<td>2.45</td>
<td>.12</td>
<td>.02</td>
</tr>
<tr>
<td>Group x condition x CII</td>
<td>.34</td>
<td>2</td>
<td>.17</td>
<td>.93</td>
<td>.40</td>
<td>.01</td>
</tr>
<tr>
<td>Error</td>
<td>24.59</td>
<td>136</td>
<td>.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>4.02</td>
<td>1</td>
<td>4.02</td>
<td>65.32***</td>
<td>$p &lt; .001$</td>
<td>.32</td>
</tr>
<tr>
<td>Time x group</td>
<td>.09</td>
<td>2</td>
<td>.04</td>
<td>.72</td>
<td>.49</td>
<td>.01</td>
</tr>
<tr>
<td>Time x condition</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.05</td>
<td>.82</td>
<td>.00</td>
</tr>
<tr>
<td>Time x CII</td>
<td>.91</td>
<td>1</td>
<td>.91</td>
<td>14.82***</td>
<td>$p &lt; .001$</td>
<td>.10</td>
</tr>
<tr>
<td>Time x group x condition</td>
<td>.26</td>
<td>2</td>
<td>.13</td>
<td>2.11</td>
<td>.13</td>
<td>.03</td>
</tr>
<tr>
<td>Time x group x CII</td>
<td>.15</td>
<td>2</td>
<td>.08</td>
<td>1.23</td>
<td>.30</td>
<td>.02</td>
</tr>
<tr>
<td>Time x condition x CII</td>
<td>.20</td>
<td>1</td>
<td>.20</td>
<td>3.25</td>
<td>.07</td>
<td>.02</td>
</tr>
<tr>
<td>Time x group x condition x CII</td>
<td>.23</td>
<td>2</td>
<td>.11</td>
<td>1.85</td>
<td>.16</td>
<td>.03</td>
</tr>
<tr>
<td>Error</td>
<td>8.36</td>
<td>136</td>
<td>.06</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 13

Note. Dependent variable = frequency of movie-related intrusions. Time = T1 and T2.
Condition = suppress and monitor only conditions. Group = depressed (n = 25), high
ruminator (n = 49) and low ruminator (n = 74). CII = cognitive inhibition index. All means
are adjusted to covary the effects of CII.

***p < .001, **p < .01, *p < .05.
Table 14

Summary of ANOVA Predicting Sad Mood Recovery from Group, Condition, and CII -

Experimental Group Sample

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>(Mean Square)</th>
<th>F</th>
<th>p</th>
<th>(\eta_p^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>4983.45</td>
<td>2</td>
<td>2491.73</td>
<td>4.29**</td>
<td>.02</td>
<td>.06</td>
</tr>
<tr>
<td>Condition</td>
<td>1728.72</td>
<td>1</td>
<td>1728.72</td>
<td>3.00</td>
<td>.09</td>
<td>.02</td>
</tr>
<tr>
<td>CII</td>
<td>660.77</td>
<td>1</td>
<td>660.77</td>
<td>1.14</td>
<td>.29</td>
<td>.01</td>
</tr>
<tr>
<td>Group x Condition</td>
<td>1034.78</td>
<td>2</td>
<td>517.39</td>
<td>.89</td>
<td>.41</td>
<td>.01</td>
</tr>
<tr>
<td>Group x CII</td>
<td>7343.49</td>
<td>2</td>
<td>3671.85</td>
<td>6.32***</td>
<td>.00</td>
<td>.09</td>
</tr>
<tr>
<td>Group x Condition x CII</td>
<td>925.30</td>
<td>2</td>
<td>462.52</td>
<td>.80</td>
<td>.45</td>
<td>.01</td>
</tr>
<tr>
<td>Error</td>
<td>79023.89</td>
<td>136</td>
<td>581.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>288240.00</td>
<td>148</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Dependent variable = sad mood recovery. Group = depressed (n = 25), high ruminator (n = 49) and low ruminator (n = 74) groups. Condition = suppression and monitor only conditions. CII = cognitive inhibition index. All means are adjusted to covary the effects of CII. n = 148.*

***p < .001, **p < .01, *p < .05
Table 15

*Number of Words Recalled on the Directed Forgetting Task by Depression Status - Overall Sample.*

<table>
<thead>
<tr>
<th>Depressed(^a)</th>
<th>List 1</th>
<th>List 2</th>
<th>List 1 neg</th>
<th>List 1 pos</th>
<th>List 2 neg</th>
<th>List 2 pos</th>
</tr>
</thead>
<tbody>
<tr>
<td>(M)</td>
<td>4.53</td>
<td>6.70</td>
<td>1.77</td>
<td>2.77</td>
<td>3.07</td>
<td>3.63</td>
</tr>
<tr>
<td>(SD)</td>
<td>2.27</td>
<td>3.39</td>
<td>1.38</td>
<td>1.57</td>
<td>1.82</td>
<td>1.87</td>
</tr>
<tr>
<td>Nondepressed(^b)</td>
<td>(M)</td>
<td>4.86</td>
<td>6.36</td>
<td>2.11</td>
<td>2.75</td>
<td>2.81</td>
</tr>
<tr>
<td>(SD)</td>
<td>2.60</td>
<td>2.58</td>
<td>1.60</td>
<td>1.57</td>
<td>1.44</td>
<td>1.63</td>
</tr>
</tbody>
</table>

Note. List 1 = number of forget words recalled. List 2 = number of remember words recalled. List 1 neg = number of negative forget words recalled. List 1 pos = number of positive forget words recalled. List 2 neg = number of negative remember words recalled. List 2 pos = number of positive remember words recalled.

\(^a\)\(n = 30.\) \(^b\)\(n = 188.\)
Table 16

Summary of Repeated Measures ANOVA for Predicting Number of Words Recalled on the Directed Forgetting Task - Overall Sample.

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>(Mean Square)</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>1.19</td>
<td>1</td>
<td>1.19</td>
<td>.26</td>
<td>.61</td>
<td>.00</td>
</tr>
<tr>
<td>RRS</td>
<td>2.59</td>
<td>1</td>
<td>2.59</td>
<td>.57</td>
<td>.45</td>
<td>.00</td>
</tr>
<tr>
<td>Group x RRS</td>
<td>.61</td>
<td>1</td>
<td>.61</td>
<td>.14</td>
<td>.71</td>
<td>.00</td>
</tr>
<tr>
<td>Error</td>
<td>969.86</td>
<td>214</td>
<td>4.53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List</td>
<td>15.62</td>
<td>1</td>
<td>15.62</td>
<td>6.72*</td>
<td>.01</td>
<td>.03</td>
</tr>
<tr>
<td>List x Group</td>
<td>.05</td>
<td>1</td>
<td>.05</td>
<td>.02</td>
<td>.88</td>
<td>.00</td>
</tr>
<tr>
<td>List x RRS</td>
<td>.02</td>
<td>1</td>
<td>.02</td>
<td>.01</td>
<td>.93</td>
<td>.00</td>
</tr>
<tr>
<td>List x RRS x Group</td>
<td>3.87</td>
<td>1</td>
<td>3.87</td>
<td>1.67</td>
<td>.20</td>
<td>.01</td>
</tr>
<tr>
<td>Error (list)</td>
<td>496.94</td>
<td>214</td>
<td>2.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valence</td>
<td>19.50</td>
<td>1</td>
<td>19.50</td>
<td>12.60***</td>
<td>&lt;.001</td>
<td>.06</td>
</tr>
<tr>
<td>Valence x Group</td>
<td>.37</td>
<td>1</td>
<td>.37</td>
<td>.24</td>
<td>.63</td>
<td>.00</td>
</tr>
<tr>
<td>Valence x RRS</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>.01</td>
<td>.93</td>
<td>.00</td>
</tr>
<tr>
<td>Valence x RRS x Group</td>
<td>.67</td>
<td>1</td>
<td>.67</td>
<td>.44</td>
<td>.51</td>
<td>.00</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error (valence)</td>
<td>331.15</td>
<td>214</td>
<td>1.55</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 16

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>(Mean Square)</th>
<th>F</th>
<th>p</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>List x Valence</td>
<td>1.30</td>
<td>1</td>
<td>1.30</td>
<td>.86</td>
<td>.35</td>
<td>.00</td>
</tr>
<tr>
<td>List x Valence x</td>
<td>1.77</td>
<td>1</td>
<td>1.77</td>
<td>1.17</td>
<td>.28</td>
<td>.01</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>List x Valence x RRS</td>
<td>.25</td>
<td>1</td>
<td>.25</td>
<td>.17</td>
<td>.68</td>
<td>.00</td>
</tr>
<tr>
<td>List x Valence x RRS</td>
<td>.95</td>
<td>1</td>
<td>.95</td>
<td>.63</td>
<td>.43</td>
<td>.00</td>
</tr>
<tr>
<td>Error (List x Valence)</td>
<td>323.14</td>
<td>214</td>
<td>1.51</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Group = Depressed (n = 30) and Nondepressed (n = 188). RRS = Ruminative Response Scale. List = list 1 or 2. Valence = positive or negative words. RRS is Mean centered. All means are adjusted to covary the effects of RRS.

***p < .001, **p < .01, *p < .05
Table 17

Descriptive Statistics for Movie-Related Thoughts at T1 and T2 by Condition and Depression Status based on Log Transformed Scores - Overall Sample

<table>
<thead>
<tr>
<th>Group and Condition</th>
<th>Thoughts T1</th>
<th>Thoughts T2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suppression</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed(^a)</td>
<td>.85 (.37)</td>
<td>.55 (.37)</td>
</tr>
<tr>
<td>Nondepressed(^d)</td>
<td>.85 (.37)</td>
<td>.55 (.37)</td>
</tr>
<tr>
<td><strong>Monitor Only</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed(^e)</td>
<td>1.09 (.42)</td>
<td>.77 (.26)</td>
</tr>
<tr>
<td>Nondepressed(^f)</td>
<td>.88 (.41)</td>
<td>.62 (.37)</td>
</tr>
</tbody>
</table>

Note. T1 and T2 Thoughts = frequency of movie-related thoughts on the thought monitoring task at time 1 and time 2, respectively. Suppression and Monitor Only = suppression and monitor only conditions on the thought monitoring task. Log transformations were applied to T1 and T2 thoughts.

\(^a\)\(n = 108\). \(^b\)\(n = 110\). \(^c\)\(n = 15\). \(^d\)\(n = 95\). \(^e\)\(n = 15\). \(^f\)\(n = 93\).
Table 18

*Descriptive Statistics for Movie-Related Thoughts at T1 and T2 by Condition and Depression Status based on Raw Scores - Overall Sample*

<table>
<thead>
<tr>
<th>Group and Condition</th>
<th>Thoughts T1</th>
<th>Thoughts T2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suppression</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed</td>
<td>16.33 (12.63)</td>
<td>8.73 (8.07)</td>
</tr>
<tr>
<td>Nondepressed</td>
<td>8.90 (7.88)</td>
<td>4.13 (5.04)</td>
</tr>
<tr>
<td><strong>Monitor Only</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressed</td>
<td>17.40 (18.93)</td>
<td>6.27 (6.90)</td>
</tr>
<tr>
<td>Nondepressed</td>
<td>10.19 (10.97)</td>
<td>4.82 (5.27)</td>
</tr>
</tbody>
</table>

*Note.* T1 and T2 Thoughts = frequency of movie-related thoughts on the thought monitoring task at time 1 and time 2, respectively. Suppression and Monitor Only = suppression and monitor only conditions on the thought monitoring task.

\(^{a}n = 108.^{b}n = 110.^{c}n = 15.^{d}n = 95.^{e}n = 15.^{f}n = 93.*
Table 19

*Summary of Repeated Measures ANOVA for Predicting Movie-Related Intrusions by Depression Status, Condition, CII, and RRS - Overall Sample*

<table>
<thead>
<tr>
<th>Between-Subjects</th>
<th>Sum of Squares</th>
<th>df</th>
<th>(Mean Square)</th>
<th>F</th>
<th>p</th>
<th>(\eta^2_p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>.38</td>
<td>1</td>
<td>.38</td>
<td>1.89</td>
<td>.17</td>
<td>.01</td>
</tr>
<tr>
<td>Condition</td>
<td>.11</td>
<td>1</td>
<td>.11</td>
<td>.53</td>
<td>.47</td>
<td>.00</td>
</tr>
<tr>
<td>CII</td>
<td>1.51</td>
<td>1</td>
<td>1.51</td>
<td>7.59**</td>
<td>.01</td>
<td>.03</td>
</tr>
<tr>
<td>RRS</td>
<td>.34</td>
<td>1</td>
<td>.34</td>
<td>1.70</td>
<td>.19</td>
<td>.01</td>
</tr>
<tr>
<td>Group x Condition</td>
<td>.02</td>
<td>1</td>
<td>.02</td>
<td>.08</td>
<td>.77</td>
<td>.00</td>
</tr>
<tr>
<td>Group x CII</td>
<td>1.22</td>
<td>1</td>
<td>1.22</td>
<td>6.11</td>
<td>.01</td>
<td>.03</td>
</tr>
<tr>
<td>Group x RRS</td>
<td>.19</td>
<td>1</td>
<td>.19</td>
<td>.95</td>
<td>.33</td>
<td>.01</td>
</tr>
<tr>
<td>Condition x CII</td>
<td>.06</td>
<td>1</td>
<td>.06</td>
<td>.31</td>
<td>.58</td>
<td>.00</td>
</tr>
<tr>
<td>Condition x RRS</td>
<td>.10</td>
<td>1</td>
<td>.10</td>
<td>.05</td>
<td>.82</td>
<td>.00</td>
</tr>
<tr>
<td>CII x RRS</td>
<td>.70</td>
<td>1</td>
<td>.70</td>
<td>3.50</td>
<td>.06</td>
<td>.02</td>
</tr>
<tr>
<td>Group x Condition x CII</td>
<td>.25</td>
<td>1</td>
<td>.25</td>
<td>1.28</td>
<td>.26</td>
<td>.01</td>
</tr>
<tr>
<td>Group x CII x RRS</td>
<td>.62</td>
<td>1</td>
<td>.62</td>
<td>3.09</td>
<td>.08</td>
<td>.02</td>
</tr>
<tr>
<td>Condition x CII x RRS</td>
<td>.06</td>
<td>1</td>
<td>.06</td>
<td>.29</td>
<td>.59</td>
<td>.00</td>
</tr>
<tr>
<td>Group x Condition x CII x RRS</td>
<td>.04</td>
<td>1</td>
<td>.04</td>
<td>.18</td>
<td>.67</td>
<td>.00</td>
</tr>
<tr>
<td>Error</td>
<td>40.28</td>
<td>202</td>
<td>.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 19

<table>
<thead>
<tr>
<th>Within-Subjects</th>
<th>Sum of Squares</th>
<th>df</th>
<th>(Mean Square)</th>
<th>$F$</th>
<th>$p$</th>
<th>$\eta^2_p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>1.01</td>
<td>1</td>
<td>1.01</td>
<td>14.71***</td>
<td>&lt; .001</td>
<td>.07</td>
</tr>
<tr>
<td>Time x Group</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>10</td>
<td>.75</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Condition</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>.08</td>
<td>.78</td>
<td>.00</td>
</tr>
<tr>
<td>Time x CII</td>
<td>.05</td>
<td>1</td>
<td>.05</td>
<td>.73</td>
<td>.40</td>
<td>.00</td>
</tr>
<tr>
<td>Time x RRS</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.05</td>
<td>.83</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Group x Condition</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>.17</td>
<td>.68</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Group x CII</td>
<td>.03</td>
<td>1</td>
<td>.03</td>
<td>.42</td>
<td>.52</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Group x RRS</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>.17</td>
<td>.79</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Condition x CII</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>.07</td>
<td>.79</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Condition x RRS</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>.13</td>
<td>.72</td>
<td>.00</td>
</tr>
<tr>
<td>Time x CII x RRS</td>
<td>.01</td>
<td>1</td>
<td>.01</td>
<td>.01</td>
<td>.91</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Group x Condition x CII</td>
<td>8.15E-5</td>
<td>1</td>
<td>8.15E-5</td>
<td>.00</td>
<td>.97</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Group x Condition x RRS</td>
<td>.04</td>
<td>1</td>
<td>.04</td>
<td>.56</td>
<td>.45</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Group x CII x RRS</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.00</td>
<td>.94</td>
<td>.00</td>
</tr>
<tr>
<td>Time x Condition x CII x RRS</td>
<td>.00</td>
<td>1</td>
<td>.00</td>
<td>.01</td>
<td>.91</td>
<td>.00</td>
</tr>
</tbody>
</table>
Table 19

**Note.** $N = 218$. T1 and T2 thoughts = frequency of movie-related thoughts at time 1 and 2, respectively. Condition = suppression and monitor only conditions on the thought monitoring task. Group = depressed ($n = 30$) and nondepressed ($n = 188$). RRS = Ruminative Response Scale. CII = cognitive inhibition index. Logarithmic transformations were applied for T1 and T2 thoughts. CII and RRS were mean centered. All means were adjusted to covary the effects of CII and RRS.

***$p < .001$, **$p < .01$, *$p < .05$
Table 20

*Descriptive Statistics for Sad Mood Recovery by Depression Status and Condition – Overall Sample*

<table>
<thead>
<tr>
<th>Sad Mood Recovery</th>
<th>Depressed (^a)</th>
<th>Nondepressed (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Suppress (^c)</td>
<td>Monitor Only (^d)</td>
</tr>
<tr>
<td>(M)</td>
<td>28.47</td>
<td>21.53</td>
</tr>
<tr>
<td>(SD)</td>
<td>23.29</td>
<td>21.30</td>
</tr>
</tbody>
</table>

*Note.* Suppress and Monitor Only = suppression and monitor only conditions on the thought monitoring task.

\(^a\) \(n = 30\). \(^b\) \(n = 188\). \(^c\) \(n = 15\). \(^d\) \(n = 15\). \(^e\) \(n = 93\). \(^f\) \(n = 95\).
### Table 21

**Summary of Results from One-Way ANOVA for Predicting Sad Mood Recovery**

*From Depression Status, Condition, RRS and CII – Overall Sample*

<table>
<thead>
<tr>
<th>Between Subjects</th>
<th>Sum of Squares</th>
<th>df</th>
<th>(Mean Square)</th>
<th>F</th>
<th>p</th>
<th>η²p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>488.53</td>
<td>1</td>
<td>488.53</td>
<td>.83</td>
<td>.36</td>
<td>.00</td>
</tr>
<tr>
<td>Condition</td>
<td>115.84</td>
<td>1</td>
<td>115.84</td>
<td>.20</td>
<td>.66</td>
<td>.00</td>
</tr>
<tr>
<td>CII</td>
<td>1501.14</td>
<td>1</td>
<td>1501.14</td>
<td>2.55</td>
<td>.11</td>
<td>.01</td>
</tr>
<tr>
<td>RRS</td>
<td>233.56</td>
<td>1</td>
<td>233.56</td>
<td>.40</td>
<td>.53</td>
<td>.00</td>
</tr>
<tr>
<td>Condition x CII</td>
<td>74.20</td>
<td>1</td>
<td>74.20</td>
<td>.13</td>
<td>.72</td>
<td>.00</td>
</tr>
<tr>
<td>Group x Condition</td>
<td>246.48</td>
<td>1</td>
<td>246.48</td>
<td>.42</td>
<td>.52</td>
<td>.00</td>
</tr>
<tr>
<td>Condition x RRS</td>
<td>577.77</td>
<td>1</td>
<td>577.77</td>
<td>.98</td>
<td>.32</td>
<td>.01</td>
</tr>
<tr>
<td>Group x CII</td>
<td>1493.26</td>
<td>1</td>
<td>1493.26</td>
<td>2.53</td>
<td>.11</td>
<td>.01</td>
</tr>
<tr>
<td>CII x RRS</td>
<td>1240.10</td>
<td>1</td>
<td>1240.10</td>
<td>2.10</td>
<td>.15</td>
<td>.01</td>
</tr>
<tr>
<td>Group x RRS</td>
<td>448.58</td>
<td>1</td>
<td>448.58</td>
<td>.76</td>
<td>.38</td>
<td>.00</td>
</tr>
<tr>
<td>Group x Condition x CII</td>
<td>.04</td>
<td>1</td>
<td>.04</td>
<td>.00</td>
<td>.99</td>
<td>.00</td>
</tr>
<tr>
<td>Condition x CII x RRS</td>
<td>299.74</td>
<td>1</td>
<td>299.74</td>
<td>.51</td>
<td>.48</td>
<td>.00</td>
</tr>
<tr>
<td>Group x Condition x RRS</td>
<td>57.45</td>
<td>1</td>
<td>57.45</td>
<td>.10</td>
<td>.76</td>
<td>.00</td>
</tr>
<tr>
<td>Group x CII x RRS</td>
<td>3427.13</td>
<td>1</td>
<td>3427.13</td>
<td>5.82</td>
<td>.02</td>
<td>.03</td>
</tr>
<tr>
<td>Group x Condition x CII x RRS</td>
<td>41.54</td>
<td>1</td>
<td>41.58</td>
<td>.07</td>
<td>.79</td>
<td>.00</td>
</tr>
<tr>
<td>Error</td>
<td>119047.86</td>
<td>202</td>
<td>589.35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>446360.00</td>
<td>218</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 21

Note. Group = depressed (n = 30) and nondepressed (n = 188). Condition = suppression and monitor only conditions from the thought monitoring task. CII = cognitive inhibition index. RRS = Ruminative Response Scale. CII and RRS were mean centered. All means were adjusted to covary RRS and CII.

***p < .001, **p < .01, *p < .05.
### Table 22

**Summary of Regression Analysis Predicting the Cognitive Inhibition Index (CII) from Emotion Regulation Strategies – Overall Sample**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>sr²</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p</th>
<th>R²</th>
<th>R² change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.07</td>
<td>.02</td>
<td>.02</td>
<td>.08</td>
<td>1.08</td>
<td>.28</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>-.11</td>
<td>-.00</td>
<td>.00</td>
<td>-.11</td>
<td>-1.62</td>
<td>.11</td>
<td>.11</td>
<td></td>
</tr>
</tbody>
</table>

**Step 2**

| Gender | .06 | .02  | .02 | -.28| -2.97| .41  | .05 | .04       |
| BDI-II | -.20| -.00 | .00 | -.28| -2.97| <.001|     |           |
| RRS    | .18 | .00  | .00 | .25 | 2.56 | .01  |     |           |
| WBSI   | -.03| .00  | .00 | -.04| -.44 | .66  |     |           |
| ERQ-reappraisal | -.02| .00  | .00 | -.02| -.25 | .81  |     |           |
| ERQ-suppression  | .08 | .00  | .00 | .09 | 1.25 | .81  |     |           |

*Note. N = 216. Two participants who were identified as multivariate outliers were removed from analyses. BDI-II = Beck Depression Inventory, 2nd Edition. RRS = Ruminative Response Scale. WBSI = White Bear Suppression Inventory. ERQ-reappraisal and ERQ-suppression = Emotion Regulation Questionnaire, reappraisal and suppression subscales, respectively.*

***p < .001, **p < .01, *p < .05.*
Table 23

**Summary of Regression Analysis Predicting the Control of Unwanted Thoughts Scale (CUTS) from Emotion Regulation Strategies and the Cognitive Inhibition Index (CII)**

---

**Overall Sample**

<table>
<thead>
<tr>
<th>Step</th>
<th>$s_{R}^2$</th>
<th>$B$</th>
<th>$SE$</th>
<th>$\beta$</th>
<th>$t$</th>
<th>$p$</th>
<th>$R^2$</th>
<th>$R^2$ change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>.47</strong></td>
</tr>
<tr>
<td>Gender</td>
<td>.04</td>
<td>2.97</td>
<td>3.74</td>
<td>.04</td>
<td>.79</td>
<td>.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>.67</td>
<td>2.47</td>
<td>.18</td>
<td>.68</td>
<td>13.45</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>.70</strong></td>
<td><strong>.24</strong></td>
</tr>
<tr>
<td>Gender</td>
<td>.01</td>
<td>1.08</td>
<td>2.88</td>
<td>.02</td>
<td>.38</td>
<td>.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BDI-II</td>
<td>.19</td>
<td>.96</td>
<td>.19</td>
<td>.26</td>
<td>4.98</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RRS</td>
<td>.27</td>
<td>1.00</td>
<td>.14</td>
<td>.41</td>
<td>7.30</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBSI</td>
<td>.26</td>
<td>.92</td>
<td>.13</td>
<td>.32</td>
<td>7.01</td>
<td>&lt;.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERQ-reappraisal</td>
<td>.07</td>
<td>.29</td>
<td>.17</td>
<td>.07</td>
<td>1.76</td>
<td>.08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERQ-suppression</td>
<td>.00</td>
<td>.00</td>
<td>.31</td>
<td>.00</td>
<td>.01</td>
<td>.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CII</td>
<td>-.02</td>
<td>-6.14</td>
<td>9.41</td>
<td>-.03</td>
<td>-.65</td>
<td>.52</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 216. Two participants who were identified as multivariate outliers were removed from this analysis. Dependent Variable = CUTS (Control of Unwanted Thoughts Scale). CII = cognitive inhibition index. BDI-II = Beck Depression Inventory, 2nd Edition. RRS = Ruminative Response Scale. WBSI = White Bear Suppression Inventory. ERQ-reappraisal and ERQ-suppression = Emotion Regulation Questionnaire, reappraisal and suppression subscales, respectively.*
***p < .001, **p < .01, *p < .05.
7.0 References


*Motivation and Emotion, 22*(1), 1-32. doi:10.1023/A:1023080224401


De Lissnyder, E., Koster, E. H. W., Derakshan, N., & De Raedt, R. (2010). The association between depressive symptoms and executive control impairments in


doi:10.1037/0033-2909.121.3.395


Grant, S., Aitchison, T., Henderson, E., Christie, J., Zare, S., McMurray, J., & Dargie, H. (1999). A comparison of the reproducibility and the sensitivity to change of


Mathews, A., & MacLeod, C. (2005). *Cognitive vulnerability to emotional disorders*


doi:10.1023/A:1018709212986


Oberauer, K. (2001). Removing irrelevant information from working memory: A
cognitive aging study with the Modified Sternberg Task. *Journal of Experimental
Psychology: Learning, Memory, and Cognition, 27*(4), 948-957. doi:10.1037/0278-7393.27.4.948

differences in short-term recognition. *Journal of Experimental Psychology:
General, 134*(3), 368-387. doi:10.1037/0096-3445.134.3.368

Oberauer, K. (2005b). Control of the contents of working memory--A comparison of
two paradigms and two age groups. *Journal of Experimental Psychology: Learning,

Ruscio, A. M., & Ruscio, J. (2002). The latent structure of analogue depression:
Should the beck depression inventory be used to classify groups? *Psychological

information-theoretic latent variable modeling. *Personality and Individual


depend on the mode of assessment. *Assessment, 16*(2), 127-144.
doi:10.1177/1073191108330065


Trudel, G., & Goldfarb, M. R. (2010). Marital and sexual functioning and
dysfunctioning, depression and anxiety. *Sexologies: European Journal of Sexology
and Sexual Health/Revue Européenne De Sexologie Et De Santé Sexuelle, 19*(3),
137-142. doi:10.1016/j.sexol.2009.12.009

and birth cohort difference on the children's depression inventory: A meta-analysis.

*Psychoneuroendocrinology, 30*(10), 1059-1065.

doi:10.1016/j.psyneuen.2005.03.012

Greater efficiency in attentional processing related to mindfulness meditation. *The
Quarterly Journal of Experimental Psychology, 63*(6), 1168-1180.

doi:10.1080/17470210903249365

during remission from depression and are related to the number of past episodes:

doi:10.1016/j.biopsycho.2009.03.009

Watkins, E., & Brown, R. G. (2002). Rumination and executive function in depression:
400-402. doi:10.1136/jnnp.72.3.400


APPENDIX A

Recruitment Material
1) **Introductory Psychology Class Announcement:**
Hello, my name is Nicola McHale and I am a PhD student in the clinical psychology program at UNB. I am here today to invite you to participate in a study looking at the relationship between mood, memory and movie watching behaviour. Participation will take up to 1.5 hours and involves completing questionnaires, tasks on a computer as well as a brief, confidential interview regarding current and past disturbances in mood. You will receive 1.5 bonus points towards your grade for your participation.

If you are interested, you can find the study entitled “The Relationship between Mood, Memory and Movie Watching Behaviour” listed on TAPS. You can also contact me at moodmemorystudy@gmail.com. I will leave a poster at the front and outside of the classroom.

Thank you and have a great day!
2) Recruitment from Counselling Services:

Dr. Fuller's Email for Eligible Participants:

Your responses to the demographic questionnaire that you completed as part of your intake assessment at counselling services indicate that you are eligible to participate in a study that looks at relationships between mood, memory and movie-watching behaviour in the hopes of better understanding factors contributing to disturbances in mood. I have attached an invitation to participate in the study, which involves completion of questionnaires, tasks on a computer, and a brief interview administered by a clinical psychology graduate student which asks about disruptions with mood.

You will receive $10 for 1.5 hours of time.

Your responses are completely confidential and will not be shared with your counselor or filed with your records at counseling services. Your participation is completely voluntary and you may choose to withdraw at any time, even after agreeing. Please be assured that participation in the study has no influence on your treatment at counselling services and no one at counselling services will know whether or not you participated in the study, including myself.

Please see the attached sheet for more information.

Sincerely,

Rice Fuller, Ph.D.
Director, Counselling Services
University of New Brunswick- Fredericton
Phone: (506) 453-4820
Fax: (506) 452-6376
Information Sheet for Eligible Participants at Counselling Services:

The Relationship between Mood, Memory and Movie-Watching

Information Sheet

[Explanation for ethics reviewers: students who scored 28 or higher on 10 depression-related questions from the counselling services screening questionnaire (see Appendix O) will be given the following information sheet by the Counselling Services Director]

Researchers at University of New Brunswick are conducting a study on the relationship between mood, memory and movie-watching behaviour. The purpose of the study is to better understand factors that may contribute to mood disturbances. This study involves completing questionnaires related to mood and coping as well as a memory task and an exercise which asks participants to pay attention to their thoughts for several minutes. Additionally, participants will be administered a brief confidential interview with the project co-ordinator, Nicola McHale, who is a Ph.D. student in clinical psychology. The interview focuses on current and past disturbances in mood. The entire study can be completed in up to 1.5 hours and you will be given $10 for participating.

The project is entirely separate from the services you are receiving at Counselling Services. Your responses are completely confidential and will not be shared with your therapist or filed with your records at Counselling Services. Your participation is completely voluntary and you may choose to withdraw at any time, even after agreeing to participate. Whether or not you participate in the study has no influence on your treatment at Counselling Services and no one will know whether or not you participated in the study, including Dr. Fuller. Your name will not appear on any of the research materials except the Consent Form. However, if you indicate that you intend to harm yourself or someone else, Dr. David Clark, a licensed Clinical Psychologist, will be notified to offer assistance to you.

Please email the project co-ordinator, Nicola McHale at moodmemorystudy@gmail.com if you are interested in participating or learning more about this study. You may also contact the project supervisor, Dr. David Clark (clark@unb.ca), who would be happy to answer any questions.
3) Posters:

**Difficulty with Mood?**

Participate in our study entitled:

"The Relationship between Mood, Memory and Movie-Watching"

$10 for Participation

We are currently conducting a study at the University of New Brunswick, which looks at the relationships between mood, memory and movie-watching behaviour, in the hopes of understanding factors contributing to disturbances in mood. Participation requires up to 1.5 hours and involves completion of questionnaires, computer related tasks, and a brief, confidential interview by a Ph.D. student in clinical psychology, which asks about current and past difficulties with mood. **All responses are completely confidential**

For more information please contact the project co-ordinator:

Nicola McHale, at: moodmemorystudy@gmail.com

This study is on file with the UNB Ethics Board (REB # 2012-147)
4) Kijiji and e-daily advertisements

**Difficulty with Mood? Participate in our Study and Earn $10 cash!**

We are currently conducting a study at the University of New Brunswick, which looks at the relationships between mood, memory and movie-watching behaviour, in the hopes of understanding factors contributing to disturbances in mood. Participation requires up to 1.5 hours and involves completion of questionnaires, computer related tasks, and a brief, confidential interview by a Ph.D. student in clinical psychology, which asks about current and past difficulties with mood.

**You will receive $10 for your participation**

All responses are completely confidential

For more information please contact the project co-ordinator:

Nicola McHale, at: moodmemorystudy@gmail.com

4) Form requesting whether campus residents may be contacted to participate in the study

I am interested in being contacted for the study entitled “Mood, Memory, and Movie Watching”

Y / N

Name: _________________________________

Email: ________________________________

Phone Number: _________________________

Alternate Phone Number: ________________________
**Outcome Questionnaire (OQ 45.2)**

**Instructions:**
Looking back over the last week, including today, help us understand how you have been feeling. Read each item carefully and mark the box under the category which best describes your current situation. For this questionnaire, work is defined as employment, school, housework, volunteer work, and so forth. Please do not make any marks in the shaded areas.

<table>
<thead>
<tr>
<th>Name:</th>
<th>Age: _____ yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID #:</td>
<td>Sex: M / F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. I get along well with others</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Almost</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. I tire quickly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I feel no interest in things</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I feel stressed at work/school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I blame myself for things</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I feel irritated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I feel unhappy in my marriage/significant relationship</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I have thoughts of ending my life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I feel weak</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I feel fearful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. After heavy drinking, I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>Statement</td>
<td>Options</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>---------------------------------------------------------------------------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>need a drink the next morning to get going. (If you do not drink, mark “never”)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I find my work/school satisfying</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>I am a happy person</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>I work/study too much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>I feel worthless</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>I am concerned about family trouble</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>I have an unfulfilling sex life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>I feel lonely</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>I have frequent arguments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>I feel loved and wanted</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>I enjoy my spare time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>I have difficulty with concentration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>I feel hopeless about the future</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>I like myself</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Disturbing thoughts come into my mind that I cannot get rid of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. I feel annoyed by people who criticize my drinking (or drug use) (If not applicable, mark “never”)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. I have an upset stomach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. I am not working/studying as well as I used to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. My heart pounds too much</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. I have trouble getting along with friends and close acquaintance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. I am satisfied with my life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32. I have trouble at work/school because of drinking or drug use (If not applicable, mark</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;never&quot;&quot;)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33. I feel that something bad is going to happen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34. I have sore muscles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. I feel afraid of open spaces, of driving, or being on buses, subways, and so forth</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36. I feel nervous</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. I feel my love relationships are full and complete</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. I feel that I am not doing well at work/school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. I have too many disagreements at work/school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. I feel something is wrong with my mind</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41. I have trouble falling asleep or staying asleep</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42. I feel blue</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43. I am satisfied with my</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>relationships with others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44. I feel angry enough at work/school to do something I might regret</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45. I have headaches</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

Ruminative Response Scale (RRS)
People think and do many different things when they feel depressed. Please read each of the items below and indicate whether you almost never, sometimes, often, or almost always think or do each one when you feel down, sad, or depressed. Please indicate what you generally do, not what you think you should do.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Almost never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Think about how alone you feel</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Think “I won’t be able to do my job if I don’t snap out of this”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Think about your feelings of fatigue and achiness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Think about how hard it is to concentrate</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Think “what am I doing to deserve this?”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Think about how passive and unmotivated you feel</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Analyze recent events to try to understand why you are depressed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8</td>
<td>Think about how you don’t seem to feel anything anymore</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>Think “why can’t I get going?”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>Think “why do I always react this way?”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Go away by yourself and think about why you feel this way</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>Write down what you are thinking about and analyze it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>Think about a recent situation, wishing it had gone better</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>Think “I won’t be able to concentrate if I keep feeling this way”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15</td>
<td>Think “why do I have problems other people don’t have?”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>Think “why can’t I handle things better?”</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>Think about how sad you feel</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18</td>
<td>Think about all your shortcomings, failings, faults, mistakes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19</td>
<td>Think about how you don’t feel up to doing anything</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20</td>
<td>Analyze your personality to try to understand why you are depressed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21</td>
<td>Go someplace alone to think about your feelings</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22</td>
<td>Think about how angry you are with yourself</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
APPENDIX C

Questionnaire Package
BACKGROUND INFORMATION SHEET

Date: ________________

Instructions: We would be most grateful if you could answer the following background questions before completing the questionnaires. **Please circle your answer or fill in the blank.**

1. Please circle: Male  Female

2. Current age: ________________ (years)

3. Race/Ethnicity:  
   (1) White  (2) Asian
   (3) Black  (4) Aboriginal
   (5) Other (please specify) ________________

4. Current year in university: ________________ (year)
BDI-II

Not Included due to copyright restrictions
Instructions:

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1-----------------2------------------3------------------4------------------5------------------6--------------7

strongly agree
neutral
strongly disagree

1. ____ When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.

2. ____ I keep my emotions to myself.

3. ____ When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.

4. ____ When I am feeling positive emotions, I am careful not to express them.

5. ____ When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.

6. ____ I control my emotions by not expressing them.

7. ____ When I want to feel more positive emotion, I change the way I'm thinking about the situation.

8. ____ I control my emotions by changing the way I think about the situation I'm in.

9. ____ When I am feeling negative emotions, I make sure not to express them.

10. ____ When I want to feel less negative emotion, I change the way I'm thinking about the situation.
**CUTS-40**

**Instructions:**

Please recall some recent experiences you have had with unwanted thoughts. ‘Unwanted thoughts’ can include worries:

- Worries or unpleasant thoughts that occur against your will
- Thoughts that, in and of themselves, might not be unpleasant but are ones you don’t want to have at a particular time or in a particular place.

Listed below are a series of statements that refer to the general experience of unwanted thoughts and one’s attempt to gain control over them. Please indicate how much you agree with each statement by circling the number that best reflects your experience with unwanted thoughts and your control of them.

**PART A.**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Disagree/Not Applicable</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Agree Moderately</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My unwanted thoughts tend to be persistent.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. My unwanted thoughts can interfere with what I am doing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I have unwanted thoughts much of the time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I find it difficult to tell when I’ve achieved good control over an unwanted thought.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. My mind tends to race with unwanted thoughts.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Statements</td>
<td>Disagree/Not Applicable</td>
<td>Slightly Agree</td>
<td>Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>----------------</td>
<td>-------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td>6. My unwanted thoughts tend to involve situation(s) or problem(s) that require my attention.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. I often try to remove or suppress unwanted thoughts that have entered my mind.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8. I have difficulty exerting enough control over my unwanted thoughts so that they no longer bother me.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9. Many of my unwanted thoughts are distressing to me.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10. It is easy to lose my desired level of control over unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11. I tend to have the same unwanted thought over and over.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12. I am concerned that failure to control certain unwanted thoughts could lead to dire consequences for others or myself.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Statements</td>
<td>Disagree/Not Applicable</td>
<td>Slightly Agree</td>
<td>Agree</td>
<td>Agree Moderately</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>----------------</td>
<td>-------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>13. It doesn’t take much to trigger my unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14. If left unattended, some of my unwanted thoughts could lead to serious consequences.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15. I tend to have unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16. Once an unwanted thought enters my mind, it usually interferes with my concentration despite my best efforts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. It is important that I maintain control over my thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. I should try harder to prevent or remove unwanted thoughts from my mind.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. It is important for me to maintain strict control over unwanted thinking.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. When my unwanted thoughts occur, they really stand out in my mind.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Statements</td>
<td>Disagree/Not Applicable</td>
<td>Slightly Agree</td>
<td>Agree</td>
<td>Agree Moderately</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>----------------</td>
<td>-------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>21. Sometimes I think there must be something wrong with me because I have so many unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. I wonder if some of my unwanted intrusive thoughts are due to unresolved issues.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. I think I have a problem with unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. I haven’t really found any strategies that work well at getting rid of my unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. My unwanted thoughts must have importance, or they wouldn’t keep coming back.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26. I get really down on myself for not having better control over my unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27. I often try to prevent unwanted thoughts from entering my mind.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Statements</td>
<td>Disagree/Not Applicable</td>
<td>Slightly Agree</td>
<td>Agree</td>
<td>Agree Moderately</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------</td>
<td>----------------</td>
<td>-------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>28. My unwanted thoughts can make it hard to concentrate.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>29. I try very hard to prevent unwanted thoughts from entering my mind.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>30. I can’t have peace of mind until I’ve resolved my unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>31. Unwanted thoughts can make me feel guilty.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>32. If I don’t control my unwanted thoughts, I will no longer be able to function well.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>33. If only I had more willpower or discipline, I would have better control over my unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>34. I try to distract myself from unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>35. When things in my life go badly, I am more likely to have difficulty with unwanted thoughts.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Statements</td>
<td>Disagree/Not Applicable</td>
<td>Slightly Agree</td>
<td>Agree</td>
<td>Agree Moderately</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>----------------</td>
<td>-------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>36. I try very hard to get unwanted thoughts out of my mind.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37. I tend to become overwhelmed by my unwanted thoughts.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38. My unwanted thoughts tend to grab my attention.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39. I'm concerned that if I fail to control my unwanted thoughts, I will feel more and more upset.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40. I'm concerned that if I don't control my unwanted thoughts, they will become more and more frequent.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PART B.**

While you were completing the questionnaire items, you probably had in mind one or two unwanted thoughts that you experienced and tried to control. In the space provided below, please indicate the most frequent or upsetting unwanted thought that you used as a basis for answering this questionnaire.

---
## WBSI

This survey is about thoughts. There are no right or wrong answers, so please respond honestly to each of the items below. Be sure to answer every item by circling the appropriate letter beside each.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Neutral or Don't Know</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
</tbody>
</table>

1. **A B C D E** There are things I prefer not to think about.
2. **A B C D E** Sometimes I wonder why I have the thoughts I do.
3. **A B C D E** I have thoughts that I cannot stop.
4. **A B C D E** There are images that come to mind that I cannot erase.
5. **A B C D E** My thoughts frequently return to one idea.
6. **A B C D E** I wish I could stop thinking of certain things.
7. **A B C D E** Sometimes my mind races so fast I wish I could stop it.
8. **A B C D E** I always try to put problems out of mind.
9. **A B C D E** There are thoughts that keep jumping into my head.
10. **A B C D E** There are things that I try not to think about.
11. **A B C D E** Sometimes I really wish I could stop thinking.
12. **A B C D E** I often do things to distract myself from my thoughts.
13. **A B C D E** I have thoughts that I try to avoid.
14. **A B C D E** There are many thoughts that I have that I don't tell anyone.
15. **A B C D E** Sometimes I stay busy just to keep thoughts from intruding on my mind.
APPENDIX D

Visual Analogue Scale (VAS)
Visual Analogue Scales (VASs)

Instructions: Please rate the way you feel at this moment on the following six scales. The line labeled from 0 to 100 represents the full range of each emotion. Rate the intensity of your feeling by placing a vertical mark across the line at the point that best indicates how you are feeling at this moment.

0

|----------------------| 100

NOT AT
ALL SAD

0

|----------------------| 100

NOT AT
ALL CURIOUS

0

|----------------------| 100

NOT AT
ALL HAPPY

0

|----------------------| 100

NOT AT
ALL DEPRESSED

0

|----------------------| 100

NOT AT
ALL LAZY

0

|----------------------| 100

NOT AT
ALL SPONTANEOUS

0

|----------------------| 100

EXTREMELY SAD

EXTREMELY CURIOUS

EXTREMELY HAPPY

EXTREMELY DEPRESSED

EXTREMELY LAZY

EXTREMELY SPONTANEOUS
APPENDIX E

Stimuli for Directed Forgetting Task
Stimuli for Directed Forgetting Task

<table>
<thead>
<tr>
<th>List A</th>
<th>List B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Negative Self-Referent Words</strong></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>Needy</td>
</tr>
<tr>
<td>Stupid</td>
<td>Lonely</td>
</tr>
<tr>
<td>Failure</td>
<td>Limited</td>
</tr>
<tr>
<td>Annoying</td>
<td>Cowardly</td>
</tr>
<tr>
<td>Deserted</td>
<td>Excluded</td>
</tr>
<tr>
<td>Insecure</td>
<td>Unwanted</td>
</tr>
<tr>
<td>Alienated</td>
<td>Dependent</td>
</tr>
<tr>
<td>Impatient</td>
<td>Irritable</td>
</tr>
<tr>
<td>Demanding</td>
<td>Resentful</td>
</tr>
<tr>
<td>Criticized</td>
<td>Aggressive</td>
</tr>
</tbody>
</table>

| **Positive Self-Referent Words**           |                      |
| Joyful                                      | Beauty               |
| Leader                                      | Strong               |
| Admired                                     | Playful              |
| Selfless                                    | Sociable             |
| Unbeaten                                    | Valuable             |
| Outgoing                                    | Gracious             |
| Important                                   | Energetic            |
| Connected                                   | Desirable            |
| Hilarious                                   | Wonderful            |
| Delightful                                  | Encouraged           |
APPENDIX F

Manipulation Check
Manipulation Check

What do you think the purpose of the study was? *(open ended response format)*
APPENDIX G

Informed Consent Form
INFORMED CONSENT FORM

Title of Project: Relationships between Mood, Memory and Movie Watching

Principal Investigator: Nicola McHale, University of New Brunswick
Email: nicola.mchale@unb.ca

Faculty Supervisor: Dr. David Clark
Department of Psychology, University of New Brunswick
Office Tel: 452-6225; Email: clark@unb.ca

This study investigates relationships between mood, memory and movie watching behaviour. The study involves completion of a demographics sheet along with five questionnaires about mood and the ways that people typically cope with sad mood states. You are also administered a brief interview by a graduate student in the clinical psychology program at the University of New Brunswick (UNB). The interview consists of questions about times when you have felt sad or depressed. You will also be asked to complete a short task which asks you to remember words presented on a computer screen as well as a task which requires you to focus on your thoughts for several minutes. Additionally, you will be shown two short movie clips and be asked follow-up questions.

This study will take up to 1.5 hours to complete. If you are enrolled in Introductory Psychology you will receive 1.5 bonus point towards your final grade. You may also choose to receive $10 for your participation. If you are not enrolled in Introductory Psychology, you will be given $10. Your participation is strictly voluntary and you may choose to withdraw at any time without penalty.

The information you provide will be kept strictly confidential and private. A breach in confidentiality will only occur if you provide information in the interview or questionnaires to suggest that there is an imminent risk of serious harm to yourself or others. In this case, the researcher will contact the faculty supervisor of this research project, Dr. David Clark, who is a Professor and licensed Clinical Psychologist and will recommend an appropriate course of action. Please be assured that any publication of the current research findings will be presented in aggregated form so that individual responses remain anonymous. All participants will be provided with access to an online summary of the research findings.
During this study you will be watching a 6 minute film clip of varying content that you may or may not find distressing. Participants are encouraged to contact UNB Counseling Services at (506) 453-4820 or counsel@unb.ca if they would like professional help with persistent sadness or other personal life problems. It is not expected that the current study will cause any significant harm or distress to participants.

This project has been reviewed and is on file with the Research Ethics Board at the University of New Brunswick (REB #2012-147). If you have any questions or concerns about your rights or treatment as a research participant please contact the acting coordinator of Research Ethics, Dr. Sandra Byers at (506) 458-7697 (byers@unb.ca).

I have read the above statements and agree to participate in this study.

Participant’s Name (please print): ________________________________

Participant’s Signature: _________________________________________

Date: _________________________________________________________

I wish to receive a summary of the research results (please circle)  Yes  No

If yes,

Participant Email: ____________________________________________
APPENDIX H

Participant Information Sheet
PARTICIPANT INFORMATION SHEET

Relationships between Mood, Memory and Movie Watching

What is the purpose of the current study?

The current study is intended to investigate relationships between mood, memory and movie watching behavior. The data collected from the current study will be used towards a doctoral thesis as part of a required research project. The current study has been reviewed and is on file with the Research Ethics Board at the University of New Brunswick (UNB).

What does my participation involve?

In this study you will be asked to provide demographic information about yourself and fill out five questionnaires relating to mood and coping. Additionally, you will meet with Nicola McHale, a graduate student in clinical psychology who will conduct a brief interview about times in your life that you have felt sad or depressed. During the study you will also be shown two short movie clips and answer questions about the movies. Additionally, you will be asked to complete a short memory task and complete a task which requires you to monitor your thoughts. This study will take up to 1.5 hours to complete.

What are the benefits and/or risks to my participation?

Introductory Psychology students will be given 1.5 bonus points or $10 for participation. Students not enrolled in Introductory Psychology will be given $10. It is not expected that participation in the current study will pose any risks or harm to participants. However, the study will ask you to answer questions relating to sad mood and you will be watching a 6 minute film clip of varying content, which you may or may not find upsetting. If you feel distressed as a result of your participation in the current study or are experiencing life problems that you would like professional help with you may contact UNB Counseling Services by phone at 453-4820 or by email at counsel@unb.ca.

Will the information I provide be kept confidential?

All responses you provide will be kept confidential and private. All data will be stored under lock and key and will be destroyed after a period of 7 years. Any publication of data from the study will be presented in aggregate form so that individual responses remain anonymous.

Am I required to answer all questions in the study?
Your participation is completely voluntary. While we appreciate your responses, you may choose to withhold answers to any of the questions or withdraw at any time, without penalty.

Who should I contact about the study?

The current research is conducted by a PhD student in Clinical Psychology, Nicola McHale (nicola.mchale@unb.ca) and is supervised by Dr. David Clark, who is a licensed psychologist and professor at UNB. If you have any questions about the study please feel free to ask the experimenter before beginning the study. Additionally you may contact Dr. Clark at (506) 452-6225 (clark@unb.ca) if you have further questions.
APPENDIX I

Filler Movie-Related Questions
Movie-Related Questions

Have you seen this movie before? Y / N

Did this clip remind you of any past experiences? Y / N

How much did you enjoy the film clip?

1 2 3 4 5 6 7 8 9 10

Not at all Extremely

How interested are you in watching the full movie?

1 2 3 4 5 6 7 8 9 10

Not at all Extremely

How believable did you find the main characters? (select one)

1 2 3 4 5 6 7 8 9 10

Not at all Extremely
APPENDIX J

Thought Suppression Rating Scales
Thought Suppression Rating Scales

Did you try to prevent yourself from thinking about the movie? Y / N

How difficult was it for you to prevent yourself from thinking about the movie? (select one)

1  2  3  4  5  6  7  8  9  10
(not at all difficult)  (extremely difficult)

How much effort did you use to prevent yourself from thinking about the movie? (select one)

1  2  3  4  5  6  7  8  9  10
(No effort at all)  (a great deal of effort)
APPENDIX K

Debriefing Form
Participant Feedback Form

The Relationship between Mood, Memory, and Movie-Watching

The current study looks at factors that make it difficult to recover from a sad mood (emotion regulation). This research is important because poor ability to regulate negative emotions increases risk for depression (Teasdale, 1988). Recent research suggests that individuals who are depressed and vulnerable for depression possess weak cognitive inhibition (i.e. poor ability to keep irrelevant memories from entering awareness) (Dempster & Brainerd, 1995). It has been suggested that weak cognitive inhibition may increase risk for depression because it disrupts emotion regulation (Joormann & Gotlib, 2010). The current study will thus examine whether weak cognitive inhibition predicts trait-like use of a maladaptive emotion regulation strategy called rumination, which involves repetitive self-focusing on one's distress (Nolen-Hoeksema, 1991) and increases risk for depression. Weak cognitive inhibition may explain why individuals who tend to ruminate have difficulty terminating negative thoughts once they become sad. Additionally, it is expected that weak cognitive inhibition will predict increased intrusions (spontaneous unwanted thoughts) and prolonged sadness when using thought suppression, which is a maladaptive strategy that involves effort to prevent or dismiss unwanted, upsetting thoughts (Rassin, 2005).

The interview at the beginning of the study was used to classify participants as depressed or non-depressed and scores on a rumination questionnaire were used to identify individuals who are high and low ruminators. Cognitive inhibition was measured by your memory for the "practice" words you were instructed to forget during the memory task. In order to measure emotion regulation using thought suppression, we attempted to induce a mild and brief increase in sadness by showing a clip from Stepmom. The purpose of the movie clip was kept intentionally vague to reduce biases that are often found when changes in mood are being measured. To measure thought suppression, half of participants were assigned to a suppression condition, where they were asked to block out thoughts about the movie for the first 5 minutes and think anything for the next 5 minutes; The other half were instructed to think anything for the full 10 minutes. Thought suppression ability was indexed by spacebar presses for movie-related thoughts. Changes in mood were measured throughout the study in order to examine the effects of cognitive inhibition on emotion regulation. Finally, the last video clip was used to boost positive emotions following the study. If, for any reason, you choose to withdraw your responses, you are free to do so at any time. Please be assured that your responses will be kept confidential and anonymous.

Thank you for your participation in this study! Your responses will provide valuable information to help understand depression and emotion regulation processes. If you have any questions or concerns about this research project, you may contact Dr. David
Clark: clark@unb.ca. You may also contact UNB Counseling Services at 453-4820 if you would like professional help with persistent sadness or other personal life problems. If you have any questions or concerns about your rights or treatment as a research participant, you may contact the Acting Chair of the Psychology Research Ethics Committee, Dr. Sandra Byers at (506) 458-7697 (byers@unb.ca).


APPENDIX L

Computer-Based Procedures
Computer-Based Procedures

Screen 1 (Welcome Page)

Thank you for your participation in the current study. Over the course of the study you will be asked to complete a number of tasks. Your effort and honesty is greatly appreciated! Press next to begin.

Screen 2 (Remember Cue)

Please do your best to remember the following 20 words. You may be asked to recall them at a later time. After each word is presented, please rate how much the word describes you from 1 (not at all characteristic of me) to 5 (completely characteristic of me) by pressing the appropriate key on the keyboard in front of you. Press the next to begin.

Screen 3 (Forget Cue)

The previous list was for practice purposes only. Please make every effort to forget all the words in the previous list as they will interfere with memory for the upcoming list of words. Press next to Continue.

Screen 4 (Remember Cue)

Display Remember Cue again

Screen 5 (Distraction Task)

For the next two minutes, please count backwards from 200. Please say these numbers out loud.

Screen 6

What number did you stop at? *(Record numerical response)*

Screen 7 (Recall Instructions)

For the next 5 minutes please remember as many words as you can that were presented on the screen. Please try your best to recall ALL words presented, regardless of earlier instructions to forget certain words. All words presented should be considered relevant. Please provide your answers in the space below.

Screen 8 (Sad Mood Induction)

The following film depicts a mother who is talking to her young children about dying. Please pay close attention to the characters and imagine how you would feel if your own mother or someone else who is very close to you was dying. Try your best to concentrate on this feeling. Press next to begin.

Screen 9 (Sad Movie Clip)
Display 6 minute movie clip from Stepmom

Screen 10 (VAS 2)
See Appendix D

Screen 11 (Filler Movie-Related Questions)
See Appendix I

Screen 12 (Thought Suppression Instructions: Time 1)

Group A

Please take a moment to notice your thoughts. A thought can be experienced as words or images (pictures). We now ask that for the next 5 minutes you try your best not think about anything relating to the movie. It is important that you make every effort to push any thoughts about the movie out of your mind. However, it is possible that thoughts or images from the movie will pop into your mind from time to time. Please press the spacebar each time a thought or image from the movie enters your mind. Press next to begin.

Group B

Please take a few minutes to notice your thoughts. A thought can be experienced as words or images (pictures). You may think about whatever you like, which may or may not include thoughts about the movie your just watched. If you happen to think about the movie please press the spacebar each time a thought about the movie enters your mind. Press next to begin.

Screen 13 (Thought Suppression Activity: Time 1)

Display blank screen for 5 minutes. Record space bar presses.

Screen 14 (Thought Suppression Instructions: Time 2)

Group A

For the next 5 minutes, we ask that you take a few minutes to notice your thoughts. You may now think of whatever you like, which may or may not include thoughts about the movie you just watched. If you happen to think about the movie please press the spacebar each time a thought about the movie enters your mind. Press next to begin.

Group B

For the next 5 minutes, we ask that you continue to notice your thoughts. You may think of whatever you like, which may or may not include thoughts about the movie you
just watched. If you happen to think about the movie please press the spacebar each
time a thought about the movie enters your mind. Press next to begin.

Screen 15 (Thought Suppression Activity: Time 2)
Display blank screen for 5 minutes. Record spacebar presses.

Screen 16 (VAS 3)
See Appendix D

Screen 17 (Thought Suppression Rating Scales)
See Appendix J

Screen 18 (Happy Mood Induction)
The following film depicts a man exploring a public swimming pool for the first time.
Please pay close attention to the characters and imagine how you would feel if you were
at the swimming pool watching. Try your best to concentrate on this feeling. Press next
to continue.

Screen 19: (VAS 4)
See Appendix D

Screen 20 (Filler Movie-Related Questions)
See Appendix I

Screen 21 (Manipulation Check)
See Appendix
CURRICULUM VITAE

Candidates Full Name:
Nicola McHale

Universities Attended (with dates and degrees obtained):
2008-2015 PhD, University of New Brunswick
2007-2008 (MA/PhD., transferred to Ph.D. Sept 1, 2008)
2006 BA (Honours), University of Western Ontario

Publications:


Conference Presentations:
