Cognitive patterns that influence female vulnerability to depression: Rumination, thought

suppression, reaction time variability and self-evaluation.

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Declaration

This thesis contains no material that has been accepted for the award of any other degree or diploma in any university or other institution and, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference is made.

The ethical principles and procedures specified by the Australian Catholic University's policy document on Human Research and Experimentation have been adhered to in the preparation of this report.

Signed: _____

Date: _____

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Abstract

This research program consisted of three complementary studies. The overall focus of this research was to examine the influence of a number of cognitive risk factors on depression in females. The first two studies informed the third study by, firstly, assessing the appropriateness of online data collection (Study 1), and secondly by clarifying the factor structures of two pivotal measures to be utilised in this research (Study 2). Having established the methodological and psychometric appropriateness of the variables of interest, Study 3 was then able to investigate the individual and combined influence of a number of cognitive variables on depression, specifically in females.

To facilitate acquisition of a large sample, online testing was used. Prior to testing, the appropriateness of this modality for each individual measure needed to be ascertained. Therefore, Study 1 examined the online comparability of a number of cognitive processing tasks, including Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991), White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994), Self-referent Information Processing Task (SRIP; Alloy, Abramson, Murray, Whitehouse, & Hogan, 1997), Autobiographical Memory Task (AMT; Williams & Broadbent, 1986) and Edinburgh Depression Scale (EDS; (Cox, Holden, & Sagovsky, 1987), each of which have traditionally been administered in a face-to-face format. Sixty females, ranging in age from 18 – 46 years participated in this study. Thirty participants (age M_{age} =27.5) completed the measures in a traditional face-to-face format, and 30 females (M_{age}=26.43) completed them online. An examination of between-group differences, effect sizes and, internal consistency was conducted. Those analyses indicated strong support for the online comparability of RRS, WBSI and EDS. Mixed support was found for the comparability of SRIP in the online modality, and no support was found to suggest AMT was comparable in online and traditional administration formats.

Given the established suitability of the RRS and WBSI for use in the online context in Study 1, Study 2 sought to clarify the discrepant findings pertaining to the factor structures of those measures, in order to utilise individual factors within those measures in a more fine grained approach to the clarification of the roles of individual cognitive risk factors for depression. To further this aim, Study 2 explored the factor structures of the RRS and the WBSI in a number of different groups, namely, the entire sample (N=565); males (N=116), females (N=449), "not depressed" (N= 323), and "possibly depressed" (N=242). That study identified factor structures for each of those measures which were partially consistent with previous literature and which supported the multidimensional nature of each of those measures. The most consistent factor structure for the RRS was a three-factor solution comprised of depression symptoms, reflection and brooding. For the WBSI, a particularly stable factor was identified and labelled unwanted intrusive thoughts. An additional factor labelled avoidance of unwanted thoughts also emerged for the entire sample and the female participants.

Having (a) established the suitability for use in the online context of a number of measures; and (b) clarified the factor structures of the RRS and WBSI, the third study then investigated the individual and combined influence of those variables on the prediction of current depression scores in a female sample (N=446). Specifically, the factors derived from the RRS and WBSI, self-evaluation and reaction time variability were included in additional analyses to assess their respective influence on the prediction of depression. Regression analyses indicated this combination of variables was effective at predicting depression, however mediation effects appeared to be occurring. A structural equation model was developed to further explore those interrelationships. That model was a good-fitting model which accounted for 65% of variance in depression. Maladaptive rumination, which consisted of the RRS factors of depression symptoms and brooding, emerged as the

most influential variable in the prediction of depression; both as a direct predictor and as a mediator of other variables.

To identify which of the variables of interest represented cognitive risk factors for depression, and which should be considered cognitive symptoms associated with depressive symptoms or remnants of previous depressive episodes, comparisons were conducted between participants with a previous diagnosis of depression and those without a previous diagnosis, whilst controlling for the effect of current depressive symptoms. Those comparisons indicated significant between-group differences in positive self-evaluation, unwanted intrusive thoughts and brooding, and the differences between the groups on depressive symptoms approached significance. Reflection and avoidance of unwanted thoughts were not significantly different between the groups, which suggested that those variables, independent of other cognitive risk factors such as maladaptive rumination, do not represent cognitive risk factors for depression.

These findings have methodological, psychometric and theoretical implications. The mixed findings of Study 1 confirmed that online comparability of measures should not be assumed, and should be assessed on a case-by-case basis. Study 2 identified factor structures for the RRS and WBSI which indicated those constructs are multidimensional, and the precise factor structures may differ according to gender and depression symptoms. Study 3 identified different relationships between individual factors from the RRS and WBSI, positive self-evaluation, reaction time variability, and depression. Those findings have implications in both research and clinical contexts. Of particular relevance is the identification that a fine grained conceptualisation of rumination and thought suppression may be informative in better understanding those constructs and their respective contribution to negative psychological outcomes.

Chapter 1: Introduction to the Research

1.1   Overview of chapter

In this chapter, the rationale for the current research will be developed. Specifically, the greater prevalence of depression in females will be established and several hypotheses which have been proposed to account for that difference presented. It will be demonstrated that previous research has not conclusively explained the gender differences in depression prevalence, however cognitive vulnerabilities appear promising as explanatory factors of this observed difference. Although this research does not purport to specifically examine gender differences in depression, gender differences in depression prevalence are presented to support the focus of the current research, which is cognitive vulnerability to depression in females. The significant burden to females represented by depression will also be considered, as a means of establishing a clear rationale for this research; namely, that depression is a highly prevalent and burdensome condition which affects females in greater numbers than males.

1.2   Prevalence of depression

Depression has been identified by the World Health Organisation (WHO) as the third leading contributor to the global burden of disease, accounting for 12.15% of years lived with disability (World Health Organisation, 2003). It was estimated that 11.6% of Australian adults would experience a depressive episode during their lifetime, and 4.1% would have experienced a depressive episode in the preceding 12 months (Australian Bureau of Statistics, 2008). Females were more commonly affected by depression than males, with 14.5% of females experiencing an episode in their lifetime, and 4.1% in the preceding 12 months, compared to 8.8% lifetime prevalence and 3.1% in the previous 12 months for males (Australian Bureau of Statistics, 2008). The challenges associated with

mental disorders, particularly anxiety and depression, were especially relevant for females, with those disorders representing the greatest burden of disease for females in Australia and accounting for 10% of total female burden. This is in contrast to males, for whom anxiety and depression represented the third leading cause of burden, and accounted for 4.8% of total burden for that group. (Beggs, et al., 2007) Understanding the precipitating factors that contribute to the onset of depression is important, given that 50% of people who experience a major depressive episode (MDE) will experience at least one other episode in their lifetime (Ingram, Miranda, & Segal, 1998). As such, depression is a common and often recurring condition, particularly among females. Obtaining a better understanding of cognitive patterns that may increase or reduce the risk of experiencing depression is considered a worthwhile research endeavour to inform the early identification of at-risk individuals, and contribute to prevention and/or early intervention programs to reduce the significant burden associated with depression.

1.3   Gender differences in depression

Epidemiological and other research studies have consistently found females experience depression more commonly than males (see, for example, Australian Bureau of Statistics, 2008; Kessler, 2003). For example, a prospective study by Lewinsohn, Hoberman, and Rosenbaum (1988) identified being female, along with younger age and a previous episode of depression, as risk factors for developing a future depressive episode. Several hypotheses have been proposed to account for the observed gender difference in the occurrence of depression, including the artifact hypothesis of Phillips and Segal (1969), the precipitating factors hypothesis of Radloff and Rae (1979), and various biological hypotheses (Greene, 1980; Pitt, 1982; Schmidt et al., 1991). Although some support has been found for each of those hypotheses, none of them have conclusively

accounted for the observed gender differences in depression prevalence (Ingram, Miranda, & Segal, 1998).

The artifact hypothesis, first articulated by Phillips and Segal (1969), proposed that the prevalence of depression was likely to be similar for both genders and suggested the often reported higher prevalence of depression in females may be a product of females' greater tendency to report symptoms and engage in help seeking behaviours than males. In addition, it was purported that women may be subject to a sex bias in diagnosing depression and thus more likely to obtain a depression diagnosis than males (Shaw, Kennedy, & Joffe, 1995). Some tentative support for the artifact hypothesis has been identified. For example, in a study investigating tendencies toward under-reporting of depression symptoms, Hunt, Auriemma, and Cashaw (2003) found females reported more depressive symptoms than males in an overt assessment of depression symptoms, whereas males and females reported depressive symptoms with equivalent frequency in a covert condition. However, the difference between the genders in the overt condition was not statistically significant. Additional support for the artifact hypothesis was found by Bertakis et al. (2001), who identified significant gender differences in self-reporting of depression symptoms and in the rates of clinical diagnosis of depression. In that study, women were found to be 72% more likely to be diagnosed as depressed than men. However, when controlling for all other independent variables, including demographic variables and frequency of visits to a primary care provider, the effect of gender on diagnosis frequency was not significant. The proposition of the artifact hypothesis that women were more likely to experience sex bias in diagnosis of depression was supported by Brommelhoff, Conway, Merikangas and Levy (2004), who found family members were more likely to over-report depression symptoms (as compared to the index person's own ratings) for females than for males. These studies together suggested females may be more

willing to report depression symptoms than males (Bertakis et al., 2001; Hunt, Auriemma, & Cashaw, 2003), and more likely to be recognised as depressed in both a clinical (Bertakis et al., 2001) and a familial context (Brommelhoff, Merkiangas, & Levy, 2004). However, the differences identified in those studies do not conclusively account for the substantial differences in prevalence rates observed between the genders.

An alternative explanation for the gender differences in depression is the precipitating factors hypothesis of Radloff and Rae (1979), which proposed that the higher occurrence of life changing events in the lives of females may account for gender differences in the occurrence of depression. That model is similar to the vulnerability-stress model (Nolen-Hoeksema, 2001), which proposed women may be more prone to experiencing stressful life events as a result of societal inequalities, and susceptible to a greater reactivity to those stressful events, as measured by biological responses, self-concept and coping style. Kendler, Thornton, and Prescott (2001) found that the type but not frequency of stressful events differed by gender, and no support was found for females' greater sensitivity to stressful events. As such, no support was found for the vulnerability-stress model in that study. Other plausible explanations regarding various biological differences associated with female endocrinology, such as menstruation and menopause, have also been proposed to account for gender differences in the prevalence of depression (Ingram, Miranda, & Segal, 1998). However, research has not consistently supported the role of hormones in increasing female vulnerability to depression (Hankin & Abramson, 1999).

It was apparent that there was a lack of empirical support for the proposed explanations for the substantial gender differences in the prevalence of depression provided by the artifact hypothesis, precipitating factors/vulnerability-stress model, and biological theories. Of particular interest to the current study is the possibility that female

cognitive patterns, particularly their greater tendency to ruminate (Nolen-Hoeksema, 1987), and engage in thought suppression (Wegner & Zanakos, 1994), may be influential in increasing susceptibility to the experience of depressive symptoms. Support for the hypothesis that differences in cognitive patterns, specifically the greater likelihood of females to ruminate, may contribute to depression vulnerability was identified by Nolen-Hoeksema, Larson, and Grayson (1999). Similarly, Hunt and Forand (2005) found that dysfunctional cognitions prior to a first episode of depression may predict changes in symptoms over time in females, but not in males. As such, the focus of this research was to examine various cognitive patterns that are considered to represent vulnerabilities to depression in a female sample, in an attempt to better understand how those cognitive patterns may be related to the experience of depressive symptoms.

The importance of understanding female depression is highlighted by the prevalence of depression in the female population generally (Australian Bureau of Statistics, 2008), and the significant morbidity and reduced quality of life associated with that condition (WHO, 2003), as well as the particularly difficult circumstances represented by postnatal depression (PND). PND is a serious mood disorder experienced by approximately 14.5% of new mothers (Webster et al., 2006) which has negative implications for the mother, their partners and their infants (Milgrom & Beatrice, 2003), and can be particularly detrimental to the development of a secure mother-infant attachment (Austin & Lumley, 2003). This is particularly problematic in light of the findings of research regarding cognitive vulnerability to depression which has identified disruptions in the mother-infant attachment as a potential indicator of future susceptibility to depression (Whisman & Kwon, 1992). The symptoms and duration of PND do not differ markedly from those of depression; indeed, a diagnosis of PND under the DSM-IV-TR is made by reference to the criteria for a Major Depressive Episode, with the additional

specifier "with postpartum onset" (American Psychological Association, 2000). The defining feature of PND is its onset within a short period after giving birth. This onset presents one of the major difficulties associated with PND, as it is a time when exceptional demands are placed on a mother, and her ability to care for herself and her infant are severely compromised (Ogrodniczuk & Piper, 2003).

A phenomenological study of PND identified a range of themes women used to describe their experiences of PND, including: unbearable loneliness, obsessive thoughts, loss of self, suffocating guilt, cognitive impairment, loss of previous interests and goals, uncontrollable anxiety, insecurity, loss of control of emotions, loss of all positive emotions, and contemplation of death (Beck, 1993). Women diagnosed with PND were found to be at increased risk of suffering from psychological problems in the subsequent four years, despite no history of depression prior to giving birth (Hall & Papageorgiou, 2005). In addition, partners of women diagnosed with PND were at greater risk of suffering psychological problems than men whose partners did not have PND (Zelkowitz & Milet, 1996), and there was an increased risk of deterioration of the spousal relationship (Ogrodniczuk & Piper, 2003). Children of mothers with PND were identified as being at risk of a range of cognitive, emotional and behavioural impairments (Austin & Lumley, 2003; Murray, Fiori-Cowley, Hooper, & Cooper, 1996). Of particular concern was the impact of PND on the establishment of a secure mother-infant attachment (Benvenuti et al., 2001; Honey, Bennett, & Morgan, 2003). Mothers with PND reported significantly higher rates of problems with many facets of infant care, such as feeding, crying and sleeping, and rated the quality of their relationship with their infant negatively compared to mothers who do not have PND (Cooper & Murray, 1997). As such, depression, particularly in the case of postpartum onset, represented a serious disorder with the capacity to adversely affect all members of a sufferer's family.

1.4   Overview of the current research

In this research, cognitive factors which may contribute to female vulnerability to depression will be investigated in methodological, psychometric and theoretical contexts. Investigating female cognitive vulnerability to depression is considered paramount, given the high prevalence of female depression (WHO, 2003), and the substantial impact of depression on individuals who experience it and their families. The high incidence of PND, and the significant detrimental outcomes associated with that condition, which are likely to be compounded as a result of its onset in the aftermath of childbirth, also informed the rationale for the development of this research. It is anticipated that obtaining a better understanding of female cognitive vulnerability to depression in general will have positive implications for understanding cognitive contributors to the development of PND.

Further to that aim, this research consisted of three studies. In the initial phase, a methodological investigation of the online comparability of a range of cognitive tasks was conducted in order to establish the appropriateness of online data collection for this study. The second phase of this research involved a psychometric investigation of two well-established measurement tools, namely, the Ruminative Responses Scale (RRS) (Nolen-Hoeksema and Morrow, 1991) and the White Bear Suppression Inventory (WBSI) (Wegner & Zanakos, 1994), for the particular purpose of identifying factors within those scales which may (a) vary as a function of gender and current depressive symptoms; and (b) be associated with cognitive vulnerability to depression. In the final phase of this research, factors derived from RRS and WBSI, along with other cognitive tasks which were deemed comparable in their online administration, were examined to identify their relationship to depressive symptoms, as measured by the Edinburgh Depression Scale (EDS) (Cox, Holden, & Sagovsky, 1987). Participants who had previously been diagnosed with depression were also compared with participants who had not received that diagnosis,

to ascertain whether the cognitive factors under investigation could meaningfully differentiate between those groups when controlling for current scores on EDS. As such, this research has made methodological, psychometric and theoretical contributions to the literature regarding the online equivalence of cognitive tasks, the factor structure of two important measures in different populations, and the identification of cognitive patterns that may contribute to depression vulnerability and can meaningfully distinguish between individuals who have previously been diagnosed with depression, irrespective of their current experience of depressive symptoms.

Chapter 2 of this thesis will provide an overview of the literature pertaining to cognitive theories of depression, and their particular relevance to females. In addition, the literature relating to the specific cognitive vulnerability factors of interest to this research, namely; self-referent information processing, rumination, thought suppression, overgeneral autobiographical memory, and difficulties maintaining attention (as operationalised by intra-individual reaction time variability), will be presented as a way of establishing the theoretical framework for this research program. The subsequent three chapters (chapters 3, 4, and 5) will present the three studies conducted in this program. In conclusion, chapter 6 will integrate the findings of this research and identify the major contributions, limitations and implications of this research.

Chapter 2: Literature Review

2.1   Cognitive vulnerability to depression

Depression and cognition share a relationship of reciprocity, whereby cognitive patterns influence vulnerability to depression (see, for example, Ingram, Miranda, & Segal, 1998), and depression negatively impacts on cognitive functioning (Christensen, Griffiths, Mackinnon, & Jacomb, 1997). A significant body of research has documented a range of cognitive deficits in currently depressed individuals, as well as cognitive vulnerabilities to depression. For example, Burt et al. (1995) identified widespread difficulties associated with memory and maintaining concentration in currently depressed individuals. Hertel and Rude (1991) also identified deficits in memory, as measured by free and forced recall tests, in depressed individuals. However, those authors identified that the noted deficit was not observed when the learning conditions relevant to the memory task were highly focused. That finding suggested that depression may not impair one's ability to perform memory tasks; however it may interfere with the effective processing of the stimuli to enable successful task performance (Hertel & Rude, 1991). In a meta-analysis conducted by Christensen, Griffiths, Mackinnon and Jacomb (1997), the presence of significant deficits were identified in depressed versus non-depressed participants on a variety of cognitive tasks, including tasks assessing memory, inhibition, speed and vigilance. Those authors concluded that depression had global detrimental effects on cognitive functioning, with few, if any, cognitive skills and abilities remaining unaffected. Consistent with this broad conceptualisation of cognitive deficit associated with depression, Hertel and Gerstle (2003) found that dysphoric participants had greater difficulty in forgetting stimuli they were instructed to suppress than non-dysphoric participants. The reduced ability to forget was interpreted as being potentially representative of poor attentional control whilst experiencing depressive symptoms. Although Langenecker et al. (2005) failed to identify

deficits in memory, visual-spatial, motor or attention skills in mildly depressed women, they did identify reduced performances on tasks involving perceiving emotion and the executive functioning process of inhibitory control. As such, although there are some mixed findings in relation to the particular cognitive deficits associated with depression, there was evidence to suggest a range of cognitive functions were negatively impacted at the time depressive symptoms were noted.

Conversely, cognitive theories of depression suggest that particular cognitive patterns may render individuals susceptible to the experience of depressive symptoms, particularly in the aftermath of stressful life events. Several major cognitive theories of depression have been extensively researched, including, Beck's (1967, as cited by Alloy, Abramson, Safford, & Gibb, 2006) cognitive theory of depression, the attributional reformulations of the helplessness theory of depression (Abramson, Seligman, & Teasdale, 1978), and the hopelessness model of depression proposed by Abramson, Metalsky and Alloy (1989). Beck's cognitive theory of depression is a vulnerability-stress model (also, diathesis-stress model) (Alloy & Riskind, 2006), which purports that an individual's depressogenic cognitive style, consisting of automatic negative thoughts and irrational dysfunctional attitudes, represents a causal factor in depression (Ingram, Miranda, & Segal, 1998). According to Beck (2008), individuals with a depressogenic cognitive style tended to have easily accessible negative beliefs about themselves, the world and their future. Those negative beliefs represented systematic negative cognitive biases and dysfunctional attitudes, indicative of underlying negative schemata, which were stable and enduring cognitive structures, developed from early life experiences (Beck, 2008; Grazioli & Terry, 2000; Ingram, 2003). As proposed by the vulnerability-stress component of the model, depressogenic cognitive style may be latent until activated by exposure to a stressful life event. According to the cognitive theory of depression, the depressogenic

cognitive style represented the vulnerability or diathesis, and a stressful life event

represented the stress, which then interacted with the underlying cognitive vulnerability to

render the individual at increased risk of developing depression (Wenzlaff, Rude, Taylor,

Stultz, & Sweatt, 2001). Further research regarding depressogenic cognitive styles

identified that high and low risk cognitive tendencies, as conceptualised by habitual

negative and positive inferential styles, tended to appear during adolescence (Gibb &

Alloy, 2006), and remained stable through to early adulthood (Romens, Abramson, &

Alloy, 2009).

Similar to Beck's cognitive theory of depression, the attributional reformulation of

the helplessness theory of depression (Abramson, Seligman, & Teasdale, 1978) proposes

an interaction between an individual's circumstances and their cognitive processing of

those circumstances, which can render the individual vulnerable to depression.

Specifically, in situations where an individual believes they have no capacity to improve a

negative outcome, they are likely to feel a sense of personal helplessness, which

contributes to feelings of depression. As identified by DePue and Monroe (1978), it is too

simplistic to conceptualise "situational" depression as being solely contingent upon an

individual experiencing stressful circumstances. Although the stressful circumstances may

precede the onset of a depressive episode, an additional element, such as the individual's

cognitive appraisal of the situation, appears worthy of consideration in attempting to

understand the multifaceted aetiology of depression. Similarly, the hopelessness model of

depression proposed by Abramson, Metalsky and Alloy (1989) represents a vulnerability-

stress model of depression, whereby a depressogenic inferential style in which negative

life events are attributed to internal, stable and global causes, interacts with a stressful life

event to increase an individual's risk of developing depression. Consistent with the model

proposed by Abramson, Seligman, and Teasdale (1978), the hopelessness model

specifically considers the inferential style or cognitive appraisal of a situation as a crucial element of vulnerability to depression. Early studies evaluating cognitive vulnerability hypotheses examined cognitive characteristics of individuals who had previously experienced a depressive episode but were currently in remission (Scher, Ingram, & Segal, 2005). However, those designs were criticised for their inability to meaningfully differentiate between cognitive patterns that preceded the onset of the depressive episode and cognitive remnants of those episodes (Alloy, Lipman, & Abramson, 1989). In addition, some research involving remitted depressed individuals failed to identify significant differences in attributional styles between never-depressed and formerly depressed individuals (see, for example, Dohr, Rush, & Bernstein, 1989). Gotlib and Joormann (2010) observed that, although the evidence for cognitive biases during depressive episodes appeared well established, the definitive identification of cognitive biases independent of depressive symptoms may not have been achieved. To overcome the limitation of the designs involving remitted individuals, longitudinal designs utilising both a retrospective (Alloy, Lipman, & Abramson, 1992) and a prospective (Alloy, et al., 2000) behavioural high risk design have been adopted. In those studies, participants deemed to be at higher cognitive risk of depression were shown to be more likely to develop depression after stressful life events than participants deemed to be of low cognitive risk who were exposed to similar stressful events.

For example, in a retrospective design, Alloy, Lipman, and Abramson (1992) identified currently non-depressed participants who were considered high cognitive risk for depression, based on their habitual cognitive style (negative = high risk, positive = low risk) had higher incidence and greater severity of depressive episodes in the preceding two years, compared to participants who were identified as low cognitive risk for depression. Similarly, in the Temple-Wisconsin Cognitive Vulnerability to Depression (CVD) project

(Alloy et al., 1999), a prospective longitudinal study designed to test cognitive vulnerability to depression, at a 2 year follow up, the initially non-depressed high risk group (negative cognitive style) was found to be more likely than the low risk group to have experienced a first onset of a clinically diagnosed depressive disorder. In another prospective study, Hunt and Forand (2005) also found dysfunctional cognitive patterns in never-depressed individuals were predictive of the onset of a depressive episode one month later. Similarly, Bohon et al., (2008) utilised a prospective design to investigate the cognitive vulnerability model in adolescent females. In accordance with the hypotheses suggested by that model, negative attributional style interacted with stressful life events to predict increases in depressive symptoms and the onset of clinical depressive episodes.

Together, those studies provided support for the role of cognitive style as a potential marker of depression vulnerability, in the absence of current depressive symptoms. The findings of the prospective studies were particularly compelling, as the prospective behavioural high risk design addressed a potential limitation of the retrospective design, whereby a negative cognitive style may be argued to represent a psychological remnant from the previous depressive episode (Alloy, Lipman, & Abramson, 1992). By establishing the pre-existence of the depressogenic cognitive style, Alloy et al. (2000) provided persuasive support for the notion that individuals with a particular cognitive style may be more prone to depression in the aftermath of stressful life events than individuals with a less depressogenic cognitive style. Mathews and MacLeod (2005) summarised the substantial body of literature investigating cognitive vulnerability to depression and inferred the evidence for that vulnerability was "impressive" (p. 183). Those authors identified several cognitive tendencies, including negative attributional style, negative memory bias, rumination, and poor self-image as factors contributing to that vulnerability. However, as noted by Mathews and MacLeod, substantial attention had

not been paid to the examination of possible interactive links between various cognitive vulnerability factors. This observation suggested the utility of identifying other elements of cognitive styles and tendencies, which, in addition to a habitually negative inferential style, may represent precursors to depression vulnerability. As articulated by Alloy, Lipman, and Abramson, (1992), a depressogenic cognitive style was deemed to be "neither necessary nor sufficient" (p. 392) for the occurrence of depression. As such, the identification of other cognitive patterns which interact with one another and/or stressful life events or, alternatively, act independently of one another and stressful life events to serve as vulnerability markers of depression, represents a meaningful endeavour in the attempt to better understand the complicated aetiology of depression.

In the current study, several cognitive tendencies which have been identified as implicated in the onset, severity and/or maintenance of depressive episodes will be investigated, in an attempt to better understand their individual and combined relative contributions to cognitive vulnerability to depression. Specifically, self-referent information processing, rumination, thought suppression, and difficulty maintaining attention, as operationalised by reaction time variability, will be examined in a non-clinical sample of females.

2.2   Self-referent information processing

2.2.1. Assessing self-referent information processing. As previously noted, substantial empirical support has been demonstrated for the contention posed by cognitive theories of depression that suggested individuals who were cognitively vulnerable to depression were likely to be prone to negative thinking and to possess negative schemata regarding the self (Mathews & MacLeod, 2005). The Temple-Wisconsin Cognitive Vulnerability to Depression (CVD) project was specifically designed to test hypotheses proposed by cognitive theories of depression, as they related to, inter alia, negative

inferential styles in relation to the self, as well as the interaction between cognitive

vulnerabilities (as defined by negative self-referential thinking) and stress in contributing

to the onset of depression (Alloy & Abramson, 1999). That project was informed by the

methodological limitations of early research which assessed the hypotheses of cognitive

theories of depression, and incorporated a longitudinal prospective design as a means of

effectively evaluating the predictive capacity of cognitive styles for depression. The CVD

involved cohorts from two universities, who were frequently assessed over an extended

period of 5.5 years. Participants were screened to ensure no participants were actively

experiencing depression at the outset of the project, to facilitate the prediction of

depression in the prospective design. (Alloy & Abramson, 1999)

As part of an extensive array of assessment tools utilised in the CVD, the Self-

Referent Information Processing (SRIP) task was developed to assess how individuals

processed information in relation to the self (Alloy, Abramson, Murray, Whitehouse, &

Hogan, 1997). The SRIP comprised of four separate tasks which involved various

techniques for processing self-referent positive and negative information that was either

depression relevant or depression irrelevant. In each of the tasks, stimuli consisted of four

types, namely: (a) positive depression relevant (PDR; e.g., "motivated"); (b) negative

depression relevant (NDR; e.g., "failure"); (c) positive depression irrelevant (PDI; e.g.,

"polite"); and (d) negative depression irrelevant (NDI; e.g., "offensive"). Task 1 required

participants to rate adjectives from each of the categories as being descriptive of

themselves or not; task 2 required participants to provide specific examples of occasions

on which they had demonstrated behavioural evidence of adjectives from each of the

categories; task 3 required participants to rate, on a scale of 0 – 100, how likely they were

to behave in a certain way that was illustrative of adjectives from each of the categories;

and task 4 was a free recall task which required participants to recall as many adjectives from task 1 as they could.

2.2.2. Self-referent information processing bias and depression. Alloy et al., (1997) delineated participants as "high risk" or "low risk" for depression, based on their cognitive style, as measured by the Cognitive Style Questionnaire and the Dysfunctional Attitudes Scale. They then utilised the SRIP task to ascertain whether meaningful differences would be identified between high risk and low risk participants in self-referent information processing. Those authors found that participants in the high risk group were more likely than participants in the low risk group to process negative information in relation to themselves. In addition, participants in the high risk group were less likely than participants in the low risk group to process positive information in relation to themselves.

For example, in task 1, high risk participants were more likely to endorse negative adjectives as being indicative of themselves than positive adjectives. Whilst the interaction between risk and valence was significant for both depression relevant and depression irrelevant stimuli, the between-group differences based on risk were smaller for the depression irrelevant stimuli than for the depression relevant stimuli. High risk participants were also more likely to provide greater numbers of behavioural examples in task 2 that demonstrated negative characteristics than examples pertaining to positive characteristics. For task 2, the interaction of risk and valence was significant for the depression relevant stimuli, but not for the depression irrelevant stimuli, which was consistent with the pattern that emerged from task 1, whereby the between-group differences were more pronounced in relation to depression relevant stimuli. Similarly, high risk participants predicted they were more likely to behave in negative ways in task 3. Between-group differences on task 3 also conformed to the pattern identified in task 1, whereby although differences between the groups were significant for depression relevant and depression irrelevant content, those

differences were greater for the depression relevant content. Finally, high risk participants

recalled less positive words they had judged to be self-descriptive than negative words

they had similarly endorsed. Another important finding of that study was the significant

between-group differences in self-referent information processing persisted when current

levels of depression were controlled for. In summary, those findings suggested high risk

participants were processing negative information preferentially, which supported the

hypotheses of the cognitive theories of depression that suggested cognitively vulnerable

individuals display negative processing biases. Further, the maintenance of significant

between-group differences on the basis of cognitive risk when current depressive

symptoms were accounted for, provided further evidence of cognitive vulnerabilities

existing independently of depression symptoms. (Alloy et al., 1997)

Whilst the relationship between negative self-referent information processing and

depression vulnerability has been identified to exist independently of current depressive

symptoms (Alloy et al., 1997), other research has demonstrated that the relationship

between negative self-referent information processing and depression was particularly

evident during depressive episodes (Segal & Gemar, 1997). In a longitudinal study which

involved clinically depressed participants, negative self-referent processing, as assessed

using an emotional Stroop task, became less pronounced in participants who had

experienced a reduction in depressive symptoms after a treatment regime involving 20

weekly sessions of cognitive behavioural therapy, relative to participants who had not

responded well to the treatment (Segal & Gemar, 1997). Those findings were interpreted

as providing support for the relationship between negative thoughts regarding the self and

depression, and Segal and Gemar (1997) proposed that the effectiveness of the cognitive

behavioural therapy may have involved reducing the accessibility of negative schemas, as

opposed to altering the cognitive structure itself. As such, the negative information

processing bias may continue to exist, but become dormant in times of normal mood. That

suggestion was consistent with cognitive theories of depression which suggested cognitive

vulnerabilities to depression were likely to be stable markers which may be exacerbated in

certain circumstances (see, for example, Beck, 2008).

Similar findings were identified by Reilly-Harrington, Alloy, Fresco and

Whitehouse (1999), who found self-report measures of cognitive style, as well as SRIP,

interacted with stressful life events to predict depression. Those authors also extended the

research pertaining to unipolar depression to include bipolar disorder, and found that

cognitive styles and self-referent information processing biases were predictive of both

depressive and manic symptoms. Specifically, participants who had previously been

diagnosed with depression, engaged in a negative cognitive approach and also experienced

stressful life events reported an increase in depressive symptoms. In addition, participants

who had received a diagnosis of bipolar disorder adopted a negative cognitive style and

experienced stressful life events were more likely to report an increase in symptoms. It was

noteworthy that participants with bipolar disorder who were in the high risk category by

virtue of their negative cognitive style and the presence of stressful life events experienced

an increase in both depressive and manic symptoms. That finding was considered an

important extension of the cognitive vulnerabilities theories of depression to bipolar

disorder. It was also noted that the data collected from multiple methods to assess

cognitive style provided significant support for the diathesis-stress model of cognitive

vulnerability to psychopathology (Reilly-Harrington, et al., 1999).

Additional research has investigated the applicability of self-referent information

processing biases to depression in children. Some interesting findings pertaining to

negative self-schemas in children were found by Timbremont and Braet (2005) who

identified that, compared to non-depressed children who possessed positive self-schemas

as assessed by preferential recall of positive words, depressed children demonstrated equivalent recall for positive and negative words. It was suggested that the development of a positive self-schema was a designated developmental task of middle childhood and, thus, depression in middle childhood may be related to a lack of success in attaining that milestone, rather than the development of a negative self-schema (Timbremont & Braet, 2005). It appeared possible that, instead of preferentially processing negative information, depressed children failed to inhibit negative information and processed such information in an equivalent manner to positive information. In contrast, non-depressed children appeared to have a positivity bias for self-referent information. When an "other-referent" condition was introduced in Timbremont and Braet's second experiment, both the depressed and non-depressed groups recalled positive self-referent words significantly better than negative self-referent words. That finding was interpreted as being consistent with the findings of Watkins and Teasdale (2001) and Watkins, Teasdale and Williams (2000). In those studies, it was identified that distraction techniques which disrupted an internal focus could reduce memory bias in depression. In general terms, the findings of Timbremont and Braet indicated that there may be some qualitative differences in the relationship between self-referent information processing and depression as a function of developmental stage. However, a consistent finding emerged that depressed individuals processed self-referent information differently to non-depressed individuals, and those differences may represent one aspect of cognitive vulnerability to depression. The implication of the finding that encouraging the processing of stimuli external to the self interrupted cognitive patterns associated with depression may be understood in the context of the wide body of literature linking self-focused thoughts, as represented by rumination, to depression. As such, the relationship between rumination and depression will be explored in the following section.

2.3   Rumination

2.3.1. Defining rumination. Rumination is the tendency to repeatedly focus on negative aspects of one's cognitive experience, namely: the content, likely causes, and potential implications of depressive thoughts (Nolen-Hoeksema, 1991). A key component of rumination is that it emphasises one's negative thoughts, whilst prohibiting the individual from engaging in proactive attempts to alleviate their negative symptoms (Nolen-Hoeksema, 1998). As such, rumination can be conceptualised as a passive, negatively self-focused activity which is likely to prolong the negative effects of depressed mood (Nolen-Hoeksema, 1998). This conceptualisation of rumination is reminiscent of the personal helplessness described by Abramson, Seligman, and Teasdale (1978) in the attributional reformulation of the learned helplessness theory of depression, whereby they describe individuals who have experienced negative events as questioning why such events occurred. Attributions arising from this self-focused consideration which are stable ("there is no end in sight"), global ("everything is likely to be effected") and internal ("I am personally responsible for negative outcomes") contribute to feelings of helplessness and vulnerability to depression (Peterson & Vaidya, 2001). Consistent with this theory, the relationship between rumination and depressive symptoms has been investigated in both non-clinical (Morrow & Nolen-Hoeksema, 1990) and clinical samples (Kuehner & Weber, 1999) and rumination has been found to be implicated in depression in several ways, including being predictive of the onset of a depressive episode, and contributing to the severity (Just & Alloy, 1997) and perseveration of that episode (Kuehner & Weber, 1999).

For example, Just and Alloy (1997) found that non-depressed individuals who reported rumination tendencies in response to negative moods were more likely to develop depression in an 18 month period than participants who utilised distraction techniques when experiencing a negative mood. Similarly, Morrow and Nolen-Hoeksema (1990)

examined the role of ruminative and distracting responses, with both passive and active emphases, to sad mood in a non-clinical sample, in an experimental paradigm involving mood inducement. Sad mood was induced when participants read a story involving sudden death of a person's mother, and were instructed to imagine the story related to them. In addition, sad music was played, and participants were requested to attempt to get into the mood of the music. Four experimental groups were established, which differed according to the type of response enacted after the mood induction procedure. Those responses were: (a) passive-ruminative response (i.e., read ruminative sentences and reflect on them, such as, "I often wonder why I feel the way I do"); (b) passive-distracting response (i.e., read irrelevant, external-focused sentences, such as, "Canada's biggest industry is lumber"); (c) active-ruminative (perform a Q-sort with emotion stimuli and sort them according to current emotional state); and (d) active-distracting (perform a Q-sort with an external focus i.e., the industrialised status of countries of the world). In that study, Morrow and Nolen-Hoeksema found support for their hypotheses that participants in the passive-ruminative group would have the smallest reduction in sad mood, and participants in the active-distracting group would experience the greatest respite from that mood. They also found rumination had a greater impact on the prolongment of sad mood than level of activity. The findings of Kuehner and Weber (1999) also supported the hypothesis that rumination would be implicated in the increased duration of depressed mood. Using a clinical sample and a longitudinal design, Kuehner and Weber found episodes of depression were likely to continue for longer periods for participants who demonstrated ruminative tendencies during an inpatient assessment, when they were followed up 4 months after discharge. As such, rumination has been found to be associated with the continued experience of depressive symptoms, such as sad mood, in a non-clinical sample and depressive episode in a clinical sample.

2.3.2. Gender differences in rumination. The prolonging effect of rumination on depressed mood was proposed as a possible explanation for the often documented gender differences in the prevalence of depression (Nolen-Hoeksema, 1987), whereby females were deemed to be twice as likely to be diagnosed with depression as males (Kessler, 2003). Initially, Nolen-Hoeksema (1987) reported unpublished data which indicated sex differences in response to depressed moods, whereby males were more likely to report they would engage in distracting activities, such as playing sport, and females were more likely to report passive and reflective activities, such as "I try to determine why I'm so depressed" (p. 275). As such, Nolen-Hoeksema concluded females were more likely than males to engage in ruminative thought in response to a depressed mood, and she proposed that this may partially explain gender differences in depression prevalence rates. Similarly, Ingram, Cruet, Johnson, and Wisnicki (1988) found females were more likely than males to engage in self-focused attention in an experimental setting. In addition, when participants were lead to believe they had scored poorly on a measure of empathy, a significant sex x focus interaction emerged on the self-retribution factor of the Beck Depression Inventory, such that females who were in the self-focus condition had higher scores on that factor than females in the non-focus condition, and higher scores than androgynous and male participants in the self-focus conditions. The findings from that study provided support for gender differences in self-focus, which is one of the defining characteristics of rumination. In addition, a relationship between self-focus and negative psychological outcomes was identified, which was consistent with the observations of Nolen-Hoeksema.

Nolen-Hoeksema's (1987) proposition regarding gender differences in rumination as an explanatory factor for gender differences in depression prevalence was specifically investigated and supported in several studies. For example, Roberts, Gilboa, and Gotlib

(1998) found rumination mediated the effects of both gender and neuroticism on dysphoric symptoms. Similarly, Nolen-Hoeksema, Larson and Grayson (1999) conducted a longitudinal study with a community sample and assessed depressive symptoms, rumination, mastery and chronic strain in males and females over a 12 month period. Significant gender effects were found, with females more likely to experience higher levels of depression, rumination, chronic strain, and lower levels of perceived mastery. In addition, higher levels of chronic strain and rumination, along with lower levels of mastery, mediated the gender difference in depression. As such, in that study, rumination was found to be related to depression, and women were found to ruminate more than men. In an attempt to better understand the established gender difference in rumination tendencies, Nolen-Hoeksema and Jackson (2001) investigated a number of beliefs which were hypothesised to explain why females tended to ruminate more than males, including beliefs indicating; (a) emotions were uncontrollable, (b) the individual had minimal mastery over their environment, and (c) the need to be held personally responsible for the emotional state of their relationships. Those authors found that the gender difference in rumination was partially mediated by each of those beliefs individually, and fully mediated by the combination of those beliefs, such that individuals who believed they had minimal control over their emotions and environment, and felt that they were personally responsible for the emotional status of their relationships, were more likely to ruminate and, in turn, to display depressive tendencies. That combination of beliefs was found to be more commonly held by females who were also more likely to ruminate and to have depressive tendencies.

2.3.3. Rumination as an enabler for other vulnerability factors. The interaction between rumination and depression is complex and multifaceted. A substantial body of literature has been developed, whereby several studies have investigated the potential

mediational role of rumination in rendering individuals vulnerable to depression. For example, Spasojevic and Alloy (2001) conducted a longitudinal study examining relationships between rumination and noted risk factors for depression, namely: negative cognitive styles, self-criticism, dependency, neediness and previous episodes of depression, as well as the predictive utility of each of the risk factors for the onset of depressive episodes in a 2.5 year period. Those authors found each of the risk factors were related to rumination, and rumination was a significant mediator of the predictive relationship of those variables with depression. It was proposed that rumination may serve as a mechanism which enables other vulnerability factors to influence depressive tendencies (Spasojevic & Alloy, 2001). That suggestion was consistent with the findings of Roberts, Gilboa, and Gotlib (1998), who identified rumination as a cognitive manifestation of neuroticism, which was particularly conducive to the experience of depressive episodes. Nolan, Roberts, and Gotlib (1998) also identified rumination and neuroticism as vulnerability factors for depression, with the effect of neuroticism and previous diagnoses of depression being mediated by rumination. Similarly, Cox, Enns and Taylor (2001) identified that rumination completely mediated the previously identified role of anxiety sensitivity in increasing the severity of depressed mood (Taylor, Koch, Woody, & McLean, 1996).

In a more recent longitudinal study conducted by Flynn, Kecmanovic and Alloy (2010), the complex relationship between rumination and depression was further explored in the context of the interaction between rumination, perceived social support and interpersonal stress generation, and the relative contribution of each of those variables to depressive symptoms. It was identified that rumination contributed to interpersonal stress, and rumination and interpersonal stress both contributed to the experience of depressive symptoms. As such, Flynn et al. recognised the potential utility of integrating cognitive

and interpersonal vulnerability factors for depression. Similarly, McBride and Bagby

(2006) proposed a model of depression vulnerability which incorporated rumination and

interpersonal dependency. Those authors suggested that the interaction of women's greater

tendency to ruminate (Nolen-Hoeksma, Larson, & Grayson, 1999) and their higher

likelihood of being interpersonally dependent (Sanathara, Gardner, Prescott, & Kendler,

2003) represented a potentially useful mechanism for understanding females' increased

propensity to experience depression.

      2.3.4. Negative cognitive outcomes associated with rumination. In addition to its

identified involvement in increasing the severity and duration of depressive episodes (Just

& Alloy, 1997), rumination has been implicated in a variety of negative cognitive

outcomes. For example, Hertel (1998) found dysphoric participants who engaged in self-

focused thinking performed more poorly on a recall task than dysphoric participants who

were induced to focus on self-irrelevant thoughts in the period between exposure to stimuli

and a recall test. As such, self-focused rumination was considered to contribute to some of

the memory impairments associated with dysphoria (Hertel, 1998). Rumination was also

associated with memory in a study by Lyubomirsky, Caldwell, and Nolen-Hoeksema

(1998). Those authors conducted a series of four studies utilising different

autobiographical memory paradigms, and identified that rumination was related to the

enhanced retrieval of memories associated with negative life events for dysphoric

participants. That finding was interpreted as support for the proposal of Nolen-Hoeksema

(1991) that rumination increased the accessibility of negative memories. It was also

suggested that rumination may have served as a dysphoric "starting point" (p. 175) which

lead to the recall of mood congruent memories (Lyubomirsky, Caldwell, & Nolen-

Hoeksema, 1998). Similarly, Watkins, Teasdale and Williams (2000) identified a

rumination induction was associated with the maintenance of tendencies toward generating

overgeneral autobiographical memories, whereas a distraction induction lead to a reduction in overgeneral memory. Consistent with those findings, Watkins and Teasdale (2001) also identified reducing self-focused attention lead to a reduction in overgeneral autobiographical memories. Those authors suggested that naturally occurring rumination may have been implicated in ongoing overgeneral autobiographical memory, which, in turn, was associated with poor outcomes in depressed individuals (Watkins, Teasdale, & Williams, 2000).

In a study utilising a negative priming paradigm, Joormann (2006) identified rumination was associated with reduced inhibition of irrelevant information that was emotionally valenced and had been processed in relation to the self. Importantly, Joormann found that current depressive symptomology was not implicated in the relationship between rumination and inhibition deficits. That finding also provided support for the proposition that rumination may represent a stable personality marker that contributes to depression vulnerability (see, for example, Roberts, Gilboa, & Gotlib, 1998; Spasojevic, & Nolen-Hoeksema, 2001). Joormann's study was also consistent with the findings of Hertel and Gerstle (2003), who had identified deficits in forgetting irrelevant information in people who tended to ruminate. Together, those studies suggested rumination may be implicated in cognitive deficits associated with inhibiting unwanted or irrelevant information, independent of depressive symptoms (Joormann, 2006). The role of rumination in reducing the ability to inhibit irrelevant information is worthy of consideration in the context of thought suppression, which has been labelled an ironic process, whereby the intention to suppress unwanted thoughts leads to an increased accessibility of those thoughts (Wegner, 1994). The relationship between thought suppression and rumination, as well as thought suppression's unique relationship with depression, will be considered in the following section.

2.4   Thought suppression

   2.4.1. Ironic processes of mental control. Wegner (1994) proposed the ironic

processes of mental control theory, whereby it was identified that one's intentions to

control thought processes to avoid certain thoughts may have the opposite effect of

rendering those thoughts highly salient. Wegner suggested mental control involved two

complementary processes; a subconscious, automatic monitoring process, and a conscious

and effortful operating process. The monitoring process was purported to require minimal

cognitive effort to recognise failures of cognitive control. Once those failures were

identified, Wegner hypothesised the conscious and effortful operating process would be

activated, whereby the cognitive environment would be actively considered and stimuli

consistent with the desired mental state identified. Wegner suggested that certain

conditions increased the likelihood that the mental control processes would be

unsuccessful, including adverse cognitive and emotional conditions, such as cognitive load

and stress; and the strong desire to control one's thoughts, despite the ironic rebound effect

observed.

   The rebound effect of mental control was investigated in early research conducted

by Wegner, Schneider, Carter and White (1987) in which participants were required to

verbalise and tape record all of their thoughts during a five minute period. One group of

participants was initially instructed to intentionally avoid thinking about an irrelevant item

(a white bear), but to ring a bell or say "white bear" whenever that thought occurred

(suppression condition). After the five minute interval, those participants were requested to

record their thoughts for another five minutes, with instructions to specifically focus on

thinking about a white bear (expression condition). A second group of participants

performed those conditions in reverse order, that is, expression condition followed by

suppression condition. Results indicated the group that was instructed to suppress first

reported more thoughts of the white bear during their expression condition than the

participants who were instructed to express first. In addition, participants in both groups

reported thinking about the white bear during the suppression condition, indicating

repeated failures of thought suppression attempts. In a second study using the

suppression/expression versus expression/suppression conditions, along with an additional

suppression/expression condition in which participants were directed to distract themselves

from thoughts of a white bear with thoughts of a red Volkswagen, the paradoxical effects

of attempted thought suppression were again identified. The distraction group reported

some thoughts of a red Volkswagen, but also reported thoughts of a white bear more

frequently than the expression/suppression group in both the suppression and expression

conditions. These studies were important in establishing that the irony associated with the

process of attempting thought suppression was independent of the nature of the thought to

be suppressed. For the rebound effect to have occurred, a thought did not necessarily need

to be particularly "obnoxious or unnerving" (p. 11). Rather, the apparently benign thought

of a white bear was sufficient to demonstrate the effect. Wegner et al. (1987)

acknowledged the potential difficulties associated with the unwanted rebound effect of

suppressed thoughts, particularly as they related to traumatic events. They also identified

the magnified effect of suppressed thoughts may initiate more deliberate attempts at

thought suppression, which, when those attempts at suppression failed, was likely to lead

to a cycle of rumination or obsession. As such, the paradoxical effect of thought

suppression was identified as having potential implications for mental wellbeing that were

considered worthy of further investigation.

     2.4.2. Thought suppression and mental wellbeing. The potential implications of

tendencies toward thought suppression and mental wellbeing were investigated by Wegner

and Zanakos (1994). Those authors found support for Wegner's (1994) notion that

attempts to control mental processes may have unintended consequences, and suggested

the intention of suppressing a particular thought was likely to initiate the monitoring

process which signalled a failure of mental control and increased accessibility of the

thought that was initially intended to be avoided (Wegner, & Zanakos, 1994). As part of

that study, Wegner and Zanakos developed the White Bear Suppression Inventory (WBSI)

as a self-report measure of attempts to suppress unwanted thoughts. Those authors

identified that the WBSI was an effective means of assessing thought suppression, and

used that measure to assess relationships between thought suppression and a number of

vulnerabilities to psychopathology. It was observed that thought suppression, as measured

by the WBSI, was moderately and significantly positively correlated with a range of

measures assessing various psychopathological sensitivities including obsessive thinking,

depressive responding, state-anxiety and trait-anxiety. In addition, thought suppression

was found to be predictive of depression in individuals who identified a particular dislike

of experiencing negative thoughts. A linear hierarchical regression model with thought

suppression and depression sensitivity (conceptualised as a dislike of negative thoughts) as

predictors accounted for 28% of variance in scores on the Beck Depression Inventory

(Wegner & Zanakos, 1994). As such, thought suppression was identified as sharing

relationships with a range of negative psychological outcomes, including depression.

Wenzlaff, Rude, Taylor, Stultz, and Sweatt (2001) further investigated the

relationship between depression vulnerability and thought suppression. Those authors

utilised a measure of information processing (the Imbedded Word Task; IWT) to assess

cognitive bias for negative information in participants who were categorised as follows: (a)

previously depressed ("at risk), (b) never depressed, (c) currently dysphoric with no

previous episode of depression, and (d) currently dysphoric with a previous episode of

depression. Half of the participants in each category were given an 8-digit sequence to

recall at the completion of the IWT (high cognitive load); the other half of the participants

were not required to recall any additional information (no cognitive load). Findings

indicated depression-relevant cognitive biases in the at risk group of participants when

they were in the high cognitive load condition. This suggested support for the hypotheses

that at risk individuals may actively engage in thought suppression to minimise the impact

of negative thoughts and, when that thought suppression was interrupted by an increased

cognitive load, a tendency toward negative attentional biases was evident. That study

provided further support for the relationship between depression vulnerability and thought

suppression (Wegner & Zanakos, 1994), and the role of cognitive load in implementing the

paradoxical effect of attempts at cognitive control (Wegner, 1994).

   2.4.3 Thought suppression and rumination. Wegner, Schneider, Carter, and

White (1987) identified a potential relationship between highly motivated efforts at

thought suppression and the unintended experience of rumination. That relationship was

further explored by Wenzlaff and Luxton (2003) in a longitudinal study comparing

participants who differed according to their tendencies to engage in thought suppression

(high versus low thought suppressors), but were equivalent in reporting low levels of

rumination and depression. At a 10-week follow up, participants provided information

regarding stressful life events that had occurred in the time since the initial assessment, and

the high versus low thought suppressors were compared on their current levels of

rumination and depression. Results indicated that high thought suppressors who had

experienced a high level of stress had significantly higher levels of rumination and

dysphoria than any other group, including low thought suppressors who had experienced a

similar level of stress. Those findings supported the hypothesis that thought suppression

may contribute to rumination which, in turn, has implications for the experience of

depression (Wenzlaff & Luxton, 2003). As such, both thought suppression and rumination

have been identified as cognitive precursors to the onset of depressive symptoms, as well as cognitive processes which are likely to be more prominent during depressive episodes. Those findings are similar to research pertaining to overgeneral autobiographical memory, which has also been identified as a cognitive vulnerability factor for depression and a cognitive tendency which is more pronounced during depressive episodes.

2.5   Overgeneral autobiographical memory

2.5.1. Defining overgeneral autobiographical memory. An individual's autobiographical memories pertain to personally experienced events, and serve an important function by contributing to one's coherent sense of self (Williams, et al., 2007). Specific autobiographical memories are those which describe a unique event that occurred at a particular time and place and lasted less than one day (Croll & Bryant, 2000); whereas overgeneral autobiographical memories lack specificity of time, place and/or event, and instead may involve recollections of categories of events (e.g., "whenever I go to the dentist"), extended events (e.g., "my vacation to Florida"), or semantic associations (e.g., "the song 'Happy Birthday' comes to mind") (Rekart, Mineka, & Zinbarg, 2006). A tendency to provide overly general details of autobiographical events has been associated with a range of negative psychological outcomes, both during a current episode (see, for example, Williams & Broadbent, 1986), and prior to the onset of symptoms (see, for example, Van Minnen, Wessel, Verhaak, & Smeenk, 2005). As such, overgeneral autobiographical memory has been identified as a potential marker of vulnerability to psychopathology (Brittlebank, Scott, Williams, & Ferrier, 1993).

2.5.2. Overgeneral autobiographical memory and psychopathology. A substantial body of literature has identified a relationship between a tendency to recall overgeneral autobiographical memories and a range of psychological difficulties including: suicidal intentions (Williams & Broadbent, 1986), depression (Gibbs & Rude, 2004),

postnatal depression (Croll & Bryant, 2000; Mackinger, Loschin, & Leibetseder, 2000), schizophrenia (Wood, Brewin, & McLeod, 2006), and acute stress disorder (Harvey, Bryant, & Dang, 1998). In addition, a tendency toward overgeneral autobiographical memory has been associated with a tendency to ruminate (Barnard, Watkins, & Ramponi, 2006) which, as identified in previous sections, has been associated with a range of negative psychological outcomes; particularly depression (see, for example: Just & Alloy, 1997).

Williams and Broadbent (1986) initially identified the tendency of recent suicide attempters to display emotionally biased and overly general retrieval of autobiographical memories. Specifically, in-patients who had recently attempted to commit suicide by overdose, took longer to retrieve positive memories relative to two control groups; consisting of another inpatient group who had not attempted suicide, and a non-hospitalised control group of students. Interestingly, the latency of retrieving negative memories was equivalent between groups, which suggested that the recent suicide attempters had greater difficulty accessing positive memories, but were equally capable of accessing negative memories. In addition, the recent suicide attempters generated more overly general memories than either of the control groups.

Whilst the findings pertaining to the effect of valence on autobiographical recall have been mixed (Gibbs & Rude, 2004), the tendency for at-risk groups to have difficulty in retrieving specific autobiographical memories has been replicated in many studies using both cross-sectional and prospective methodologies. For example, Rekart, Mineka, and Zinbarg (2006) found that the autobiographical memories recalled by dysphoric college students were significantly more general than those of non-dysphoric participants. Similarly, Wood, Brewin, and McLeod (2006) found participants with schizophrenia demonstrated deficits in retrieving specific autobiographical memories, compared to a

control group matched for age, gender, number of years of education, and premorbid full scale IQ. In addition, there were no significant differences between the groups on depression symptoms at the time of testing. As such, the differences in autobiographical memory retrieval were interpreted as being predominantly related to the experience of schizophrenic symptoms. That finding provided support for the notion that autobiographical memory impairments were associated with a number of psychological disorders, in addition to the well-established relationship with depression.

In research investigating the relationship between autobiographical memory and postnatal depression, Croll and Bryant (2000) identified that participants experiencing postnatal depression retrieved significantly more general autobiographical memories, and did so more slowly, than a control group. In that study, positive memories associated with parental themes were more likely to be provided by the control group, and negative experiences pertaining to parental themes were more likely to be recalled by the group with postnatal depression. The relationship between overgeneral autobiographical memory and postnatal depression was also investigated by Mackinger, Loschin, and Leibetseder (2000). Those authors utilised an autobiographical memory task administered during pregnancy as a predictive measure of postnatal depression, and found that participants who provided overgeneral responses to negative cue words during pregnancy were more likely than participants who provided specific responses to negative cue words to develop postnatal depression in the first 3 months after giving birth. That prospective study provided support for the possibility that overgeneral autobiographical memory may represent a trait marker for depression, as proposed by Brittlebank, Scott, Williams and Ferrier (1993).

Another prospective study utilising autobiographical memory was conducted by Van Minnen, Wessel, Verhaak, and Smeenk (2005). In that study, overgeneral

autobiographical memory performance was predictive of anxiety and depression symptoms after unsuccessful IVF treatment. That predictive relationship was significant, even when initial anxiety and depression symptoms were taken into account. It was proposed by Van Minnen et al. (2005) that non-specific autobiographical memory patterns may interact with stressful life events to represent a cognitive vulnerability for depression. Another finding of that study was the predictive value of negative cues, whereby reporting low numbers of specific negative memories was related to increases in both anxiety and depression symptoms. That finding was consistent with the finding of Mackinger, Loschin, and Leibetseder (2000) who also identified a relationship between general responses to negative cues and negative psychological outcomes. As previously identified, other studies, such as that of Williams and Broadbent (1986) did not identify a relationship between negative cue responses and psychological dysfunction. Rather, those authors identified a relationship between increased response latencies to positive words and a tendency toward overgeneral autobiographical memory which was, in turn, related to schizophrenic symptoms. As such, whilst there have been mixed findings in relation to the relationship between valenced cue words, autobiographical memory patterns and psychological dysfunction, a consistent finding has emerged whereby overgeneral autobiographical recall has been strongly associated with a range of negative psychological outcomes.

       2.5.3. Overgeneral autobiographical memory and rumination. Although the relationship between overgeneral autobiographical memory and various forms of psychopathology has been well established, the mechanisms underlying the vulnerability to psychological disorder represented by overgeneral autobiographical memory are not well understood. One hypothesis proposed to explain the mechanisms underlying overgeneral autobiographical memory was the rumination hypothesis (Watkins &

Teasdale, 2001), which proposed that overgeneral autobiographical memory was influenced by an individual's cognitive state and, specifically, where an individual was engaged in rumination, they would also be prone to overgeneral autobiographical memory. Support for the rumination hypothesis was obtained by Watkins, Teasdale, and Williams (2000), when it was identified that, relative to a manipulation in which rumination was encouraged, a distraction manipulation was associated with a reduction in overgeneral autobiographical memory. Those results suggested the potential utility of interventions targeted at reducing rumination to also reduce overgeneral autobiographical recall. Further to that suggestion, Watkins and Teasdale (2001) assessed whether manipulating analytic thought and self-focused thought would impact upon tendencies toward overgeneral autobiographical memory. Results of those manipulations suggested a reduction in analytical self-focused thought was related to a reduction in overgeneral autobiographical recall. As such, that study provided support for the malleability of overgeneral autobiographical memory via manipulations of cognitive processing, and identified a specific relationship between tendencies toward rumination and overgeneral autobiographical memory, both of which appear implicated in cognitive vulnerability to depression. The findings of that study also suggested the focus of one's attention was a possible contributing factor to the relationship between overgeneral autobiographical memory and negative psychological outcomes. As such, attention may also be considered a cognitive contributor to depression, and is worthy of consideration in that context.

2.6   Attention

2.6.1. Attentional bias and depression. In addition to rumination, thought suppression, self-evaluation and overgeneral autobiographical memory, attentional bias has been identified as a cognitive vulnerability factor which may contribute to depressive tendencies (Beevers & Carver, 2003). The role of attentional bias in depression appears

multifaceted, and it is too simplistic to say that negative attentional bias predisposes individuals to depression. Early research investigating information processing bias in emotional disorders produced mixed findings in relation to depression, with some studies failing to identify an attentional bias in depression (Macleod, Mathews & Tata, 1986) and others identifying preferential processing of depression-congruent stimuli (Mathews, Ridgeway, & Williamson, 1996). Other findings suggested an interaction between vulnerability to depression, negative mood and negative attentional bias. For example, Ingram and Ritter (2000) identified that individuals who had experienced a depressive episode but were currently remitted demonstrated a stronger negative attentional bias than individuals who had never experienced a depressive episode. However, that difference was only observed in the presence of a negative mood. Similarly, Beevers and Carver (2003) found that an increase in attentional bias for negative information after a negative mood induction, in combination with stressful life events, was predictive of higher levels of dysphoria at a 7-week follow up. Those findings suggested support for the diathesis-stress model of cognitive vulnerability to depression, whereby an inherent tendency towards negative processing bias interacted with stressful life events to result in psychopathology (Segal & Shaw, 1986). Beevers and Carver suggested attentional bias may act as a moderating variable which increased the likelihood of negative psychological outcomes in individuals who experienced stressful life events.

Despite these mixed findings, a consistent finding across studies examining attentional bias and psychopathology has been the identification of differences between anxiety and depression, particularly in relation to the exposure time required to produce an attentional bias effect (Mathews & Macleod, 2005). The role of attention in anxiety has been extensively considered, theoretically and empirically. For example, the four-factor theory of trait anxiety proposed by Eysenck (2000) suggests that an individual's

vulnerability to anxiety is contingent upon their cognitive appraisal of their situation, their physiological reaction, worries about future events, and their own behavioural manifestations of anxiety. However, Eysenck suggested that the effects of each of those sources of information are mediated by "intervening attentional and interpretive processes" (p. 465). Consistent with Eysenck's four-factor theory of anxiety, Mogg, Bradley and Williams (1995) found anxious participants demonstrated preferential attention to anxiety-related cues with both brief (14 milliseconds) and longer (1 second) exposure. However, in that study, attentional bias toward depression-relevant threatening cues was only evident for the depressed group in the longer exposure condition. Similarly, Mathews, Ridgeway and Williamson (1996) observed attentional bias in a depressed group for threatening stimuli only in a longer exposure condition, whereas attentional bias was evident in both the brief and extended exposure conditions for the anxious group. Bradley, Mogg and Lee (1997) also failed to identify attentional bias in dysphoric participants in a short exposure condition, whilst identifying a bias in longer exposure trials. Those aggregated findings, which suggested the possibility of an automated sensitivity to threat in anxiety, and a more strategically controlled sensitivity to threat in depression, have been replicated in research utilising non-word paradigms, such as emotionally valenced pictures and faces (Mathews & Macleod, 2005). Whilst the findings pertaining to attentional biases in depression and anxiety have been replicated in several studies, the mechanisms underlying those disparate attentional biases are not well understood. However, the suggestion that a combination of automatic and strategic processing of information may be implicated is consistent with suggestions that executive functioning deficits may be associated with depression (Gotlib & Joormann, 2010).

2.6.2. Attention as an executive function and its relationship with depression.

The potential role of executive functioning deficits in depression was articulated by Hertel

(1997), who identified that hypoactivity in the prefrontal cortex associated with depression resembled the reduced synaptic activity implicated in difficulties with sustaining attention. Further, Hertel (1997) proposed that some of the well documented memory deficits associated with depression may occur due to disruptions in either memory formation or retrieval, associated with a lack of sustained attention either during the encoding process or retention interval. Depressed individuals' vulnerability to thought intrusions of that nature was hypothesised to be related to the compelling nature of a depressed individual's "self-concerns" (p. 570), and their subsequent difficulties with retaining task-focus. Eysenck and Derakshan (2011) made similar observations regarding the relationship between disruptions in the executive functioning processes of inhibition and shifting, and experiences of anxiety. This type of distractibility was identified by Ode, Robinson, and Hanson (2011) as an executive functioning deficit with implications for a range of psychological outcomes. In a series of five studies, "mental noise", as operationalised by reaction time variability, was utilised as a measure of executive functioning deficit and found to represent an increased vulnerability to impaired cognitive and behavioural control, negative emotions and depressive symptoms. Ode et al.'s research was informed by recent literature exploring the concept of "mind wandering", including hypotheses regarding possible mechanisms involved in this process and its influence on a diverse array of psychological outcomes.

According to Smallwood and Schooler (2006), "mind wandering" occurred when an individual's attention became diverted away from a task and became involved in the consideration of personally relevant but task irrelevant details. This diversion of attention was likely to occur without the individual's explicit intention, and may lack a specific goal or purpose (Smallwood & Schooler, 2006). Rather, personally relevant information may initiate mind wandering without the individual realising they have temporarily diverged

from the task at hand (Gollwitzer, 1999). It was suggested that mind wandering involved dual processes, namely (a) automaticity, to the extent that the initial diversion of attention from the task at hand occurs without deliberate intent, and (b) executive control, whereby, once initiated, the focus on self-directed attention was maintained (Smallwood & Schooler, 2006). This conceptualisation of mind wandering was reminiscent of the hypothesised mechanisms involved in thought suppression, whereby a combination of automatic and controlled processing influenced the rebound effect of suppressed thoughts (Wegner, 1994). Similar to thought suppression, mind wandering has also been identified as occurring more frequently in currently depressed or dysphoric individuals than non-depressed/non-dysphoric controls (Smallwood, Fitzgerald, Miles, & Phillips, 2009). Research investigating the effect of mind wandering on task performance has provided support for the involvement of executive processes in mind wandering, as evidenced by findings that mind wandering was less likely to occur when tasks were cognitively challenging and more likely to occur when an individual was engaged in a task for which they were well-equipped, through extensive practice (Smallwood, Davies, et al., 2004; Smallwood, Obonsawin, & Reid, 2003).

     2.6.3. Assessing mind wandering. A number of methodologies for assessing mind wandering have been utilised, the most common of which is self-report (Smallwood, et al., 2004; Smallwood & Schooler, 2006). Self-report measures of the subjective experience of mind wandering during a task can be categorised as probe-caught or self-caught mind wandering (Smallwood & Schooler, 2006). In the probe-caught mind wandering paradigm, participants are interrupted during the performance of a task and required to report on their inner experience. This may be accomplished via self-classification of mind wandering, where participants have been trained to recognise off-task thinking and simply report "yes" or "no" when prompted to report whether they have engaged in mind wandering (Giambra,

1995). Alternatively, in the experimenter-classification procedure, participants are

regularly asked to report on their inner experiences, and the experimenter then determines

the task relatedness of those thoughts (Smallwood, Obonsawin, & Reid, 2003). Self-caught

mind wandering may be examined via questionnaires such as the Thinking Content

component of the Dundee Stress State Questionnaire (Matthews, Joyner, Gililand,

Campbell, & Faulconner, 1999).

The subjective experience of mind wandering has also been inferred from

performance deficits on cognitive tasks, as represented by intra-individual variability

during non-demanding reaction time tasks (Ode, Robinson, & Hanson, 2011). As

previously identified, Ode, Robinson, and Hanson (2011) conceptualised mind wandering

as "mental noise", and operationalised mental noise as "variability to each stimulus-

response decision…assessed in terms of trial-to-trial variations in reaction time in basic

choice tasks" (p. 308). Utilising a number of reaction time tasks, including a basic Stroop

task, a go/no go task, and a semantic decision making task, Ode et al. identified mental

noise was implicated in a range of cognitive and emotional outcomes. In study 1, mental

noise was negatively related to sustained attention during a boring task. In study 2, mental

noise was negatively related to self-reported dispositional self-control. Those authors also

identified relationships between mental noise and negative emotional outcomes in study 3

and study 4, in which mental noise was positively related to the experience of negative

emotions over an extended period of time and depressive symptomology, respectively.

Finally, in study 5, a relationship was identified between mental noise and task-switching

deficits. Further, mental noise was identified to have a moderating effect between

mindfulness, attentional focus and daily negative emotions. In combination, the results of

that series of studies suggested variability on a number of reaction time tasks was related

to a variety of adverse consequences (Ode, Robinson, & Hanson, 2011). Other research

has also identified a relationship between intra-individual variability and negative

psychological outcomes. For example, Klein, Wendling, Huettner, Ruder and Peper (2006)

identified intra-individual variability (ISV) in a range of neuropsychological tasks

provided a better discrimination index than measures of central tendency between a

clinical group of participants diagnosed with attention-deficit hyperactivity disorder and

healthy controls.

2.6.4. Mental noise and depression. The research related to attentional bias and

depression indicates a complex relationship between those constructs, which appears to be

moderated to some extent by stimuli exposure time, mood, and, to some degree, stressful

life events. Recent findings implicating reaction time variability in a number of adverse

cognitive and emotional outcomes (Ode, Robinson, & Hanson, 2011) suggested the utility

of examining that aspect of cognitive functioning in an endeavour to better understand the

relationship between attention and depression. As such, the current research will extend

the research investigating the role of attentional bias in depression by utilising the

methodology and conceptualisation of mental noise proposed by Ode et al. (2011), to

investigate the potential relationship between intra-individual variability in reaction time,

as measured by variability in response to a dot probe task, and depressive symptoms.

2.7   The current research

A broad range of cognitive risk factors for depression have been identified by

previous research, including, *inter alia*, self-evaluation, rumination, thought suppression,

overgeneral autobiographical memory and reaction time variability. A substantial body of

literature has been established for the relationship between each of those variables and

tendencies toward depression, particularly in the aftermath of stressful life events. Theories

such as cognitive theories of depression (Beck, 1967, as cited by Alloy, Abramson,

Safford, & Gibb, 2006), attributional reformulation of the learned helplessness theory

(Abramson, Seligman, & Teasdale, 1978), hopelessness model of depression (Abramson, Metalsky, & Alloy, 1989), along with attentional control theories pertaining to anxiety (Eysenck, & Derakshan, 2011), provide support for the possible role of these variables in the aetiology and symptomology of depression. For example, the hypothesised role of rumination as a cognitive risk factor and mediator of other risk factors for depression can be understood in terms of the personal helplessness described by Abramson, Seligman, and Teasdale (1978). Similarly, support for the relationship between anxiety and attention, as described by Eysenck (2000), suggested the utility of examining attentional deficits as a potential risk factor for depression. There is evidence to suggest the variables of interest may occur both during depressive episodes and also prior to the onset of depressive symptoms, which provides support for the contention that they represent risk factors for depression, rather than cognitive alterations as a result of a depressive episode.

In addition to their relationship to depression, it is hypothesised that each of those variables may be related, to some extent, to each other. The precise nature of those relationships have not been investigated in detail, however, some research has addressed the relationship between various combinations of those variables, including: rumination and thought suppression (Wenzlaff & Luxton, 2003); rumination and self-evaluation (Barnard, Watkins, & Ramponi, 2006) and rumination and overgeneral autobiographical memory (Watkins & Teasdale, 2001). In addition, parallels have been noted between mind wandering and thought suppression, whereby the hypothesised mechanisms underpinning those processes comprise both automatic and controlled components (Smallwood & Schooler, 2006). Smallwood and Schooler (2006) also identified the self-focused nature of much mind wandering, which is reminiscent of the focus of rumination. As such, each of the variables of interest in the current research has been linked to one another, and to depression, in previous research. It remains to be determined, however, the precise nature

of those relationships and whether any of the theorised relationships may assist in identifying cognitive pathways to depression.

It is evident that, of the variables of interest, rumination and thought suppression have been identified as sharing a strong relationship. In addition, rumination has been identified as a mediator of several risk factors for depression. Several studies have indicated rumination plays a significant role in contributing toward many factors which represent cognitive vulnerabilities to depression. As such, it was determined that a useful contribution of this research would be to examine the influence of rumination in more explicit detail by conducting a factor analysis of the Ruminative Response Scale (RRS) and to include factors derived from that analysis in regression and mediation analyses. In addition, the research pertaining to rumination and thought suppression has indicated those constructs may share some common characteristics, such as a preoccupation with one's own thoughts. Therefore, it was considered meritorious to also conduct a factor analysis of the White Bear Suppression Inventory (WBSI) to further explore those hypothesised common characteristics. As such, whilst each of the variables of interest have been examined individually and in combination with a subset of other variables of interest, an extensive examination of the individual and cumulative effects of each of those variables on depressive vulnerability has not previously been undertaken. Therefore, the goal of the current research was to investigate the combined influence of individual factors related to rumination and thought suppression, along with self-evaluation, overgeneral autobiographical memory, and reaction time variability, on depression proneness, specifically in females.

The rationale for focusing on females was developed out of recognition that females are more likely to develop depression, are more likely to display a number of those cognitive patterns hypothesised to represent cognitive vulnerability to depression

(e.g., rumination), and the severe and debilitating effects of depression have particularly damaging ramifications when suffered in the postnatal period. It was anticipated that examining this particular combination of variables, identified via their individual relationship with depression and their theorised relationships with one another, would potentially provide additional insight into the complex and multifaceted relationship between cognitive functioning and depression.

In order to obtain a large and representative sample of females, online data collection was utilised in this research. Whilst online data collection is an increasingly common means of gathering data (Schulenberg & Yutrzenka, 2004), it has been identified that each individual measure should be assessed for equivalence prior to adopting that modality (Hollandare, et al., 2008). Therefore, to ensure that the online modality represented an appropriate means of testing for this study, an initial study was conducted to examine the equivalence of online administration of the tasks involved in this study with a traditional face-to-face, paper-and-pencil administration. Chapter 3 describes that study.

Chapter 3: Does Modality Matter? Measuring Cognitive Processing Styles Online

and Offline Using Fixed- and Free-response Self-report Tasks

3.1 Introduction

3.1.1 Overview of Chapter

This chapter presents the findings of a study which examined the online characteristics of a number of cognitive tasks and a depression scale which have traditionally been administered in a face-to-face format. The measures utilised in this study were chosen after an extensive examination of the literature pertaining to cognitive vulnerability to depression. Each of the constructs assessed by the instruments included in the current study has been empirically demonstrated to share relationships with each other and with depression. The overall purpose of this research program was to further explore the relationships between those constructs and depression in a representative sample of female participants. In order to facilitate a large sample size, online administration of those instruments was deemed appropriate. An assessment of comparability between online and traditional administrations was necessary to investigate whether those testing modalities introduced differences in the relevant constructs, which may interfere with the ability to draw meaningful conclusions from this research.

As such, traditional and online administrations of the Ruminative Responses Scale (RRS) (Nolen-Hoeksema & Morrow, 1991), White Bear Suppression Inventory (WBSI) (Wegner & Zanakos, 1994), Autobiographical Memory Task (AMT) (Rekart, Mineka, & Zinbarg, 2006; Williams & Broadbent, 1986), Self-referent Information Processing Task (SRIP) (Alloy & Abramson, 1997), and the Edinburgh Depression Scale (EDS) (Cox, Holden, & Sagovsky, 1987) were compared utilising *t*-tests and Cronbach's α.

3.1.2 The need for establishing online equivalence

Computers and the internet are being increasingly utilised in psychological research and clinical practice (Schulenberg & Yutrzenka, 2004). Recent research has identified several clear benefits of online data collection, such as accessing large and diverse samples (including groups who may have previously been considered inaccessible), opportunities for cross-cultural investigation, the possibility that the relative anonymity of the internet may encourage greater self-disclosure (Epstein, Klinkenberg, Wiley, & McKinley, 2001), reduced costs associated with data collection, the opportunity to explore phenomena unique to the online environment and additional variables such as response latencies (Kraut et al., 2003), increased accuracy of data due to automated scoring, and the ability to eradicate missing data by requiring participants to complete all items prior to moving on to the next one in any given test (Hollandare, Askerlund, Nieminen, & Engstrom, 2008). In addition, computerised testing may have a beneficial impact on the reliability, standardisation and objectivity of test administration (Schulenberg & Yutrzenka, 2004). However, it is necessary to recognise that internet data collection is not automatically equivalent to the traditional modes of face-to-face, telephone or postal data collection (Coles, Cook, & Blake, 2007). In addition, there are several ethical issues which must be considered in the context of conducting psychological research via the internet (Schulenberg & Yutrzenka, 2004).

When adapting psychological test instruments for use on the internet, it is necessary to assess the psychometric properties of the instrument in the online environment, rather than relying on the psychometric properties of the traditionally administered precursor (Coles et al., 2007). Whilst equivalency between traditional and computerised testing is often found, this may differ according to the test domain and the nature of the constructs under investigation (Butcher, Perry, & Atlis, 2000). For example, Hollandare et al. (2008) found support for the psychometric equivalence of paper-and-

pencil and online administration of the Beck Depression Inventory – Second Edition (BDI-II) and the Montgomery Asberg Depression Rating Scale – Self rated version (MADRS-S), and Coles et al. (2007) had similar findings in their examination of the Obsessive Compulsive Inventory (OCI) and the Obsessive Beliefs Questionnaire (OBQ). Grieve and de Groot (2011) also found no significant differences between traditional and online administrations of the short form of the Depression, Anxiety and Stress Scale (DASS-21). However, Joinson (1999) found lower levels of socially desirable responding and Davis (1999) found higher levels of self-focused negative thoughts in an online sample compared to a traditionally tested group.

In addition, Buchanan (2003) noted that even when the psychometric properties of an online test have been shown to be acceptable, it may not be appropriate to utilise norms based on traditional administration to interpret scores from online tests. This is due to the potential for subtle but significant differences, such as different factor structures being identified for the traditional and online versions of a test. These mixed findings regarding equivalence testing for online and traditional test formats necessitate each instrument being considered individually upon being adapted for online use (Hollandare et al., 2008). Some previous studies attempting to assess equivalence have lacked persuasiveness due to methodological limitations, including failure to ensure equivalence between groups on variables that may influence responses (such as age, ethnicity and gender), and limited statistical comparisons (Epstein et al., 2001). Other issues for consideration when assessing equivalence include comparing reliabilities, equivalence of means and standard deviations and correlations between the groups (Hollandare et al., 2008), as well as examining the construct validity of the online instrument in a similar fashion to that of a newly devised tool (Schulenberg & Yutrzenka, 2004). Kraut et al. (2003) recommended small pilot studies be conducted prior to the online administration of each psychological

instrument, to facilitate an examination of potential differences between the traditional and online data collection methods.

In addition to the need to examine the psychometric properties of the online test instrument, the online modality introduces ethical issues which must be acknowledged and addressed. Whilst online testing is not considered inherently more risky than face-to-face testing, it does introduce some unique challenges and carries with it the same ethical obligations as face-to-face testing, assessment and data collection (Kraut, et al., 2003). For example, the ethical principle of competence is as applicable to internet-based psychological assessments as it is to traditional assessments (Schulenberg & Yutrzenka, 2004). Of particular relevance to online data collection are challenges regarding obtaining informed consent, ensuring participants have fully understood instructions and conducting appropriate debriefing (Kraut, et al., 2003). Recommendations proposed by Barchard and Williams (2008) for the ethical conduct of online research indicate that projects deemed to be of "minimal risk" do not require written consent, so the clicking of an "I agree" icon on a computer screen is likely to be sufficient. Further, strategies such as ensuring the wording of information documents is as simple as possible and providing participants with a means of contacting the researcher for clarification are likely to fulfil the ethical obligations in relation to obtaining informed consent and debriefing. A more significant challenge is that of ensuring participants have fully understood the instructions and are not unduly distressed as a result of their participation, as well as monitoring attitudes to testing to safeguard against frivolous or malicious responding (Kraut, et al., 2003). Suggestions for dealing with these challenges include refraining from investigating topics likely to cause distress, avoiding the use of groups incapable of providing informed consent (Barchard & Williams, 2008), and tracking responders via unique logins to prevent multiple submissions from individual participants (Kraut et al., 2003).

3.1.3 Aims of the current study

In recognition of the need to examine each test individually prior to using an online version, and in accordance with the recommendations of Kraut et al. (2003) that a pilot study should examine the utility of online task administration prior to use in the online modality, the purpose of the current study was to compare a traditional testing format (i.e., face-to-face, paper and pencil administration) with an online testing format, for a series of tasks assessing several cognitive risk factors for depression and a depression scale. Given the potential benefits of online research, specifically larger and more diverse samples, it was intended to establish whether the Ruminative Response Scale (RRS), White Bear Suppression Inventory (WBSI), Autobiographical Memory Task (AMT), Self-referent Information Processing Task (SRIP), and the Edinburgh Depression Scale (EDS) could be administered online and considered comparable to the traditional paper and pencil administration of each of those measures.

3.1.4 The current study

Based on the findings of Hollandare et al. (2008), Coles et al. (2007), and Grieve and de Groot (2011), who found equivalence between traditional and online administration of self-report questionnaires, it was anticipated that there would be no significant differences between the traditional and online groups' scores on the measures of interest. However, in recognition that a non-significant finding of a null hypothesis test does not mean two groups can be considered equivalent (Nickerson, 2000), this study examined differences between the groups, effect sizes, and internal consistency, in order to investigate whether the two test modalities may be considered comparable for these measures.

3.2 Method

3.2.1 Participants

A total of 60 female participants, ranging in age from 18 – 46 years participated in this study. Table 3.1 contains information in relation to the characteristics of the participants. Thirty of the participants completed the test battery in a face-to-face session ("traditional group"), and the remaining 30 participants completed the test battery in an online format ("online group"). Participants were recruited via word-of-mouth, through announcements in undergraduate psychology classes, and online via email and the social networking website, "Facebook". Undergraduate psychology students were offered 2% course credit in exchange for their participation. Members of the wider community were not offered any incentives to participate.

Table 3.1

Demographic Characteristics of Pilot Study Participants

		Traditional group (N = 30)	Online group (N=30)
Age	*M(SD*		
		27.5 (8.16)	26.43(7.6)
Years of education			
M(SD)		13.57(1.7)	13.5(1.8)
Employment status			
Fulltime		10 (33.3%)	8 (26.7%)
Part-time		7 (23.3%)	8 (26.7%)
Casual		13 (43.3%)	7 (23.3%)
Maternity leave		0	7 (23.3%)
Not employed		0	0
Relationship status			
Married		2 (6.7%)	7(23.3%)
Defacto		10 (33.3%)	9 (30%)
Separated		6 (20%)	2 (6.7%)
Single		12 (40%)	12 (40%)
Depression diagnosis	yes	11 (36.7%)	7(23.3%)
	no	19 (63.3%)	23(76.7%)
Other diagnosis	yes	3 (10%)	1 (3.3%)
	No	27 (90%)	29 (96.7%)

3.2.2 Design

This study utilised a cross-sectional correlational design involving between-groups comparisons, with mode of testing as the grouping variable. Participants who learnt about the study via internet recruitment techniques were able to access the online version and those who learnt about the study via word-of-mouth were allocated to the traditional group.

3.2.3 Materials

3.2.3.1 Demographic questionnaire. The demographic questionnaire contained questions pertaining to age, occupation, level of education, employment status, relationship status, and previous diagnoses of depression and other psychological disorders. If participants had previously been diagnosed with depression or another psychological disorder, they were asked to identify whether they had received medication or other treatment for that condition, whether they were currently being treated for that condition, and whether they considered themselves to be currently suffering from that condition. A copy of the demographic questionnaire is attached as Appendix A.

3.2.3.2 Ruminative Response Scale (RRS). The RRS (Nolen-Hoeksema & Morrow, 1991) was a 22 item subscale of the Response Styles Questionnaire (RSQ) which measured an individual's tendency to engage in ruminative thoughts when feeling sad, blue or depressed. The RRS consisted of a four point Likert scale, whereby 1 = *almost never* and 4 = *always*. Items in the RRS were deemed representative of the tendency to ruminate on either self-focused thoughts (e.g., "*1. Think about how alone you feel.*"), symptom focused thoughts (e.g., "*3. Think about your feelings of fatigue and achiness.*"), or the possible causes and consequences of one's dysphoric mood (e.g., *2. Think "I won't be able to do my job if I don't snap out of this."*") (Nolen-Hoeksema, 2000). Scores range

from 22 – 88, with lower scores indicating less of a tendency to ruminate, and higher

scores indicating a greater tendency to ruminate. Treynor, Gonzalez, and Nolen-Hoeksema

(2003) reported the RRS had very high internal consistency of Cronbach's $\alpha = .90$. A copy

of the RRS is attached as Appendix B.

3.2.3.3 Autobiographical Memory Test (AMT). The AMT was originally

devised by Williams and Broadbent (1986) to assess individuals' tendency to provide

autobiographical memories which are either specific or overly general. The current study

utilised an expanded version of the AMT, as devised by Rekart, Mineka and Zinbarg

(2006), which included the 10 original (five positive and five negative) words utilised by

William and Broadbent (happy, sorry, safe, angry, interested, clumsy, successful, hurt,

surprised, lonely) and an additional 10 depression relevant (five positive and five negative

words, i.e., proud, sad, excited, rejected, cheerful, failure, pleased, hopeless). The stimuli

used for this task are presented in Appendix C. Participants were required to provide an

autobiographical memory in response to each of the cue words within a 60 second period.

Responses were then rated by independent scorers and categorised as specific (which

constitutes a correct response), or extended, categoric, semantic association or omission

(all of which represent an incorrect response). Specific responses described an event that

lasted less than a day and occurred at one particular time and place. Extended responses

referred to events that lasted for longer than one day, for example "my holiday in Europe".

Categoric responses reflected a summary of multiple occurrences, such as "whenever I

think of my children". Semantic associations were responses that fail to describe a past

event but, rather, indicated an association to the cue word, such as "Happy birthday" in

response to the cue word, "Happy". An omission reflected a failure to respond or an

incomplete answer which could not be categorised under any of the other headings.

(Rekart, Mineka, & Zinbarg, 2006).

3.2.3.4 White Bear Suppression Inventory (WBSI). The WBSI (Wegner & Zanakos, 1994) was developed to measure an individual's tendency to attempt to suppress unwanted thoughts. This measure consisted of 15 items on a five point Likert scale, whereby 1 = *strongly disagree* and 5= *strongly agree*. Scores on the WBSI range from 15 – 75, with lower scores indicating less of a tendency to attempt to suppress unwanted thoughts and higher scores indicating a greater tendency to engage in this method of self-regulation. Sample items from the WBSI include, "*1. There are things I prefer not to think about"; and "2. Sometimes I wonder why I have the thoughts I do.*" Wegner and Zanakos reported very high internal consistency of the WBSI, with Cronbach α ranging between .87 and .89. A copy of the WBSI is attached as Appendix D.

3.2.3.5 Self-referent Information Processing Task (SRIP). The SRIP (Alloy & Abramson, 1997) was comprised of four tasks intended to assess whether participants displayed preferential processing of negative self-referent information, which is recognised as a cognitive risk factor for depression. SRIP Task 1 required participants to respond either "Me" or "Not me" to a series of trait words, to indicate whether those words were self-descriptive or not. The trait words reflected positive depression relevant (PDR) traits, for example, competent; negative depression relevant (NDR) traits, for example, failure; positive depression irrelevant (PDI) traits, for example, polite; and negative depression irrelevant (NDI) traits, for example, offensive. In SRIP Task 2, participants were given examples of each of the categories and required to provide behavioural examples of any of the words they considered to be self-descriptive. SRIP Task 3 consisted of 24 statements describing hypothetical behaviours and participants were required to provide a score between 0 and 100 to indicate how likely it was they would behave as described in the hypothetical statements. Each domain (i.e., PDR, NDR, PDI and NDI) was represented with six statements in this task. An example of a PDR statement is, "*5. You give an in-class presentation and communicate your ideas clearly*" (representing the PDR trait of

competence). The mean scores for each domain represented the dependent variables in this

task. The final SRIP task was a free recall task in which participants were given five

minutes to recall the trait words presented in SRIP Task 1. The dependent variable for this

task was the number of words correctly recalled from each domain. A copy of each of the

SRIP tasks is attached as Appendix E.

3.2.3.6 Edinburgh Depression Scale (EDS). The EDS (Cox, Holden & Sagovsky,

1987) was a 10-item self-report scale which has been used extensively to identify

symptoms of depression and postnatal depression. The EDS consisted of items related to

depressive symptoms participants may have experienced in the previous seven days (e.g.,

"I have blamed myself unnecessarily when things went wrong": (a) Yes, most of the time;

(b) Yes, some of the time; (c) Not very often; (d) No, never). The EDS has been found to

be a highly sensitive measure of PND, identifying 86% of true positives (participants

identified by the EDS as being depressed who obtained a diagnosis of depression after a

standardised psychiatric interview) and 78% of true negatives (participants identified by

the EDS as not being depressed who were assessed as not being depressed after a

standardised psychiatric interview). The split-half reliability of the EDS has been reported

as .88 and the standardised ά-coefficient was reported as .87 (Cox, et al., 1987). Scores of

10 and above indicated possible depression, whilst scores of 13 and above indicated the

individual was likely to be suffering from some form of depressive illness (Cox, et al.,

1987). The EDS has been used to assess depression in several populations including non-

postnatal women (Cox, Chapman, Murray, & Jones, 1996), patients with late stage cancer

and terminal illness (Lloyd-Williams, Shiels, Taylor & Dennis, 2009; Lloyd-Williams,

Dennis, & Taylor, 2004), Aboriginal and Torres Strait Islander women (Campbell, Hayes,

& Buckby, 2008), and women of menopausal age (Nyklicek, Scherders, & Pop, 2004). The

EDS has robust psychometric properties and has been found to be a reliable and valid

instrument for identifying depressive symptoms (Nyklicek, Scherders, & Pop, 2004). A copy of the EDS is presented in Appendix F.

3.2.4 Procedure

Ethical clearance for this study and the two subsequent studies was obtained from the Australian Catholic University's human research ethics committee (reference number: Q2010-04). A copy of that approval is contained in Appendix G. Sample participant information letters and consent forms for each of the testing modalities are presented in Appendices H and I.

3.2.4.1 Traditional group. Participants were tested individually in a face-to-face session conducted by the researcher, in either a tutorial room, office or research laboratory at the Australian Catholic University. Testing sessions lasted between 60 and 90 minutes per participant. In accordance with ethics requirements, all participants read an information letter and completed an informed consent form prior to the commencement of testing. Participants then completed the demographic questionnaire, RRS, AMT, WBSI, SRIP, and EDS. Measures were not counterbalanced because the order of presentation needed to be identical to the online group, which was pre-programmed into the testing website.

3.2.4.2 Online group. Participants completed testing individually in a location convenient to them, utilising their own computer. In accordance with the ethical protocol of this study, upon accessing the test website via an internet web address, participants were required to read the information letter and indicate their consent to participate in this study by clicking "I agree". Upon providing this consent, participants were able to access the test battery, one task at a time, in the same order as that completed by the traditional group. Participants were required to complete each task before the next task would become available to them for completion. The results of each individual test were emailed to the researcher upon completion.

3.2.4.2.1 RRS. The instructions for the RRS were as follows: "*People think and do many different things when they feel sad, blue or depressed. For each of the following statements, please indicate if you never, sometimes, often, or 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.*" Participants in the traditional group ticked a box to indicate their response, whilst participants in the online group clicked on the relevant box to record their response. This task was untimed.

3.2.4.2.2 AMT. Participants in the traditional group and online group were required to read the following explanation of the AMT: "*The focus of this activity is events that have happened in your life. You will be shown a series of words. For each word, think of an event that happened to you that the word reminds you of. The event could have happened recently (yesterday, last week), or a long time ago. It might be an important event, or a trivial event. The memory you recall should be a specific event. So in response to the word 'fun' it would not be okay to say, "I always enjoy going on trips", because that does not mention a specific event. It would be okay to say, "I had fun when I went to Dreamworld", because that refers to a specific event. It is also important to try to recall a different memory or event for each cue word*" (Rekart, Mineka, & Zinbarg, 2006). Upon reading these instructions, participants were informed they had 60 seconds to record their response to each cue word. They were then provided with the first cue word. Participants in the traditional group were timed with a stopwatch and participants in the online group were given 60 seconds by the computer program in which to finalise their response. When 60 seconds had lapsed participants in the traditional group were asked to stop writing and participants in the online group were rendered unable to type anything further by the computer program, which removed the cue word and their response from the screen. If participants completed their response in less than 60 seconds the traditional group were

able to indicate to the researcher they were finished and move on to the next cue word.

Similarly, online participants were able to click on "next" and proceed to the next cue

word. All participants responded to the 20 cue words in the following order: happy, sorry,

safe, angry, interested, clumsy, successful, hurt, surprised, lonely, proud, sad, excited,

rejected, cheerful, failure, pleased, hopeless.

3.2.4.2.3 WBSI. All participants were required to read the following instructions:

"*Please indicate the extent to which you agree or disagree with each of the following*

statements by ticking (traditional)/clicking (online) the box corresponding to the response

that most applies to you." Participants in the traditional group ticked a box to indicate their

response, whilst participants in the online group clicked on the relevant box to record their

response. This task was untimed.

3.2.4.2.4 SRIP Task 1. All participants were provided with instructions for this

task as follows: "*In this task, you will see a number of adjectives that can be used to*

describe a person. For each adjective, please decide whether it describes you or not. If you

feel that the adjective does describe you, tick (traditional)/click (online) the "ME" box. If

you feel that the adjective does not describe you, tick (traditional)/click (online) the "NOT

ME" box. When making these decisions, think about the way you usually view yourself."

Traditional participants were provided with the list of trait adjectives in a table, with a

"Me" and "Not me" column accompanying each trait word. Online participants were

provided with each trait word on their screen, accompanied by a "Me" and a "Not me" box

in which to click their mouse. All participants responded to five trial words and a complete

set of 12 positive depression relevant words, 12 negative depression relevant words, eight

positive depression irrelevant words and eight negative depression irrelevant words. Once

the complete set of trait adjectives had been responded to, each word was presented a

second time, in a different order to the first set of responses. Upon completion of the

second set of responses, the five trial words were presented again. As such, each

participant provided a response to 45 trait adjectives, twice each, for a total of 90 trials.

The purpose of the trial words appearing at the beginning and end of this task was to

control for primacy and recency effects in the memory task associated with these words in

SRIP Task 4. This task was untimed.

3.2.4.2.5 SRIP Task 2. The instructions for SRIP Task 2 were as follows: "*In this*

activity, you will again see adjectives that can be used to describe a person. Select each

adjective that you feel describes you. For each of the words you choose as being

descriptive of you, list the reasons you feel this adjective is self-descriptive. Give specific

examples from your past to indicate why you feel a particular trait is self-descriptive. Use

as many examples of as many kinds of behaviours as come to your mind. Do not worry

how other people might interpret a particular behaviour; use your own frame of reference.

For example, if the word "athletic" was selected, examples of this might include winning a

swimming race, achieving As in physical education classes at school etc." Participants in

the traditional group were required to tick a "Me" or "Not me" box for each of the traits,

and were provided with a blank box in which to write their response providing behavioural

examples of any traits they deemed to be self-descriptive. Similarly, participants in the

online group were required to click either "Me" or "Not me" in response to each of the

traits, and were provided with a blank box in which to type their response for the

behavioural examples of self-descriptive traits. This task was untimed. Upon completion of

each response, participants were able to progress to the next trait word.

3.2.4.2.6 SRIP Task 3. For SRIP Task 3, participants were provided with the

following instructions: "*During this next activity, you will be reading sentences that*

describe a number of behaviours and reactions that might be true of you. For each

sentence, indicate how likely or how probable it is that you would behave or react in the

way described. You may assign each sentence any number from 0 to 100. A 0 means that this could not be true of you, that is, it is extremely unlikely that you would act or feel this way. A 100 means that this could very well be true of you, that is, it is extremely likely that you would act or feel this way. Use numbers in between 0 and 100 if it is somewhat likely that you would act or feel this way. The higher the number you choose, the more likely it is that you would act or feel the way described." Participants in the traditional group were required to write their response (i.e,. 0-100) in a box next to each statement; and participants in the online group were required to drag their mouse along a continuum with the numbers 0-100 at either extreme and all numbers in between represented in equal intervals. Participants' responses were recorded by dragging their mouse along the continuum and clicking at the point representing their required value. This task was untimed.

     3.2.4.2.7 SRIP Task 4. This task was a free-recall task based on the trait adjectives from SRIP Task 1, with a timed component. Participants were provided with the following instructions: "*The next part is a memory task. Please recall as many as possible of the adjectives that were presented during the first part of this task. That is, I want you to remember as many of the words as you can regardless of whether you judged them to be "ME" or "NOT ME" words. Please write the adjectives in any order that you wish in the box below. You have 5 minutes in which to complete this task.*" Participants in the traditional group were timed with a stopwatch and required to write their responses in a blank box on a page containing the instructions for this task. Similarly, participants in the online group were provided with blank space on their computer screen in which to type their responses. Upon completion of the requisite time, participants in the traditional group were requested to stop working; participants in the online group were unable to record any

responses beyond that timeframe, as their workspace became unavailable for text to be

entered, and their screen would progress to the next task.

3.2.4.2.8 EDS. When completing the EDS, participants were asked to reflect upon

how they had been feeling in the previous seven days and respond to each item

accordingly. Participants in the traditional group recorded their response by ticking the

relevant box, whilst participants in the online group clicked their mouse on the relevant

box. This was an untimed task.

3.3 Results

3.3.1 Scoring and Data Screening

The scores obtained from each measure are outlined in Appendix J. Prior to

analysis, data screening was conducted to assess for accuracy of data input, missing

values, significant outliers and breaches of the assumptions of normality, namely skewness

and kurtosis. A summary of the data screening findings is attached as Appendix K.

Missing data were minimal, with only one participant failing to provide data for a single

variable (WBSI). As such, no attempt was made to replace missing values. No issues of

concern were identified for RRS, AMT, WBSI, SRIP Task 3 (PDR, NDR, PDI and NDI),

SRIP Task 4 (PDR, NDR and PDI), or the EDS. Breaches of the assumptions of normality

and significant outliers were identified in the remaining variables. As such, square root

transformations were performed on each of the SRIP Task 1 and Task 2 scores, along with

the SRIP Task 4 NDI. These transformations rectified the problems associated with these

variables, and the resulting transformed variables were deemed suitable for inclusion in

further analyses.

3.3.1.1 Control measures. Between-groups *t*-tests were conducted to compare age

and years of education between the groups, with the effect size for each of those *t*-tests

calculated using Cohen's *r* (Cohen, 1992). Those *t*-tests identified the groups were not

significantly different in age, *t*(58)=.52, *p*=.60, *r* = .07, or years of education *t*(58) = .15, *p*

= .88, *r* = .02. The effect sizes for each of these results are in the small range (Cohen,

1992). These small effect sizes indicated that less than .01% of variance in age and years

of education was explained by group membership. Mann-Whitney tests were conducted to

compare the groups on the categorical variables of employment status, relationship status,

depression diagnosis and other diagnosis. The effect sizes of those tests were calculated

using Rosenthal's (1991: as cited by Field, 2005) equation to convert a *Z*-score into an

effect size estimate. Those tests revealed the groups did not differ significantly on

employment status, *U* = 378.5, *p* = .28, *r* = -.14 or relationship status, *U* = 388, *p* = .36, *r* =

.12. In addition, the groups did not significantly differ according to whether they had

previously been diagnosed with depression, *U* = 390, *p* = .39, *r* = .14 or another

psychological disorder, *U* = 420, *p*=.61, *r*=.13. Again, the effect sizes for each of these

results were in the small range (Cohen, 1992), with group membership accounting for

between .01% and .02% of variance in those variables. As the groups did not differ

significantly on any of the demographic variables, they were considered comparable for

the purpose of comparing modes of testing.

3.3.2 Descriptive Statistics

Table 3.2 contains the means and standard deviations for each group on the

variables of interest.

Table 3.2

Mode of Testing Comparison of Mean Scores on Cognitive Tasks and EDS

	Traditional group (n = 30) M(SD)	Online group (n=30) M(SD)	t	p	r
RRS	43.13(12.89)	41.97(12.16)	.36	.72	.05
AMT Tot.spec	15.8(4.3)	11.03(5.06)	3.93	<.001	.45
AMT Tot.errors	7.1(6.61)	9.23(5.45)	-1.36	.18	.17
AMT dr.spec	8.2(2.17)	5.73(2.94)	3.69	<.001	.43
AMT dr errors	3.13(3.43)	4.3(3.02)	-1.4	.17	.18
WBSI	50.62(10.2)	50.36(13.13)	.08	.93	.01
SRIP1PDR	1.08(.09)	1.12(.12)	-1.68	.1	.19
SRIP1NDR	.29(.27)	.37(.26)	-1.16	.25	.15
SRIP1PDI	1.05(.06)	1.08(.08)	-1.74	.08	.21
SRIP1NDI	.31(.26)	.36(.25)	-.74	.46	.10
SRIP2PDR	1.71(.71)	1.4(.67)	1.72	.09	.22
SRIP2NDR	.41(.69)	.38(.51)	.19	.85	.02
SRIP2PDI	1.71(.42)	1.64(.52)	.55	.59	.07
SRIP2NDI	.41(.63)	.26(.49)	1.04	.3	.13
SRIP3PDR	72.14(10.02)	66.41(15.28)	1.72	.09	.22
SRIP3NDR	42.24(14.96)	42.2(15.81)	.01	.99	<.001
SRIP3PDI	76.52(12.55)	74.5(11.01)	.66	.51	.09
SRIP3NDI	28.85(14.91)	30.21(15.13)	-.35	.73	.05
SRIP4PDR	.29(.09)	.27(.14)	.82	.42	.08
SRIP4NDR	.24(.12)	.18(.13)	1.7	.09	.23
SRIP4PDI	.24(.09)	.25(.14)	-.56	.58	.04
SRIP4NDI	.15(.12)	.20(.16)	-1.46	.15	.17
EDS	9.63(6.3)	8.63(5.83)	.64	.53	.08

Note: RRS = Ruminative Response Scale; AMT = Autobiographical Memory Test; Tot.spec = total specific responses; Tot.errors = total errors; dr.spec = depression relevant specific responses; dr.errors = depression relevant errors; SRIP = Self-Referent Information Processing Task; pdr = positive depression relevant; ndr = negative depression relevant; pdi = positive depression irrelevant; ndi = negative depression irrelevant; EDS = Edinburgh Depression Scale.

3.3.3 Inferential Statistics

In line with similar research conducted by Grieve and de Groot (2011), between-groups *t*-tests were conducted to ascertain whether the differences in mean scores between the traditional group and the online group on the cognitive tasks and the EDS were significant, as calculated with an alpha level of .002, with Bonferroni's adjustment for multiple comparisons (.05/23 = .002) . Effect sizes for each of those tests were calculated using Cohen's *r* (Cohen, 1992). The results of those *t*-tests are displayed in Table 3.2. As can be identified in Table 3.2, the only significant differences between the groups were the number of correct responses provided for the AMT overall and the AMT depression relevant stimuli. The effect sizes for these significant results are considered large, and the effect sizes for each of the non-significant findings are considered small (Cohen, 1992). Those effect sizes indicated modality accounted for minimal variance in the variables for which there were non-significant findings, but accounted for approximately 20% of variance in the variables which were found to significantly differ across modalities.

Consistent with the recommendations of Hollandare et al. (2008) the reliability of the Likert-scale measures was calculated using Cronbach α. Table 3.3 contains a summary of these calculations for the traditional and online groups.

Table 3.3

Cronbach α Scores for Each Group on Scales of Interest

Measure	Traditional Group α	Online Group α
RRS	.94	.95
WBSI	.92	.95
EDS	.90	.88

An examination of the internal consistency of the measures, conducted in relation to the recommendations of DeVellis (1991) for categorising internal consistency scores, revealed similar Cronbach's α for both groups for the RRS and WBSI, which were in the extremely high range (>.90), and slightly lower but very good (.80 - .90) estimates for the EDS.

3.4 Discussion

3.4.1 Summary of findings

In accordance with the findings of Hollandare et al. (2008) and Coles et al. (2007), this study found no significant differences between the scores of a traditional testing group and an online testing group on the self-report questionnaire measures of RRS, WBSI, and EDS. In addition, there were no significant differences between the groups on the SRIP tasks or the AMT error variables. However, there were significant differences between the groups on the AMT specific variables, which represent correct responses on this task. Contrary to the hypothesis that online participants would be more inclined to disclose personal information than the traditionally tested participants, the online group provided less total responses and less correct responses on AMT than the traditional group. These findings suggested preliminary evidence for the online comparability of the RRS, WBSI, EDS and SRIP. In contrast, the differences between the groups on the AMT suggest the normative standards determined for the traditional administration of that measure cannot be applied to the online modality, and further investigation is required before that measure can reasonably be administered online.

An examination of the internal consistency of the Likert-scale measures, namely RRS, WBSI and EDS, compared on the basis of mode of testing, provided further support for the online comparability of the RRS, WBSI and EDS. Each of those measures was found to have high internal consistency for both groups, which provided evidence in

relation to both the psychometric robustness of those measures in general, and the appropriateness of utilising them online.

3.4.2 Limitations and Directions for Future Research

This study was a small preliminary study and therefore restricted in its scope. As such, it should be noted that the generalisability of the results is limited by the study's small sample size and the fact that only females were included in these analyses. It is also necessary to consider the possibility that the failure to detect differences between testing modes for RRS, WBSI and EDS may be the result of a lack of statistical power to detect difference, rather than the absence of differences between the testing modes (Cohen, 1992). However, the small effect sizes for the variables with findings of no significant differences indicated that, irrespective of sample size, those variables do not appear to differ as a function of test modality.

A major limitation of this study was its quasi-experimental design, whereby participants were not randomly assigned to each condition. As such, the mode of testing was likely to represent a confound, as a result of participants selecting their preferred examination mode. Despitethe consideration of equivalence of demographic details between the groups finding no significant differences, which provided some support for the comparability of the groups, it is acknowledged that the lack of random allocation to testing conditions reduces the generalisability of this study's findings. Another possible limitation of this study is the presence of the researcher for the traditional testing group. This could represent a confound that needs to be considered in light of research which suggests the anonymity of online data collection may influence disclosure, particularly in relation to sensitive topics (Kays, Gathercoal, & Buhrow, 2012).

3.4.3 Implications

The purpose of this study was to assess the comparability of online versions of several tasks, in order to justify the use of those measures in an online testing format. Previous attempts to establish the online equivalence of psychological measures have been criticised for failing to control for differences in the demographic variables between groups and for conducting relatively cursory statistical examinations of the measures under consideration (Epstein et al., 2001). Those limitations were specifically addressed in this study, which used comparable groups and conducted several statistical analyses.

The findings of this study provided support for the appropriateness of using the self-report questionnaires of RRS, WBSI and EDS online. However, there was an absence of support for the use of the AMT, and mixed support for the SRIP, both of which may be considered predominantly free response tasks. As such, a closer examination of the AMT and specific components of the SRIP task may be required in order to reasonably include these tasks in an online testing modality. However, SRIP1 PDR appeared comparable in both the online and traditional testing formats, suggesting that these variables may be suitable for use in the online environment in further studies. Additional research regarding the SRIP is necessary, to clarify the disparate findings in relation to the various scores on that measure.

This research is considered important as it contributes to the growing literature regarding the suitability of online adaptations of a range of psychological measurement tools. The measures assessed in this study were of particular interest because they assess cognitive constructs which have been demonstrated to relate to a range of negative psychological outcomes. It is proposed that an understanding of their comparability in an online format can provide a rationale for their use in computer mediated assessment and, potentially, contribute to the increasing trend toward online assessment and virtual therapy.

3.4.4 Conclusions

This research was an exploratory preliminary study to investigate whether modality of testing introduced differences in a number of cognitive variables identified as risk factors for depression, and a depression inventory. The findings of this exploratory study make a preliminary contribution to the literature regarding the assessment of online comparability of psychological measures and affirm the need for each measure to be assessed individually prior to its introduction to the online environment.

Chapter 4: Gender and Depression-level Comparisons of the Factor Structure of

Ruminative Response Scale and White Bear Suppression Inventory

4.1 Introduction

4.1.1 Rationale for the current study

As outlined in chapter1 above, the overall purpose of this research program was to

investigate a number of empirically derived cognitive factors which may be implicated in

female vulnerability to depression, by collecting data from a large sample via the internet.

It was recognised that the robustness of this research would be enhanced if two

preliminary investigations were conducted to evaluate a number of aspects of the current

research design. Firstly, in accordance with the recommendations of Coles et al. (2007)

that all instruments should be assessed for comparability prior to their adaptation to online

use, the first study reported in this program of research was conducted to evaluate the

appropriateness of the measures of interest in the online modality. In that study, RRS,

WBSI and EDS all emerged as measures which appeared to be suitable for use in the

online environment. Although there were noted limitations to that study, for the purposes

of the current research, that study's function as a pilot study to assess comparability of

testing modalities was considered sufficient to justify the collection of data in the online

context.

A further consideration of the RRS and WBSI by examining their factor structures

in a number of samples was considered appropriate for a number of reasons. One of the

key findings which informed the development of this research was the identification by

Nolen-Hoeksema, Larson, and Grayson (1999) that gender differences in a number of

cognitive processes may be implicated in the often reported greater prevalence of

depression in females (Australian Bureau of Statistics, 2008; Kessler, 2003). In particular,

females have been found to engage in rumination (Nolen-Hoeksema, 1987) and thought suppression (Wegner & Zanakos, 1994) more frequently than males. As such, in order to justify the inclusion of rumination and thought suppression as key indicators of female vulnerability to depression, it was determined that an analysis of the factor structures of the RRS and WBSI would provide a useful point of reference. It was considered meritorious to conduct those factor analyses in order to facilitate a more fine grained approach to the exploration of cognitive pathways to depression in females. Further, it was considered informative to compare the factor structures of males and females, as well as possibly depressed and not currently depressed groups, in order to identify whether the factor structures differed across those groups. Findings of difference between males and females would be informative in further supporting gender differences in those constructs; whilst findings of difference between possibly and not currently depressed groups would provide further elucidation of the multifaceted relationship between each of those constructs and depression. As such, this study was intended to examine the factor structures of the RRS and WBSI in order to: (a) more closely consider gender differences in those constructs; (b) identify whether the factor structures of those measures was influenced by depression levels; and (c) to delineate the factor structure of those measures in a female sample in order to facilitate a more fine grained approach to examining the relationship between those constructs and depression in females.

4.1.2 Rumination

The response styles theory of depression proposed by Nolen-Hoeksema (1987) posits that an individual's approach to cognitively processing the causes, effects and features of their depressed mood will influence the severity and duration of that mood. Specifically, ruminative responding to depressed mood, whereby the individual repetitively focuses on their negative mood, is likely to increase the severity of depressive

symptoms and prolong the experience of a depressive episode (Morrow & Nolen-Hoeksema, 1990). Extensive empirical support has been established for the role of rumination in increasing vulnerability to the onset of depressive symptoms (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Support for the role of rumination in prolonging periods of depression has been mixed, with some studies failing to replicate this finding (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). However, despite these somewhat disparate findings, a substantial body of research has identified rumination as a highly accurate predictor of the onset, maintenance and severity of depressive symptoms (Just & Alloy, 1997; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema, Morrow, & Fredrickson, 1993). Importantly, rumination has also been identified as a mediator of several other noted risk factors for depression, including gender (Roberts, Gilboa, & Gotlib, 1998), anxiety sensitivity (Cox, Enns, & Taylor, 2001), previous depression levels, concurrent life stressors, social support, pessimism (Nolen-Hoeksema, Parker, & Larson, 1994) and neuroticism (Nolan, Roberts, & Gotlib, 1998). As such, rumination has been established as an important cognitive contributor to depression.

        4.1.2.1 Measuring rumination. Given the robust support for the utility of rumination as a predictor of depression, recent consideration of rumination has focused on the psychometric properties of rumination measurement tools, in an attempt to more intricately understand the precise features of rumination which represent such a powerful vulnerability to depression (Roelofs, Muris, Huibers, Peeters, & Arntz, 2006; Treynor, et al., 2003). In particular, the Ruminative Responses Scale (RRS) developed by Nolen-Hoeksema and Morrow (1991), which, in addition to the Distraction Response Scale (DRS) comprises the Response Style Questionnaire (RSQ), has been established as a psychometrically valid and effective tool for measuring an individual's tendency to ruminate (Treynor et al., 2003) and is recognised as the usual measure for assessing

rumination (Whitmer & Gotlib, 2011). Various examinations of the RRS have identified a range of factors within that scale.

For example, Roberts et al. (1998) conducted a principal components analysis of the RRS in a non-clinical sample of college students and identified three interpretable factors that accounted for 55% of variance in rumination. Those factors were labelled symptom-based rumination ($\alpha = .81$), introspection/self-isolation ($\alpha = .84$), and self-blame ($\alpha = .71$), and accounted for 17.4%, 21.2% and 17.1% of unique variance, respectively. Lam, Smith, Checkley, Rijsdijk, and Sham (2003) evaluated the RRS in relation to a clinically depressed sample and identified four factors, three of which were similarly labelled to the factors identified by Roberts et al. (symptom-based rumination $\alpha = .79$; introspection/self-isolation $\alpha = .78$; self-blame $\alpha = .67$), and a fourth factor labelled "analyse to understand" ($\alpha = .77$), which was not significantly correlated with reported depression scores. That model accounted for 57.1% of variance in rumination. Whilst the factor labels and overall variance explained by the models were similar in those studies, the amount of variance explained by individual factors differed substantially. In the Lam et al. (2003) study, symptom-based rumination, introspection/self-isolation, self-blame and analyse to understand accounted for 35.2%, 8.1%, 7.3% and 6.5% of the variance, respectively.

Similarly, Bagby and Parker (2001) examined the properties of the RRS in a clinically depressed sample. However, they examined the RSQ as a whole and identified a distraction factor ($\alpha = .80$), comprised largely of items from the DRS, and two rumination factors; one they labelled symptom-focused rumination ($\alpha = .76$), and the other self-focused rumination ($\alpha = .77$). The entire model accounted for 42.3% of variance, with the distraction factor explaining 15.2% of variance, and symptom-focused rumination and self-focused rumination explaining 14.5% and 12.6% of variance, respectively. A further

examination of the RRS in a clinically depressed sample was conducted by Cox et al. (2001), who identified a two-factor model which accounted for 43.86% of variance. Similar to Bagby and Parker (2001), the factors in Cox et al.'s model were labelled self-focused rumination and symptom-focused rumination. Contrary to Bagby and Parker, however, Cox et al. found self-focused rumination accounted for a greater percentage of variance than symptom-focused rumination.

In a further examination of RRS, Treynor et al. (2003) evaluated its psychometric properties using a community-based non-clinical sample. In order to address criticisms of the RRS's potential overlap with the Beck Depression Inventory (BDI) (see, for example, Conway, Csank, Holm, & Blake, 2000; Cox et al., 2001), Treynor et al. (2003) removed twelve items from the RRS which were deemed to resemble items from BDI. The remaining 10 items were then included in a principal components analysis. A two factor solution was identified which accounted for 50.5% of variance and comprised a reflection factor and a brooding factor. The reflection factor closely resembled the self-focused rumination factor identified by Bagby and Parker (2001) and Cox et al. (2001), as well as the introspection/self-isolation factor labelled by Roberts et al. (1998) and Lam et al. (2003). The brooding factor shared items with the self-blame factor of Roberts et al. (1998) and Lam et al. (2003). When Treynor et al. reintroduced the previously omitted items of the RRS and conducted a further principal component analysis, the reflection factor remained intact, whilst the brooding factor and the depression-related items combined in a single factor. That model accounted for 43% of variance. This study was pivotal in identifying two rumination factors without the potentially confounding influence of depression-related items in the RRS.

Having identified the reflection and brooding components of rumination, Treynor et al. (2003) sought to better understand the role of each of those factors in predicting depression. They found that both reflection and brooding were related to depression in

concurrent analyses, however, only brooding was predictive of depression in longitudinal analyses. Another significant finding was that brooding mediated the relationship between gender and depression, whereas reflection did not. This delineation of the role of reflection and brooding represented a more refined explanation of the often-reported mediating impact of rumination on the relationship between gender and depression. Those important findings ensured that the study represented a crucial progression in the understanding of rumination. However, Treynor et al. identified that, as their model accounted for only 50.5% of variance in rumination, other components must also be involved, and recommended further investigation to clarify this issue.

Whitmer and Gotlib (2011) extended the research of Treynor et al. (2003) by evaluating the reflection and brooding factors in samples of currently, remitted, and never depressed individuals. Exploratory factor analyses were conducted for each group on the 10 items identified by Treynor et al. as being uncontaminated by overlap with items from the BDI. The reflection and brooding factors identified by Treynor et al. were replicated for the never depressed group, with that model accounting for 52.75% of variance. Similarly, the formerly depressed group showed evidence of reflection and brooding, and 57.27% of variance was accounted for by those factors. However, the model identified for the currently depressed group did not replicate the reflection and brooding factors, with items that typically loaded on those factors failing to load significantly. Those findings suggested the reflection and brooding factors identified by Treynor et al. may be relevant for individuals who are not currently or have never been depressed, but lacked robustness for currently depressed individuals.

Whitmer and Gotlib (2011) also identified one of the items selected by Treynor et al. for the 10 item RRS, namely, "write down what you are thinking and analyse it", as problematic. That item had small initial communality in each of the groups, and did not load on either the brooding or reflection factor in the currently or formerly depressed

group. Replacing that item with another item from the original RRS ("isolate yourself and think about the reasons you feel sad"), improved the eigenvalues of both factors and the internal consistency estimate of the reflection factor. As such, Whitmer and Gotlib recommended the inclusion of the "isolate yourself" item in the short version of the RRS, rather than the "write down" item initially included by Treynor et al. When the factor analyses were repeated with the new item included, the brooding and reflection factors were once again identified in the never depressed and formerly depressed groups. However, a different pattern of loadings was evident for the currently depressed group. Two items referring to intentional analysis of one's situation, which had loaded on the reflection factor for other groups, cross-loaded on both factors in the currently depressed group. This pattern of cross-loading provided further evidence of indistinct boundaries between brooding and reflection in depressed individuals. Removal of the cross-loading items resulted in two factors: brooding and a newly labelled "intentional rumination" for the depressed group.

For each of the groups, brooding was found to be more strongly correlated with depression than the other factor, that is, reflection in the never depressed and not currently depressed groups, and intentional rumination in the currently depressed group. As such, this study found the items on the brooding factor to be more stable across groups and to be stronger predictors of depression than the remaining items on the 10 item RRS. The variety of factors identified within the RRS, and the differential findings based on the depression status of the sample group, suggest the precise nature of the RRS remains to be properly identified. One of the aims of the current research was to further examine the psychometric properties and factor structure of the RRS in a sample consisting of not depressed and possibly depressed individuals, to establish which, if any, of the previous findings are most closely replicated in this sample. In addition, gender differences in RRS were considered to facilitate a more in depth examination of the relationship between

rumination and depression, as well as a number of other cognitive vulnerability factors, such as thought suppression, in females.

4.1.3 Thought suppression

Thought suppression can be conceptualised as an intentional form of cognitive control, whereby an individual actively seeks to regulate their mood by suppressing particular thoughts (Wenzlaff & Wegner, 2000). However, consistent with the ironic processes theory proposed by Wegner (1994), such attempts generally lead to an increase in the accessibility and occurrence of the unwanted thoughts. For example, Wegner, Schneider, Carter and White (1987) found participants who were instructed not to think about a white bear experienced more thoughts related to a white bear than participants who were instructed to think about a white bear, in a five minute period. The rebound effect of thought suppression is particularly likely to occur in circumstances of cognitive load (Wenzlaff & Bates, 1998). Wegner purported two mechanisms were involved in thought suppression; an intentional distraction process responsible for actively diverting one's attention, and an unconscious monitoring system which is required to remain vigilant and provide feedback to the distraction process if an unwanted thought is likely to return. Research has consistently identified paradoxical effects of attempts at thought suppression, which include an increase in the occurrence of the to-be-avoided thoughts during and after the period of suppression (Wegner et al., 1987), and an intensification of intrusive thoughts if cognitive demands are increased during suppression attempts (Wenzlaff & Wegner, 2000).

Investigations of the mechanisms underlying failed attempts at thought suppression have identified that the valence and personal salience of the to-be-suppressed material, as well as individual differences in natural tendencies toward thought suppression and psychological wellbeing can influence the success or failure of thought suppression

attempts (Wenzlaff & Wegner, 2000). For example, research has consistently found

emotionally valenced material tends to be more difficult to suppress than neutral material

(Davies & Clark, 1998; Petrie, Booth, & Pennebaker, 1998). Similarly, personally relevant

cues, such as depression related information for people who are depressed, are more

difficult to effectively suppress than cues which are deemed personally irrelevant

(Wenzlaff & Bates, 1998). In addition, individuals who report a strong desire to suppress

their thoughts are likely to frequently experience thought intrusion (Wegner & Zanakos,

1994), whilst thought intrusion has been identified as occurring more commonly for

individuals experiencing symptoms associated with a range of psychopathological

conditions including bipolar disorder (Miklowitz, Yousra, Geddes, Goodwin, & Williams,

2010), depression (Wenzlaff & Bates, 1998), obsessive-compulsive disorder (Janeck &

Calamari, 1999) and post-traumatic stress disorder (Ehlers, Mayou, & Bryant, 1998) than

for individuals who do not experience those disorders.

The possible relationship between thought suppression and depression vulnerability

has been investigated in a number of important studies. In a relatively early study,

Wenzlaff and Bates (1998) examined the role of thought suppression as a cognitive risk

factor for depression. Participants were required to form sentences consisting of 5 words

from groups of six scrambled words. Each group of words could be rearranged to form a

positive or negative statement, and participants completed three sets of sentence

unscrambling, in which they were required to form (a) any statement that came to mind;

(b) positive statements; and (c) negative statements. The order of these conditions was

presented in a counterbalanced manner. In addition, participants were randomly assigned

to either a cognitive load condition, whereby they were required to recall a six digit figure

upon completion of each segment of testing, or a control condition with no increased

cognitive load. Participants in the cognitive load condition considered to be at risk of

depression, based on previous scores on the BDI, formed more negative statements in the neutral, positive and negative conditions than participants not considered at risk of depression. In addition, at risk participants reported more frequent use of thought suppression than currently depressed or non-depressed participants. Thought suppression tendencies in the at risk group were also associated with a worsening of depressive symptoms over time. At risk participants who reported high levels of thought suppression experienced more severe depressive symptoms at follow up than their at risk counterparts who reported low levels of thought suppression. As such, this study provided key findings related to increased use of thought suppression in individuals considered at risk of depression, the role of thought suppression in exacerbating depressive symptoms in at risk individuals, and also supported the role of cognitive load in causing rebound effects of thought suppression.

Another crucial investigation in the understanding of the relationship between thought suppression and depression was conducted by Wenzlaff and Luxton (2003). It was hypothesised that high levels of thought suppression may lead to rumination when high levels of stress introduced cognitive loads likely to disrupt the efficacy of the thought suppression. This hypothesis was supported when participants who were identified as high suppressors, who had also experienced stress in the time between pre- and post-test data collection, experienced higher levels of rumination and dysphoric symptoms than participants who were identified as low thought suppressors who had experienced similarly stressful events. This study provided important support for the ironic processes theory of Wegner (1994) and identified that individuals who were predisposed to thought suppression who experienced stressful events may have their ability to suppress thoughts effectively diminished, resulting in increased rumination and proneness to depression.

4.1.3.1 Measuring thought suppression. The White Bear Suppression Inventory (WBSI) (Wegner & Zanakos, 1994) was developed to assess individual differences in the tendency toward thought suppression. The 15 items developed for the WBSI were included in a factor analysis with principal axis extraction and varimax rotation. That analysis identified a single factor which accounted for 55% of variance. The internal consistency estimate of the WBSI over five university sample groups ranged from .87 - .89. In addition, temporal stability was assessed over periods ranging from 1 week to 3 months, and varied from .69 - .92. Convergent validity of WBSI was considered by examining the relationship between WBSI and obsession, depression and anxiety scores. In each instance, highly significant moderate correlations were identified. (Wegner & Zanakos, 1994) As such, WBSI was deemed to represent a psychometrically robust measurement tool for assessing tendencies toward thought suppression.

Further investigation of WBSI's factor structure by Muris, Merckelbach and Horselenberg (1996) utilising a principal components analysis with varimax rotation supported the unidimensional nature of the WBSI. However, Blumberg (2000) identified three factors which were labelled "unwanted intrusive thoughts" (α = .84), "thought suppression" (α = .74) and "self-distraction" (α = .75). Those factors explained 30.1%, 18.7% and 14.8% of variance, respectively. Gender differences were also explored, and the previous finding that female scores tended to be higher than males on WBSI (Wegner & Zanakos, 1994) was replicated. An examination of gender differences on individual factors identified no differences on the "unwanted intrusive thoughts" factor, but females had significantly higher scores on the "thought suppression" and "self-distraction" factors. The three factor solution presented a better fit than a two factor solution for both males and females. As such, contrary to earlier suggestions that WBSI measured a unidimensional construct of thought suppression, Blumberg's (2000) findings seemed to indicate the

presence of three factors within WBSI, two of which represented factors upon which males

and females differed. Blumberg's (2000) study also provided additional support for the

psychometrically robust nature of WBSI.

Another study examining the psychometric properties of the WBSI was conducted

by Palm and Strong (2007). Those researchers utilised item response theory (IRT) in an

attempt to clarify the disparate findings in relation to the dimensional structure of the

WBSI. One of the advantages of IRT over classical test theory (CTT) is that IRT is able to

provide item-specific information in relation to the way in which responses to an item

differ according to varying levels of the construct under investigation (Embretson, 1996;

Reise, Ainsworth, & Haviland, 2005). One of the assumptions of IRT is unidimensionality

(Santor & Ramsay, 1998). As such, Palm and Strong proposed that, despite the various

factor structures identified for the WBSI, there was sufficient evidence to suggest the

WBSI is "primarily unidimensional" (p. 88). Palm and Strong identified no predetermined

expectations in relation to the option characteristic curves (OCC) for each item. Therefore,

they utilised a nonparametric IRT model to construct OCCs for the WBSI. A principal

factor analysis was performed and two factors were extracted. However, the first factor

accounted for 80% of the common variance, and no items had communalities of <.25 or

factor loadings of <.30, which was interpreted as providing support for the

unidimensionality of the WBSI. Of the 15 items in the WBSI, nine items (1, 2, 4, 5, 7, 8,

10, 11, and 14) were deemed ineffective at discriminating between differing levels of

thought suppression. However, the remaining six items (3, 6, 9, 12, 13, and 15) were found

to effectively discriminate across the latent construct of thought suppression. When those

six effective items were considered as a short form of the WBSI, they were found to

correlate strongly with the full 15 items of the WBSI, and demonstrated similar patterns of

correlations with other measures considered to provide support for concurrent validity of

the WBSI, including measures of emotional avoidance, worry and depression (Palm &

Strong, 2007). As such, Palm and Strong proposed support for the unidimensionality of the

WBSI, and the particular effectiveness of six of the original 15 items in differentiating

between individuals who demonstrate low levels of thought suppression and those who

demonstrate high levels of that tendency.

It is apparent, therefore, that the discrepant findings in relation to the WBSI

remain. Whilst some authors have proposed a unidimensional measure (Muris,

Merckelbach, & Horselenberg, 1996; Palm & Strong, 2007; Wegner & Zanakos, 1994),

others have suggested it is more appropriate to consider that measure multidimensional

(Blumberg, 2000). In the current study, the factor structure of the WBSI will be

investigated via exploratory factor analysis, in an attempt to ascertain whether it is more

appropriate to consider the WBSI a single or multiple factor measure.

4.1.4 Rumination and thought suppression

It is apparent that, similar to rumination, thought suppression can be considered a

deliberate process of cognitive control which, in certain conditions, results in negative

consequences for the individual. Rumination and thought suppression are both processes

which are predominantly concerned with preoccupation with one's own thoughts. These

constructs have been identified as being significantly correlated with one another and with

depression, and are highly prevalent in individuals suffering from a range of psychological

disorders; particularly depression. The RRS and WBSI represent psychometrically

validated and robust measures of these constructs. However, the factor structures of each

of those measures have not been unambiguously established. A number of discrepant

findings pertaining to the factor structure of the RRS and the WBSI have been identified,

and it was considered worthwhile to reconsider the factor structures of those measures in

order to facilitate a more fine-grained approach in the utilisation of those measures,

particularly as predictors of depression. It was recognised that previous studies had utilised

a variety of factor analysis approaches, some of which may not have been conducted in

accordance with best practice recommendations for factor analysis (see Costello &

Osborne, 2005). It was anticipated that clarifying the factor structures, using best practice

guidelines, would provide a clearer understanding of the relationship between the

constructs of rumination and thought suppression, and other aspects of psychopathology

with which they have been identified as sharing a relationship. This was consistent with

the overall aim of this research program, which was to investigate the relationships

between rumination, thought suppression, self-evaluation and reaction time variability, and

their individual and combined influence on the experience of depression symptoms.

4.1.5 Aims and hypotheses of the current study

The rationale for the current study, namely, to examine the factor structures of the

RRS and WBSI in a heterogeneous sample, as well as to compare males with females and

possibly depressed with not depressed participants, was further informed by the need for

clarification of the factor structures of those measures, based on a number of discrepant

findings previously reported. As such, the purpose of the current study was to build upon

the research of Treynor et al. (2003), Whitmer and Gotlib (2011), Blumberg (2000), Muris

et al. (1996) and Palm and Strong (2007) to further explore the factor structure of RRS and

WBSI. The work of Treynor et al., Whitmer and Gotlib, Blumberg, Muris et al. and Palm

and Strong was extended by examining the general factor structures of these measures and,

in addition, comparing those structures by gender and current levels of depression, in order

to contribute to the ongoing discussion regarding the precise nature of the factor structure

of those measures and the appropriateness of using them with individuals who are

currently depressed. Given the nature of this research was to clarify the factor structures

for which discrepant findings have been reported, and to examine the factor structures of

the RRS and WBSI in a number of different groups, there were no specific hypotheses under investigation in this study.

4.2 Method

4.2.1 Participants

Five hundred and sixty-five participants (449 females (79.5%); 116 males (20.5%)), ranging in age from 17 to 77 years (*M = 30.35; SD = 13.19)* completed this study. Participants were recruited via word of mouth in undergraduate psychology classes and online via email. Undergraduate psychology students received course credit for their participation. Members of the general community were not rewarded for their participation. Table 4.1 contains demographic details for the participants. Those demographic details are presented separately for males and females.

Table 4.1

Demographic Details of Participants

		N	%
Educational level			
Females			
	Up to Year 10	174	38.8
	Up to Year 12	92	20.5
	TAFE/college	103	22.9
	Undergraduate degree	71	15.8
	Postgraduate degree	9	2.0
	Total	449	100
Males			
	Up to Year 10	32	27.6
	Up to Year 12	31	26.7
	TAFE/college	33	28.4
	Undergraduate degree	18	15.5
	Postgraduate degree	2	1.7
	Total	116	100
Employment status			
Females			
	Not currently employed	109	24.3
	Fulltime	77	17.1
	Part-time	95	21.2
	Casual	153	34.1
	On maternity leave	15	3.3
	Total	449	100
Males			
	Not currently employed	34	29.3
	Fulltime	50	43.1
	Part-time	11	9.5
	Casual	21	18.1
	On maternity leave	0	0
	Total	116	100
Relationship status			
Females			
	Married	106	23.6
	Defacto	89	19.8
	Separated	29	6.5
	Single	225	50.1
	Total	449	100
Males			
	Married	42	36.2
	Defacto	20	17.2
	Separated	8	6.9
	Single	46	39.7
	Total	116	100

Previous diagnosis of depression

Females		315	70.2
	No	134	29.8
	Yes	449	100
	Total		
Males		88	75.9
	No	28	24.1
	Yes	116	100
	Total		

If previous diagnosis: currently depressed?

Females			
	No	95	70.9
	Yes	39	29.1
	Total	134	100
Males			
	No	19	70.4
	Yes	8	29.6
	Total (1 missing)	27	100

Other diagnosis

Females			
	No	393	87.5
	Yes	56	12.5
	Total	449	100
Males			
	No	107	92.2
	Yes	9	7.8
	Total	116	100

4.2.2 Design

This study utilised a cross-sectional design. A series of exploratory factor analyses with maximum likelihood extraction and direct oblimin rotation were utilised to investigate the factor structures of RRS and WBSI for the entire sample in this study, as well as two groups with different levels of depression: a not depressed and a possibly depressed group. In addition, potential gender differences in the factor structure of RRS and WBSI were explored. The choice of factor analysis approach in this study was informed by the recommendations of Costello and Osborne (2005), who identified exploratory factor analysis as preferable to principal component analysis, and also recommended the use of maximum likelihood extraction for normally distributed data, and orthogonal rotation for factors which are expected to be correlated. Sample size prohibited

the consideration of factor analysis for groups split into both gender and depression level

groups (i.e., male/depressed; male/not depressed; female/depressed; female/not depressed.

4.2.3 Materials

4.2.3.1 Demographic questionnaire. The demographic questionnaire utilised in

this study was identical to that described in chapter 3. A copy of that questionnaire is

contained in Appendix A.

4.2.3.2 Ruminative Response Scale (RRS). The RRS (Nolen-Hoeksema &

Morrow, 1991) was described in chapter 3 above. A copy of the RRS is contained in

Appendix B.

4.2.3.3 White Bear Suppression Inventory (WBSI). Details regarding the WBSI

(Wegner & Zanakos, 1994) were provided in chapter 3. A copy of the WBSI is contained

in Appendix D.

4.2.3.4 Edinburgh Depression Scale (EDS). The EDS (Cox, Holden, &

Sagovsky, 1987) was also described in chapter 3, and a copy of that measure is presented

in Appendix F.

4.2.4 Procedure

Ethics approval for this research was obtained from the Australian Catholic

University's human research ethics committee. A copy of the information letter and

consent form is presented in Appendix N. All participants completed the testing online via

the specially developed test website. Participants were recruited via an advertisement

circulated on Facebook and an email sent via the student distribution list of a large

Australian university. In addition, participants were recruited via word-of-mouth and

through advertisements in undergraduate psychology classes. Participants completed

testing individually in a location convenient to them, utilising their own computer. Upon

accessing the test website, participants read the information letter and indicated their consent to participate in this study by clicking "I agree". After providing this consent, participants accessed the test battery, one task at a time. Participants were required to complete each individual task prior to progressing to the next task. It was possible for participants to log out and complete the testing in multiple sittings, if required. The programming of the test website did not facilitate counterbalancing the presentation of the measures. As such, all participants completed the measures in the same order.

4.3 Results

4.3.1 Data Screening

Prior to analysis, data screening was conducted to assess for accuracy of data input, missing values and breaches of univariate and multivariate assumptions. Each individual item from RRS and WBSI, along with total scores on RRS, WBSI and EDS were examined for out-of-range values and plausible means and standard deviations. No out-of-range values were identified, and all variables were found to have plausible means and standard deviations. An examination of missing data identified no missing data on any of the variables of interest in this study. To facilitate the comparison of males and females in additional analyses, the data file was then split by gender prior to further data screening to assess for breaches of univariate and multivariate assumptions. The results of the data screening procedures will be described separately for males and females.

4.3.1.1 Males.

4.3.1.1.1 Univariate outliers. An examination of the boxplots for the male participants' scores on RRS, WBSI and EDS indicated the presence of two high end outliers on RRS, a single low end outlier on WBSI and no outliers on EDS. In accordance with the recommendations of Tabachnick and Fidell (2001), scores that differed from the

mean by more than three standard deviations were deemed to be true univariate outliers. Adopting that criterion resulted in no significant outliers being identified.

4.3.1.1.2 Normality. The Kolmogorov-Smirnov test of normality was conducted for each of the variables. That test was significant for RRS and EDS, but not significant for WBSI. These findings indicated a possible breach of the assumption of normality by RRS and EDS, and no significant breach of the assumption of normality by WBSI. Histograms for each of the variables were examined to further explore the assumption of normality and to identify possible skew and kurtosis. Those histograms suggested RRS was positively skewed, EDS appeared positively skewed and somewhat kurtotic, and WBSI was approximately normally distributed. The significance of the skew and kurtosis were calculated for RRS and EDS by dividing the skew and kurtosis statistics by their standard errors. That process identified RRS was significantly positively skewed ($z = 3.77$), but the skew and kurtosis identified for EDS were not significant.

4.3.1.1.3 Multivariate outliers. Bivariate scatterplots were examined for each of the variables and there did not appear to be any bivariate outliers. Similarly, there did not appear to be any breaches of the assumptions of multivariate linearity or homogeneity. No males had a Mahalanobis distance score greater than the criterion value of 16.27, which represented the value of χ^2 at $p<.001$ with 3 degrees of freedom (as determined by three variables included in the multiple regression). As such, no multivariate outliers were identified in this sample. An examination of the bivariate correlations between each of the variables also indicated no multicollinearity. These data screening procedures suggested the data obtained from the male sample for the variables of interest was robust and appropriate for further analysis.

4.3.1.2 Females.

4.3.1.2.1 Univariate outliers. An examination of the boxplots for the female participants' scores on RRS, WBSI and EDS indicated the presence of two possible high end outliers on RRS, a single low end outlier on WBSI and a single high end outlier on EDS. In accordance with the recommendations of Tabachnick and Fidell (2001), scores that differed from the mean by more than three standard deviations were deemed to be true univariate outliers. When that criterion was adopted, the two high end outliers on RRS and the high end outlier on EDS were significant outliers, however the low end outlier on WBSI was not significant.

4.3.1.2.2 Normality. The Kolmogorov-Smirnov test of normality was conducted for each of the variables. That test was significant for RRS, WBSI and EDS which indicated a possible breach of the assumption of normality by each of those variables. Histograms for each of the variables were examined to further explore the assumption of normality and to identify possible skew and kurtosis. Those histograms indicated RRS and EDS were positively skewed and WBSI appeared to be negatively skewed. The significance of the skew and kurtosis were calculated for each of the variables by dividing the skew and kurtosis statistics by their standard errors. Those calculations identified RRS ($z = 4.18$) and EDS ($z = 3.83$) were significantly positively skewed, and WBSI ($z = -3.58$) was significantly negatively skewed.

4.3.1.2.3 Multivariate outliers. Bivariate scatterplots were examined for each of the variables and there did not appear to be any bivariate outliers. Similarly, there did not appear to be any breaches of the assumptions of multivariate linearity or homogeneity. One female participant had a Mahalanobis distance score greater than the criterion value of 16.27, which indicated that participant was a significant outlier. An examination of the bivariate correlations between each of the variables indicated no multicollinearity.

4.3.1.3 Outcome of data screening. The data screening procedures adopted in this study identified a single breach of the assumption of normality within the male data, and a minimal number of minor breaches of those assumptions within the female sample. Given the low number of outliers within the female sample (3 out of 449 participants), and the minimal deviations from normal represented by each of the gender samples, it was determined to proceed with analyses without performing any transformations on these variables. This was based on the expectation that to proceed with untransformed variables would improve the ease of interpretability of the analyses and provide the opportunity for meaningful comparisons between the genders.

4.3.2 Scoring

4.3.2.1 RRS and WBSI. There was no reverse scoring required for either the RRS or the WBSI. As such, the total scores for each of these measures were calculated by adding the value of each of the items. Scores on the RRS range from 22 – 88, and scores on the WBSI range from 15 – 75.

4.3.2.2 EDS. Items 3, 5, 6, 7, 8, 9 and 10 of the EDS required reverse scoring. Each individual's total score on the EDS was calculated by adding the reversed scores on each of those items, with the original scores on items 1, 2 and 4. Scores on the EDS range from 0 – 30.

4.3.2.2.1 Creation of groups according to EDS score. Participants were grouped according to their current score on EDS. In accordance with the recommendations of Cox, Holden and Sagovsky (1987), participants with scores of 9 or less were considered not to be currently depressed, participants with scores 10 - 12 were considered likely to be experiencing some depressive symptoms, and those with scores of 13 and above were considered likely to be depressed. Based on restrictions imposed by sample size

(particularly males), two groups were created: a "not depressed" group consisting of 323

participants (235 females; 88 males) with scores of 9 or below, and a "possibly depressed"

group consisting of 242 participants (211 females; 31 males) with scores of 10 and above.

4.3.3 Descriptive statistics

Table 4.2 contains the minimum and maximum scores for each of the variables,

along with means and standard deviations.

Table 4.2

Descriptive Statistics for RRS, WBSI and EDS (N = 565)

	N	Minimum	Maximum	*M*	*SD*
RRS	565	22	88	*43.65*	*13.03*
WBSI	565	15	75	*49.20*	*11.57*
EDS	565	0	29	*9.05*	*5.93*

As can be identified from Table 4.2, the range of scores on RRS and WBSI

extended from the lowest possible score to the highest possible score. Similarly, scores on

EDS ranged from the lowest possible score to 29, with the highest possible score being 30.

As such, this sample represented the breadth of responses on each of these three measures.

Table 4.3 contains the descriptive statistics for each of the variables for the "not

depressed" and "possibly depressed" groups.

Table 4.3

Descriptive Statistics RRS, WBSI and EDS for Not Depressed and Possibly Depressed Groups

	N	Minimum	Maximum	*M*	*SD*
Not depressed					
RRS	323	22	72	*36.96*	*9.74*

WBSI	323	15	75	*44.54*	*11.32*
EDS	323	0	9	*4.83*	*2.82*
Possibly depressed					
RRS	242	27	88	*52.59*	*11.43*
WBSI	242	28	75	*55.42*	*8.62*
EDS	242	10	29	*14.67*	*3.99*

As can be seen from Table 4.3, the "not depressed" group had lower mean scores on each of the measures than the "likely depressed" group. Independent group *t*-tests were conducted to investigate whether the groups differed significantly on rumination and thought suppression. The effect size for each of those *t*-tests was calculated with Cohen's *r* (Cohen, 1992). The groups differed significantly on rumination, $t(470.72) = 17.14$, $p < .001$, $r = -.59$ and thought suppression, $t(562.85) = 12.97$, $p < .001$, $r = -.47$. Descriptive statistics for males and females are displayed in Table 4.4.

Table 4.4

Descriptive Statistics RRS, WBSI and EDS for Males and Females

	N	Minimum	Maximum	*M*	*SD*
Males					
RRS	116	23	72	*40.37*	*12.36*
WBSI	116	15	75	*47.16*	*10.93*
EDS	116	0	17	*6.67*	*4.63*
Females					
RRS	449	22	88	*44.50*	*13.08*
WBSI	449	15	75	*49.73*	*11.68*
EDS	449	0	29	*9.66*	*6.07*

The descriptive statistics set out in Table 4.4 identified females had higher mean scores than males on RRS, WBSI and EDS. Independent sample *t*-tests were conducted to assess the significance of the differences in those scores. Again, effect sizes for those *t*-tests were calculated using Cohen's *r* (Cohen, 1992). Those *t*-tests indicated females scored significantly higher than males on RRS $t(563) = 3.07$, $p<.01$, $r = -.16$), WBSI $t(563) = 2.15$, $p<.05$, $r = -.11$ and EDS $t(228.27) = 5.78$, $p<.001$, $r = -.27$.

4.3.4 Inferential statistics

4.3.4.1 Reliability analysis. An examination of the internal consistency of the 22 items of RRS indicated Cronbach's $\alpha = .94$. The 15 items of WBSI had a similarly high internal consistency estimate of Cronbach's $\alpha = .91$. The 10 items of the EDS (with the inclusion of the 3 non-reverse scored items and the 7 reverse scored items) had a Cronbach's $\alpha = .88$. As such, the internal consistency of RRS and WBSI was deemed to be "excellent", and that of the EDS was considered "good" (George & Mallery, 2003). These

estimates were consistent with previous findings (RRS: Treynor et al., 2003; WBSI:

Wegner & Zanakos, 1994; EDS: Cox, Holden, & Sagovsky, 1987).

The internal consistency of each of the measures was also assessed for the male

and female groups, and the not depressed and possibly depressed groups. The estimates of

internal consistency of RRS and WBSI for each of the groups were largely congruent with

the estimates obtained from the entire sample. However, the reliability estimates for EDS

for the not depressed and possibly depressed groups were substantially lower than those

for the entire sample and the male and female groups, with the estimates for the not

depressed and possibly depressed group falling in the "questionable" category, as

described by George and Mallery (2003). Table 4.5 contains a summary of the reliability

estimates of each of the measures, for all of the groups investigated in this study.

Table 4.5

Internal Consistency Estimates of RRS, WBSI and EDS

	RRS α	WBSI α	EDS α
$N = 565$	.94	.91	.88
Females	.94	.91	.88
Males	.94	.91	.83
Not depressed	.91	.89	.63
Possibly depressed	.91	.89	.63

4.3.4.2 Correlations. Relationships between each of the variables were explored

by calculating their respective correlations. Those correlations are contained in Table 4.6.

As is evident from Table 4.6, there were moderate correlations between RRS and WBSI,

and between WBSI and EDS, and a strong correlation was detected between RRS and

EDS. All of those correlations were highly significant.

Table 4.6

Correlations between RRS, WBSI and EDS (N = 565)

	RRS	WBSI	EDS
RRS		.61**	.70**
WBSI			.56**

**p* <.01

Correlations between each of the variables were also calculated for males and females. As displayed in Table 4.7 below, those correlations were highly significant for both groups. In both groups, the correlation between RRS and EDS was the strongest, followed by the correlation between RRS and WBSI, and the correlation between EDS and WBSI, respectively.

Table 4.7

Correlations between RRS, WBSI and EDS for Males and Females

	RRS	WBSI	EDS
RRS		.64**	.63**
WBSI	.60**		.43**
EDS	.70**	.58**	

**p* <.01 NB Males – above diagonal; Females – below diagonal

The pattern of correlations between the variables was also considered for the not depressed and possibly depressed groups. In each instance, the correlations for those groups were weaker than those for the entire sample and for males and females. The correlations for the not depressed and possibly depressed groups are displayed in Table 4.8 below.

Table 4.8

Correlations between RRS, WBSI and EDS for Not Depressed and Possibly Depressed

	RRS	WBSI	EDS
RRS		.51**	.41**
WBSI	.42**		.32**
EDS	.49**	.42**	

$^{**}p <.01$ NB Not depressed – above diagonal; Possibly depressed – below diagonal

To assess whether the differences in the correlations found between the groups were significant, Fisher's *z* transformation of the correlation coefficients were calculated. There were no significant differences in the correlations between the entire sample ($N = 565$) and the male and female groups. However, there were significant differences between the entire sample and the not depressed and possibly depressed groups. Table 4.9 summarises those significant differences.

Table 4.9

Summary of Fisher's Z Transformation of r for Correlations Comparing N = 565 with Not Depressed and Possibly Depressed Groups

	RRS	WBSI	EDS
RRS			
N =565: Not depressed		n.s.	$z = 6.16^{**}$
N =565: Possibly depressed		$z = 3.38^{**}$	$z = 4.29^{**}$
WBSI			
N =565: Not depressed			$z = 4.3^{**}$
N =565: Possibly depressed			n.s.

n.s. = not significant ($p >.05$); ** $p < .001$

The estimates of internal consistency for each of the groups and correlations between the variables for each of the groups identified lower internal consistency estimates of EDS and weaker correlations between EDS and the other variables in the not depressed and possibly depressed groups. It was hypothesised that the weaker correlations may be the result of floor effects in the not depressed group and ceiling effects in the possibly depressed group, which would account for less variation in EDS scores and thus lower correlations between the variables. These findings necessitate the analyses involving the not depressed and possibly depressed groups should be interpreted with caution.

4.3.4.3 Factor analysis of RRS (N= 565). Consistent with the work of Whitmer and Gotlib (2011), exploratory factor analysis with maximum likelihood extraction and a direct oblimin rotation was conducted on RRS. Also in accordance with the guidelines proposed by Whitmer and Gotlib, 0.3 was adopted as a minimum factor loading. Firstly, correlations among each of the RRS items were examined and found to be highly significant. As such, all 22 items from RRS were included in the factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .95, which is considered "marvellous" by Kaiser (1974). In addition, Bartlett's test of sphericity was significant ($\chi(231)= 6749.62, p = <.001$), indicating these data were suitable for factor analysis. A solution was obtained in 15 iterations.

An examination of the scree plot identified three factors with eigenvalues greater than 1. Factor 1 had an eigenvalue of 10.03 and explained 45.59% of variance. Factor 2 had an eigenvalue of 1.57 and explained an additional 7.12% of variance; whilst the third factor had an eigenvalue of 1.14 and explained 5.2% of unique variance. The total amount of variance explained by this three factor model was 57.88%. Table 4.10 sets out the items from the RRS and identifies their factor loadings.

Table 4.10

Factor Structure of RRS (N = 565)

Items	Factors		
	1	2	3
Think about how alone you feel			-.32
Think "I won't be able to do my job if I don't snap out of this".	.50		
Think about your feelings of fatigue and achiness	.57		
Think about how hard it is to concentrate	.68		
Think, "What am I doing to deserve this?"			-.67
Think about how passive and unmotivated you feel	.82		
*Analyse recent events to try to understand why you are depressed.	.33	-.33	
Think about how you don't seem to feel anything anymore	.51		
Think, "Why can't I get going?"	.75		
Think, "Why do I always react this way?"			-.54
Go away by yourself and think about why you feel this way		-.74	
Write down what you are thinking and analyse it		-.56	
Think about a recent situation, wishing it had gone better			-.39
Think, "I won't be able to concentrate if I keep feeling this way"	.56		
Think, "Why do I have problems other people don't have?"			-.78
Think, "Why can't I handle things better?"			-.83
*Think about how sad you feel	.33		-.46
Think about all your shortcomings, failings, faults, mistakes			-.69
Think about how you don't feel up to doing anything	.65		
*Analyse your personality to try to understand why you are depressed		-.37	-.34
Go someplace alone to think about your feelings		-.77	
Think about how angry you are with yourself			-.59

* Cross-loading item – removal recommended (Costello & Osborne, 2005)
Factor 1 = Depression; Factor 2 = Reflection; Factor 3= Brooding

The results of this factor analysis were compared to those of Treynor et al. (2003),

on the basis that both the current study and Treynor et al. utilised a community derived

sample. Table 4.11 summarises the factor structures identified in this study and Treynor et

al. by identifying which factor was loaded upon by each item.

Table 4.11

Factor Structure of RRS Identified in Current Study and by Treynor et al. (2003)

Items	Study	
	Current study	Treynor et al. (2003)
Think about how alone you feel	**B**	**D**
Think "I won't be able to do my job if I don't snap out of this".	D	D
Think about your feelings of fatigue and achiness	D	D
Think about how hard it is to concentrate	D	D
Think, "What am I doing to deserve this?"	B	B
Think about how passive and unmotivated you feel	D	D
*Analyse recent events to try to understand why you are depressed.	**D/B**	**R**
Think about how you don't seem to feel anything anymore	D	D
Think, "Why can't I get going?"	D	D
Think, "Why do I always react this way?"	B	B
Go away by yourself and think about why you feel this way	R	R
Write down what you are thinking and analyse it	R	R
Think about a recent situation, wishing it had gone better	B	B
Think, "I won't be able to concentrate if I keep feeling this way"	D	D
Think, "Why do I have problems other people don't have?"	B	B
Think, "Why can't I handle things better?"	B	B
*Think about how sad you feel	**D/B**	**D**
Think about all your shortcomings, failings, faults, mistakes	B	D
Think about how you don't feel up to doing anything	D	D
*Analyse your personality to try to understand why you are depressed	**R/B**	**R**
Go someplace alone to think about your feelings	R	R
Think about how angry you are with yourself	**B**	**D**

* Cross-loading item – removal recommended (Costello & Osborne, 2005)
B = Brooding factor; R = Reflection factor; D = Depression factor

As is evident from Table 4.11, the factor structure of RRS obtained from the current

sample largely replicated that of Treynor et al. (2003). There were, however, some minor

variations. Item 1 ("Think about how alone you feel") and Item 22 ("Think about how angry you are with yourself") both loaded on the brooding factor in the current study, but were deemed to belong to the group of items which overlapped with the Beck Depression Inventory by Treynor et al. However, when those depression-related items were included in a principal component analysis with the remainder of RRS items, they loaded on the factor which consisted of items from the Brooding factor and the depression items which had previously been removed. As such, there does not appear to be a discrepancy between the findings of Treynor et al. and those of the current study in relation to Items 1 and 22. There were 3 items in the current study with cross-loadings. Costello and Osborne (2005) recommended removing cross-loading items. As such, in accordance with those recommendations, Items 7, 17 and 20 were removed from any further analysis. The removal of those three items resulted in a 19-item, 3-factor scale, consisting of a Depression factor (Items 2, 3, 4, 6, 8, 9, 13 and 19); a Reflection factor (Items 11, 12, and 21); and a Brooding factor (Items 1, 5, 14, 15, 16, 18 and 22).

   4.3.4.4 Factor analysis of RRS – depression level groups. Additional factor analyses were conducted to compare the factor structure of RRS for the not depressed and possibly depressed groups. In each instance, exploratory factor analysis with maximum likelihood extraction and a direct oblimin rotation was utilised. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .92 for the not depressed group and .91 for the possibly depressed group, which is considered "marvellous" by Kaiser (1974). In addition, Bartlett's test of sphericity was significant for both groups (not depressed: $\chi(231)=2802.57$, $p = <.001$; possibly depressed: $\chi(231)=2159.32$, $p = <.001$), indicating these data were suitable for factor analysis. A solution was obtained for the not depressed group in 15 iterations and in 5 iterations for the possibly depressed group.

4.3.4.4.1 Not depressed group. An examination of the scree plot for the not depressed group identified four factors with eigenvalues greater than 1. Factor 1 had an eigenvalue of 7.91 and explained 35.95% of variance. Factor 2 had an eigenvalue of 1.6 and explained an additional 7.28% of variance. Factor 3 had an eigenvalue of 1.44 and accounted for a further 6.56% of variance. The fourth factor had an eigenvalue of 1.07 and explained 4.86% of variance. The total amount of variance explained by this four factor model was 54.65%. Table 4.12 sets out the items from the RRS and identifies their factor loadings for the not depressed group.

An examination of the factor structure of the RRS for the not depressed group identified a predominantly similar factor structure to that of the entire sample (N = 565), which replicated the factors identified by Treynor et al. (2003); namely, depression, brooding and reflection. Factor 1 was comprised of the items identified by Treynor et al. as the Depression factor; factor 2 consisted of the Reflection items; and factor 3 represented Brooding. Item 1, "Think about how alone you feel", which loaded on the brooding factor for the whole sample (*N* = 565), did not load on any of the factors in this model. The Depression factor accounted for the largest amount of variance in this model, followed by Reflection and Brooding, respectively. Factor 4 for the not depressed group consisted of three items with negative loadings. Two of those items also loaded on other factors, indicating that this factor may not have meaningfully contributed to the interpretation of this factor analysis. In accordance with the recommendations of Costello and Osborne (2005), who suggested the removal of cross-loading items, and identified factors with less than 3 items as likely to be unstable, factor 4 was not labelled or considered in any further considerations of the factor structure of the RRS for the not depressed group.

Table 4.12

Factor Structure of RRS for Not Depressed Group (N = 323)

Items	Factors			
	1	2	3	4
Think about how alone you feel				
Think "I won't be able to do my job if I don't snap out of this".	.40			
Think about your feelings of fatigue and achiness	.36			
Think about how hard it is to concentrate	.53			
Think, "What am I doing to deserve this?"			.57	
Think about how passive and unmotivated you feel	.67			
Analyse recent events to try to understand why you are depressed.		-.33		
Think about how you don't seem to feel anything anymore	.44			
Think, "Why can't I get going?"	.84			
Think, "Why do I always react this way?"			.56	
Go away by yourself and think about why you feel this way		-.74		
Write down what you are thinking and analyse it		-.61		
Think about a recent situation, wishing it had gone better			.34	
Think, "I won't be able to concentrate if I keep feeling this way"	.51			
Think, "Why do I have problems other people don't have?"			.71	
Think, "Why can't I handle things better?"			.78	
Think about how sad you feel				-.53
*Think about all your shortcomings, failings, faults, mistakes			.52	-.30
*Think about how you don't feel up to doing anything	.49			-.39
Analyse your personality to try to understand why you are depressed		-.35		
Go someplace alone to think about your feelings	-.78			
Think about how angry you are with yourself		.47		

*Cross-loading items – removal recommended (Costello & Osborne, 2005)

4.3.4.4.2 Possibly depressed group. An examination of the scree plot for the

possibly depressed group identified five factors with eigenvalues greater than 1. Factor 1

had an eigenvalue of 7.79 and explained 35.4% of variance. Factor 2 had an eigenvalue of

1.89 and explained an additional 8.61% of variance. Factor 3 had an eigenvalue of 1.38

and accounted for a further 6.26% of variance. The fourth factor had an eigenvalue of 1.15

and explained 5.21% of variance. Finally, the fifth factor had an eigenvalue of 1.05 and

accounted for a further 4.11% of variance. The total amount of variance explained by this five factor model was 60.23%. Table 4.13 sets out the items from the RRS and identifies their factor loadings for the possibly depressed group.

Table 4.13

Factor Structure of RRS for Possibly Depressed Group (N = 242)

Items	Factors				
	1	2	3	4	5
Think about how alone you feel	.72				
Think "I won't be able to do my job if I don't snap out of this".					
Think about your feelings of fatigue and achiness			.62		
Think about how hard it is to concentrate			.79		
Think, "What am I doing to deserve this?"				.32	
Think about how passive and unmotivated you feel					-.46
Analyse recent events to try to understand why you are depressed.		.34			
Think about how you don't seem to feel anything anymore	.44				
Think, "Why can't I get going?"					-.78
*Think, "Why do I always react this way?"				.43	-.36
Go away by yourself and think about why you feel this way		.76			
Write down what you are thinking and analyse it		.55			
Think about a recent situation, wishing it had gone better					
Think, "I won't be able to concentrate if I keep feeling this way"					-.38
Think, "Why do I have problems other people don't have?"				.48	
Think, "Why can't I handle things better?"				.72	
Think about how sad you feel	.75				
*Think about all your shortcomings, failings, faults, mistakes	.37			.45	
Think about how you don't feel up to doing anything	.31				
Analyse your personality to try to understand why you are depressed		.41			
Go someplace alone to think about your feelings		.73			
Think about how angry you are with yourself	.44				

*Cross-loading item – removal recommended (Costello & Osborne, 2005)

An examination of the factor structure of the RRS for the possibly depressed group identified a different factor structure to that identified for the not depressed group in this study. In addition, the factor structure differed substantially from the factor structure Whitmer and Gotlib (2011) identified for their currently depressed group. Factor 1 for the possibly depressed group consisted mostly of items previously identified as representing brooding (Treynor et al., 2003). As such, the label, "Brooding" was retained. Factor 2 for this group consisted of items which loaded on the reflection factor for the not depressed group, with the addition of one item, "Go someplace to think about your feelings", which appeared to be a logical inclusion in a reflection factor. The label "Reflection" was deemed appropriate for this factor. Factor 3 consisted of two items which had previously loaded on a depression factor. In this model, those items referred to specific symptoms of depression, namely a physical (fatigue and achiness) and a cognitive symptom (difficulty concentrating). As such, that factor was labelled "Physical and Cognitive Depressive Symptoms". The stability of that factor may be questionable, given the small number of items loading on it (Costello & Osborne, 2005). However, the item loadings on that factor (.62 and .79) were quite high, which suggested it may be appropriate to retain that factor. The items loading on Factor 4 loaded on the brooding factor in the other samples. Those items, namely: "Think 'what am I doing to deserve this?'"; "Think 'why do I always react this way?'"; "Think 'why do I have problems other people don't have?'"; "Think 'why can't I handle things better?'"; "Think about all your shortcomings, failings, faults, mistakes", shared an underlying common theme pertaining to an experience of self-recrimination. As such, Factor 4 was labelled "Self-recrimination". The items loading on Factor 5 loaded on the depression factor in previous samples. Those items, namely: "Think about how passive and unmotivated you feel"; "Think 'why can't I get going?'"; "Think 'why do I always react this way?'"; and "Think 'I won't be able to concentrate if I keep feeling this way'", shared an emphasis on some of the behavioural manifestations of

depression. Factor 5 was therefore labelled, "Behavioural Depressive Symptoms". Two

items ("Think 'why do I always react this way?'"; and "Think about all your shortcomings,

failings, faults, mistakes'") were cross-loading items. In accordance with the

recommendations of Costello and Osborne (2005), those items were removed from the

final factor structure. That removal resulted in a final scale of 20 items, with five factors

for the possibly depressed group.

4.3.4.4.3 Possibly depressed group – comparison with Whitmer and Gotlib

(2011). Whitmer and Gotlib (2011) considered differences in the factor structure of RRS

for groups of individuals who had never been depressed, were formerly depressed and

were currently depressed. That study identified a largely similar factor structure to that

identified by Treynor et al. (2003) for the never depressed and formerly depressed groups.

However, the factor structure identified for the currently depressed group was somewhat

different. In order to examine whether the factor structure identified for the depressed

group was replicable in another sample of depressed individuals, a comparison of the

factor structure for the currently depressed group in Whitmer and Gotlib's study with the

possibly depressed group in this study was conducted. However, Whitmer and Gotlib

excluded the RRS items deemed by Treynor et al. to overlap with Beck Depression

Inventory items. In addition, they removed one of the remaining items ("write down what

you are thinking and analyse it"), due to its low communalities and failure to load on any

factors. As such, Whitmer and Gotlib's factor structure was based on nine items from

RRS. A comparison of the factor structure obtained for those items by Whitmer and Gotlib

and in the current study is contained in Table 4.14. Note that Whitmer and Gotlib labelled

their factors "Brooding" and "Intentional Rumination". The Brooding label was applied in

the current study, and that factor was largely consistent between the two studies. In the

current study, the term "Reflection" was applied to the factor which most closely

resembles the factor labelled "Intentional Rumination" by Whitmer and Gotlib. As such,

items which loaded on the Reflection factor in the current study and the Intentional

Rumination factor in Whitmer and Gotlib were deemed to represent consistency between

the studies.

Table 4.14

Comparison of Factor Structure of Short Version of RRS Identified in Current Study for Possibly Depressed Group and by Whitmer and Gotlib (2011) for Currently Depressed Group

Items	Study	
	Current study	Whitmer & Gotlib (2011)
Think, "What am I doing to deserve this?"	B	B
Analyse recent events to try to understand why you are depressed.	**R**	B
Think, "Why do I always react this way?"	B	B
Go away by yourself and think about why you feel this way	R	IR
Think about a recent situation, wishing it had gone better	B	B
Think, "Why do I have problems other people don't have?"	B	B
Think, "Why can't I handle things better?"	B	B
Analyse your personality to try to understand why you are depressed	**R**	B
Go someplace alone to think about your feelings	R	IR

B = Brooding; R = Reflection; IR = Intentional Rumination

The factor structure identified in Table 4.14 demonstrates largely similar findings for the

currently depressed group in the Whitmer and Gotlib (2011) study and the possibly

depressed group in the current study, with seven of the nine items loading on the same (or

equivalent) factor in both groups. However, "analyse recent events to try to understand

why you are depressed" and "analyse your personality to try to understand why you are

depressed" loaded on the Reflection factor in the current study and on the Brooding factor

in Whitmer and Gotlib. As such, the factor structure of the short version of RRS identified

for depressed participants by Whitmer and Gotlib was largely replicated for possibly depressed participants in the current study.

4.3.4.5 Factor analysis of RRS – by gender. Additional factor analyses were conducted to examine whether the factor structure of RRS differed as a function of gender. As with the previous analyses in this study, exploratory factor analysis with maximum likelihood extraction and a direct oblimin rotation were utilised. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .92 for males and .95 for females, which is considered "marvellous" by Kaiser (1974). In addition, Bartlett's test of sphericity was significant for both groups (males: $\chi(231) = 1481.83$, $p = <.001$; females: $\chi(231) = 5385.91$, $p = <.001$), indicating these data were suitable for factor analysis. A solution was obtained in 14 iterations for both genders.

4.3.4.5.1 Males. An examination of the scree plot for males identified 4 factors with eigenvalues greater than 1. Factor 1 had an eigenvalue of 10.00 and accounted for 45.46% of variance. Factor 2 had an eigenvalue of 1.53 and explained a further 6.96% of variance. Factors 3 and 4 had eigenvalues of 1.21 and 1.13, and accounted for 5.51% and 5.14% of unique variance, respectively. This 4 factor model accounted for 63.07% of total variance.

4.3.4.5.2 Females. In contrast to the factor structure of RRS for males, an examination of the scree plot for females identified 3 factors with eigenvalues greater than 1. Factor 1 had an eigenvalue of 9.96 and accounted for 45.28% of variance. The second factor had an eigenvalue of 1.62 and explained a further 7.37% of variance. Factor 3 had an eigenvalue of 1.18 and accounted for an additional 5.37% of unique variance. The total variance explained by this 3 factor model was 58.02%. Table 4.15 identifies the factor structures of RRS for males and females, and identifies the items loading on each factor.

Table 4.15

Factor Structure of RRS for Males (N = 116) and Females (N = 449)

	Depression		Reflection		Brooding		Self-recrimination	
	M	F	M	F	M	F	M	F
Think about how alone you feel					-.71	-.32		
Think "I won't be able to do my job if I don't snap out of this".	.51	.46				-.30		
Think about your feelings of fatigue and achiness	.49	.55						
Think about how hard it is to concentrate	.74	.66						
Think, "What am I doing to deserve this?"					-.38	-.68		
Think about how passive and unmotivated you feel	.56	.82						
*Analyse recent event to try to understand why you are depressed.		.35		-.34	-.72			
*Think about how you don't seem to feel anything anymore	.30	.54			-.42			
*Think, "Why can't I get going?"	.45	.77					.35	
Think, "Why do I always react this way?"							-.50	.66
*Go away by yourself and think about why you feel this way	.36		.55	-.77				
Write down what you are thinking and analyse it			.64	-.55				
Think about a recent situation, wishing it had gone better					-.43	-.37		
Think, "I won't be able to concentrate if I keep feeling this way"	.66	.54						
*Think, "Why do I have problems other people don't have?"	.35					-.80		
Think, "Why can't I handle things better?"						-.84	.64	
*Think about how sad you feel		.35			-.77	-.45		
Think about all your shortcomings, failings, faults, mistakes					-.46	-.65	.34	
*Think about how you don't feel up to doing anything	.61	.63			-.37			
*Analyse your personality to try to understand why you are depressed				-.37	-.76	-.32		
*Go someplace alone to think about your feelings	.42		.51	-.79				
Think about how angry you are with yourself					-.65	-.54		

* Cross-loading item – removal recommended (Costello & Osborne, 2005)

As is evident from Table 4.15, the factor structure of RRS for females was highly similar to the factor structure identified by Treynor et al. (2003) and in this study for the entire sample and not depressed groups. Consistent with those other findings, for females in this sample, Factor 1 was labelled Depression, Factor 2 was labelled Reflection, and Factor 3 was labelled Brooding. The factor structure for males was slightly different in that 4 factors were identified. Of those factors, Factor 1, which accounted for the greatest amount of variance, most closely resembled the Depression factor identified in other samples. Factor 2 consisted mostly of items pertaining to the Reflection factor, and the items loading on Factor 3 were predominantly items that have previously been identified as representing a Brooding factor. Factor 4 consisted mostly of items which loaded on the Brooding factor in the female sample, and on the "Self-recrimination" factor in the possibly depressed group. Those items seemed to share a common theme of focusing on one's shortcomings and that factor was labelled "Self-recrimination". As such the factor structure of the RRS for males consisted of 4 factors, two of which were highly similar to those of the female group (Depression and Reflection), and two additional factors which were comprised predominantly of items from the Brooding factor found in other samples. The variations in item-factor loadings between the groups may be the result of the smaller number of male participants, which reduced the ratio of participants to items and may, in turn, have degraded the stability of the solution obtained from that analysis. Another potential problem associated with the male solution was the high number of cross-loading items (6 out of 22 items). Again, the substantially smaller sample of males may account for the lack of robustness in that group's solution.

4.3.4.6 Factor analysis of WBSI (N = 565). To examine the factor structure of WBSI, exploratory factor analysis with maximum likelihood extraction and a direct oblimin rotation was conducted. This procedure was consistent with the work of Whitmer and Gotlib (2011), and replicated the analysis conducted in the current study in the exploration of the factor structure of RRS. Consistent with the guidelines adopted by Whitmer and Gotlib, 0.3 was adopted as a minimum factor loading. Correlations among each of the WBSI items were examined and found to be highly significant. As such, all 15 items from WBSI were included in the factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .94, which is considered "marvellous" by Kaiser (1974). In addition, Bartlett's test of sphericity was significant ($\chi(105)=4234.04$, $p = <.001$), indicating these data were suitable for factor analysis. A two factor solution was obtained in 22 iterations.

An examination of the scree plot identified two factors with eigenvalues greater than one. Factor 1 had an eigenvalues of 7.12 and accounted for 47.45% of variance. The second factor had an eigenvalue of 1.16 and explained a further 7.76% of variance. The total variance explained by this two factor solution was 55.21%. Table 4.16 sets out each of the WBSI items and their factor loadings.

Table 4.16

Factor Structure of WBSI (N = 565)

Items	Factor 1	Factor 2
1. There are things I prefer not to think about.		.65
2. Sometimes I wonder why I have the thoughts I do.	.56	
3. I have thoughts I cannot stop.	1.01	
4. There are images that come to mind that I cannot erase.	.74	
5. My thoughts frequently return to one idea.	.60	
*6. I wish I could stop thinking certain things.	.46	.42
7. Sometimes my mind races so fast I wish I could stop it.	.49	
8. I always try to put problems out of mind.		.44
9. There are thoughts that keep jumping into my head.	.64	
10. Sometimes I stay busy just to keep thoughts from intruding on my mind.		.47
11. There are things that I try not to think about.		.81
12. Sometimes I really wish I could stop thinking.		.33
13. I often do things to distract myself from my thoughts.		.58
14. I have thoughts that I try to avoid.		.78
15. There are many thoughts that I don't tell anyone.	.42	

*Cross-loading item = removal recommended (Costello & Osborne, 2005)

The items loading on Factor 1 had a common theme pertaining to the experience of unwanted intrusive thoughts. As such, that factor was labelled "Unwanted Intrusive Thoughts" (UIT), consistent with the terminology adopted by Blumberg (2000). Factor 2 was comprised of items that related to actively avoiding particular thoughts, either through distraction or attempted thought suppression. That factor was labelled, "Avoidance of Unwanted Thoughts" (AUT). One of the items, namely: "6. I wish I could stop thinking certain things", cross-loaded on both factors. In accordance with the recommendations of Costello and Osborne (2005), that item was removed.

The results of the current factor analysis were compared with those of Blumberg (2000). Blumberg identified a three factor solution which provided the best fit for his data. Table 4.17 identifies the item loadings on each of the three factors identified by Blumberg, as well as the factor loadings in the current study.

Table 4.17

Comparison of WBSI Factors – Current Study and Blumberg (2000)

Items	Current study	Blumberg (2000)
There are things I prefer not to think about.	AUT	TS
Sometimes I wonder why I have the thoughts I do.	UIT	UIT
I have thoughts I cannot stop.	UIT	UIT
There are images that come to mind that I cannot erase.	UIT	UIT
My thoughts frequently return to one idea.	UIT	UIT
Sometimes my mind races so fast I wish I could stop it.	UIT	UIT
I always try to put problems out of mind.	AUT	TS
There are thoughts that keep jumping into my head.	UIT	UIT
Sometimes I stay busy just to keep thoughts from intruding on my mind.	AUT	SD
There are things that I try not to think about.	AUT	TS
Sometimes I really wish I could stop thinking.	AUT	SD
I often do things to distract myself from my thoughts.	AUT	SD
I have thoughts that I try to avoid.	AUT	TS
There are many thoughts that I don't tell anyone.	UIT	UIT

*Cross-loading item = removal recommended (Costello & Osborne, 2005)
Current study: UIT = Unwanted intrusive thoughts; AUT = Avoidance of unwanted thoughts
Blumberg (2000): TS = Thought suppression; SD= Self-distraction

The comparison of the factor structure identified by Blumberg (2000) with that of the current study identified complete consistency in the items loading on the Unwanted Intrusive Thoughts factor. The second factor in the current study consisted of the items that loaded on the Thought Suppression and Self-Distraction factors in Blumberg's analysis. These findings suggested a highly stable factor pertaining to the experience of unwanted intrusive thoughts and

another factor or factors relating to active attempts to avoid those unwanted intrusive thoughts.

    4.3.4.7 Factor structure of WBSI – by depression level. Similar to the analyses conducted on RRS in this study, a further examination of the factor structure of WBSI was conducted to compare that structure in groups differing in their current level of depressive symptoms by utilizing exploratory factor analysis with maximum likelihood extraction and direct oblimin rotation. The Kaiser-Meyer-Olkin measure of sampling adequacy was .92 for the not depressed group, and .90 for the possibly depressed group, which is considered "marvellous" by Kaiser (1974). Highly significant values were also obtained for Bartlett's test of sphericity for both groups (not depressed: $\chi(105) = 2190.98$, $p = <.001$; possibly depressed: $\chi(105) = 1366.42$, $p = <.001$), which supported the suitability of factor analysis for these data. An examination of the scree plots identified three factor solutions for each group. Those models were achieved in seven iterations for the not depressed group and in five iterations for the possibly depressed group.

    Inspection of the eigenvalues for the not depressed group identified Factor 1 had an eigenvalue of 6.57 and accounted for 43.77% of variance. Factor 2's eigenvalue was 1.22, and that factor accounted for a further 8.11% of unique variance. The eigenvalue of Factor 3 was 1.14, and 7.62% of variance was explained by that factor. The eigenvalues and variance explained for the possibly depressed group were 5.93 (39.53%), 1.41 (9.43%), and 1.02 (6.82%), respectively. Table 4.18 identifies the factor structure of WBSI for the not depressed group and the possibly depressed group.

Table 4.18

Factor Structure of WBSI for Not Depressed (N = 323) and Possibly Depressed Group (N = 242)

Items	Not depressed			Possibly depressed		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
1. There are things I prefer not to think about.			.61			.68
2. Sometimes I wonder why I have the thoughts I do.	.52				.57	
3. I have thoughts I cannot stop.	.97				.85	
4. There are images that come to mind that I cannot erase.	.78				.61	
5. My thoughts frequently return to one idea.	.54				.65	
*6. I wish I could stop thinking certain things.	.48		.32		.50	
7. Sometimes my mind races so fast I wish I could stop it.	.42				.40	
8. I always try to put problems out of mind.		-.33				
9. There are thoughts that keep jumping into my head.	.65				.62	
10. Sometimes I stay busy just to keep thoughts from intruding on my mind.		-.85		.51		
11. There are things that I try not to think about.			.71			.68
†12. Sometimes I really wish I could stop thinking.						
13. I often do things to distract myself from my thoughts.		-.88		1.05		
14. I have thoughts that I try to avoid.			.68			.53
15. There are many thoughts that I don't tell anyone.	.43				.30	

*Cross-loading item = removal recommended (Costello & Osborne, 2005)

† Item failed to load on any factor.

Several observations can be made from the factor structures set out in Table 4.18. Firstly, the factor structure for both groups is largely homogeneous, with similar groups of items loading on individual factors. A particularly stable factor was again identified, with items 2, 3, 4, 5, 6, 7, 9 and 15 loading on that factor in both groups. Those items were also the items identified in the full sample analysis in this study and by Blumberg (2000) as comprising the Unwanted Intrusive Thoughts factor. There were only two notable discrepancies in relation to that factor in the current analysis. Firstly, one item ("I wish I could stop thinking certain things") cross-loaded on this and one other factor. Secondly, the Unwanted Intrusive Thoughts factor accounted for the greatest percentage of variance in the full sample analysis in the current study, in Blumberg's study and for the not depressed group. However, that factor was the second factor for the possibly depressed group, accounting for a substantially reduced percentage of variance in that group.

The other two factors were less stable than Unwanted Intrusive Thoughts. For the not depressed group, Factor 2 was loaded upon by two items that were deemed to represent a Self-Distraction factor by Blumberg (2000) ("Sometimes I stay busy just to keep thoughts from intruding on my mind"; "I often do things to distract myself from my thoughts") and an additional item ("I always try to put problems out of mind") that loaded on the Thought Suppression factor. Those items appeared to reflect the Self-Distraction factor identified by Blumberg. Factor 3 consisted of four items; one of which was the cross-loading item which also loaded on Unwanted Intrusive Thoughts. The other three items ("There are things I prefer not to think about"; "There are things that I try not to think about"; and "I have thoughts that I try to avoid") all loaded on Blumberg's Thought

Suppression factor. As such, the factor structure for the not depressed group largely resembled the factor structure identified by Blumberg. However, in this sample, the Self-Distraction factor accounted for a greater amount of variance than the Thought Suppression factor, which was in contrast to the findings of Blumberg, who identified the Thought Suppression factor as explaining a greater percentage of variance than the Self-Distraction factor.

The factor structure for the possibly depressed group identified the Self-Distraction factor, consisting of two items ("Sometimes I stay busy just to keep thoughts from intruding in my mind"; "I often do things to distract myself from my thoughts"), accounted for the greatest amount of variance. The Unwanted Intrusive Thoughts factor, which replicated that factor from earlier studies, was the second factor identified for that group. The third factor for that group was Thought Suppression, and this factor was loaded upon by the same items in this group as in the not depressed group. One item ("Sometimes I really wish I could stop thinking") did not load on any of the factors. This item also failed to load on any of the factors in the entire sample in the current study. As such, that item may profitably be removed from further analyses.

4.3.4.8 Factor structure of WBSI – by gender. A final pair of factor analyses was conducted to examine whether the factor structure of WBSI differed as a function of gender. As with the previous analyses conducted in this study, exploratory factor analyses with maximum likelihood extraction and direct oblimin rotation were conducted. The Kaiser-Meyer-Olkin measure of sampling adequacy was .88 for males, which is considered "meritorious", and .94 for females, which is considered "marvellous" by Kaiser (1974). Bartlett's test of sphericity was also highly significant for both groups (males: $\chi (105) = 839.16$, p

= <.001; females: χ(105) = 3503.32, p = <.001), which further indicated that factor analysis of these data were appropriate. A three factor solution was obtained in 10 rotations for males and a two factor solution was obtained in 9 rotations for females. Table 4.19 identifies the factor structure of WBSI for males and females.

An examination of the scree plots identified the male sample yielded three factors with eigenvalues greater than one, whilst the female sample had two factors with eigenvalues greater than one. The eigenvalues and variance explained by those factors were as follows; males: 6.65(44.32%), 1.40(9.33%), 1.09(7.24%); females: 7.24(48.27%), 1.22(8.12%). The total variance explained by those models was 60.89% for males and 56.38% for females. Table 4.19 displays each of the WBSI items and their factor loadings for males and females.

Table 4.19

Factor Structure of WBSI for Males (N = 116) and Females (N = 449)

Items		Males			Females	
		Factor 1	Factor 2	Factor 3	Factor 1	Factor 2
1.	There are things I prefer not to think about.			.69		.67
2.	Sometimes I wonder why I have the thoughts I do.	.46			.57	
3.	I have thoughts I cannot stop.	1.08			.98	
4.	There are images that come to mind that I cannot erase.	.55			.76	
5.	My thoughts frequently return to one idea.			.30	.69	
*6.	I wish I could stop thinking certain things.		.35	.30	.54	.36
7.	Sometimes my mind races so fast I wish I could stop it.		.33		.59	
8.	I always try to put problems out of mind.		.42			.44
9.	There are thoughts that keep jumping into my head.	.37			.71	
10.	Sometimes I stay busy just to keep thoughts from intruding on my mind.		.85			.45
11.	There are things that I try not to think about.			.64		.79
*†12.	Sometimes I really wish I could stop thinking.		.56	.33		
13.	I often do things to distract myself from my thoughts.		.89			.54
14.	I have thoughts that I try to avoid.			.76		.72
15.	There are many thoughts that I don't tell anyone.			.37	.46	

*Cross-loading item = removal recommended (Costello & Osborne, 2005)

† Item failed to load on any factor

Similar to the findings of Blumberg (2000), and for the not depressed and possibly depressed groups in this study, the factor structure identified for males consisted of three factors, which were labelled Unwanted Intrusive Thoughts, Self-Distraction, and Thought Suppression, respectively. Whilst the labeling of the factors for this sample was consistent with previous findings (Blumberg, 2000), the composition of those individual factors varied for this group. All of the items loading on the Unwanted Thoughts Factor, which accounted for the greatest amount of variance in this sample, were identified as loading on this factor in previous studies and with different samples within the current study. However, one item that has typically loaded on this factor ("My thoughts frequently return to one idea") loaded on the Thought Suppression factor in this sample. In addition, two other items ("I wish I could stop thinking of certain things"; "Sometimes my mind races so fast I wish I could stop it") that usually loaded on this factor failed to do so in this sample. Instead, those items loaded on the second factor, which was labelled "Self-Distraction". Other items on that factor included one item ("I always try to put problems out of mind") that has previously been associated with thought suppression, a cross-loading item ("Sometimes I really wish I could stop thinking"), and two items that have consistently been associated with self-distraction ("I often do things to distract myself from my thoughts"; "Sometimes I stay busy just to keep thoughts from intruding on my mind"). As such, the factor structure of WBSI for the male sample provided further support for the stability of the Unwanted Intrusive Thoughts factor, and the tendency for the Self-Distraction and Thought Suppression factors to have less clear boundaries.

The analysis of the female sample's factor structure of WBSI elucidated a two factor model, highly similar to that of the entire sample in the current study. Factor 1 consisted of items reflecting Unwanted Intrusive Thoughts, and Factor 2 contained the items reflecting the factor labelled "Avoidance of Unwanted Thoughts". The only disparity between the factor structures identified for the female sample and the entire sample was the failure of one item ("Sometimes I really wish I could stop thinking") to load on any factor in the female sample. This analysis further supported the stability of the Unwanted Intrusive Thoughts factor, and suggested the two factor model identified by the analysis of the entire sample in the current study may represent a meaningful presentation of the factor structure of WBSI.

4.4 Discussion

In this study, the factor structures of the RRS and WBSI were examined for the entire sample (N = 565), a not depressed group (N = 323), a possibly depressed group (N = 242), males (N = 116) and females (N = 449). The findings of this study provided further support for the findings of Treynor et al. (2003), Whitmer and Gotlib (2011) and Blumberg (2000) and indicated that RRS and WBSI are multidimensional scales whose factor structures can differ between groups. The two factor model identified for the WBSI was not consistent with the unidimensionality of the WBSI proposed by Wegner and Zanakos (1994), Muris et al. (1996), and Palm and Strong (2007). This study indicated there were interpretable differences in the factor structures of RRS and WBSI when comparisons were made between males and females, and between participants who were currently experiencing some depressive symptoms and those who were not experiencing those symptoms.

4.4.1 Summary of findings - RRS

At a general level of analysis, this study provided further support for the identification of two factors within RRS, namely Reflection and Brooding, as identified by Treynor et al. (2003) and replicated by Whitmer and Gotlib (2011). In addition, a third factor which was comprised of items removed from Treynor et al. and Whitmer and Gotlib's analyses on the basis that they overlapped with items from the Beck Depression Inventory, was also identified as sharing an emphasis on Depression Symptoms in the current study, and thus formed the third factor in this study. Those three factors were identified in the whole sample, the not depressed group, and the female group. The two groups for whom that factor structure did not appear to fit were the possibly depressed group and the male group. The finding that the factor structure of the RRS differed for a possibly depressed group was similar to that of Whitmer and Gotlib, who identified an alternative factor structure for individuals who were currently depressed, as compared to never depressed and remitted depressed participants. Whilst the Brooding and Reflection factors were identified for the possibly depressed group, the five factor model of the possibly depressed group indicated a greater level of specificity in relation to the grouping of depressive symptoms, as assessed by the RRS.

It appeared meaningful for the possibly depressed group to distinguish between physical, cognitive, psychological and behavioural symptoms associated with depression, as evidenced by the additional factors of "Physical and Cognitive Depressive Symptoms", "Self-recrimination" and "Behavioural Symptoms of Depression". It is interesting to note that, for not depressed individuals, a generic "Depression Symptoms" factor emerged, whereas, for possibly depressed

individuals, that factor could meaningfully be split into more specific components of the experience of depression. Although the small sample size of the possibly depressed group limits the generalisability of the findings related to that group, the delineation of depressive symptoms for that group appears noteworthy. It is possible that individuals experiencing depressive symptoms may be more inclined to focus on, and differentiate between, varying severities of different aspects of their depressive symptoms. This is consistent with the diagnostic criteria for depression which includes physical, cognitive, behavioural and emotional symptoms (APA, 2000). Individuals may be diagnosed with depression as a result of experiencing a combination of symptoms across the range of domains, and there is no requirement that an individual be experiencing symptoms from each of the domains in order to obtain a diagnosis of depression. As such, there is no "all-or-nothing" in relation to the experience of depressive symptoms, and there is likely to be substantial variation between individuals, despite having a common diagnosis of depression. In contrast, individuals who are not experiencing depression appear unlikely to experience any of the symptoms in isolation. As such, it would be beneficial to attempt to replicate the factor structure for the possibly depressed group in a clinically depressed group, and also a possibly depressed group with a larger sample size, to ascertain whether this delineation of depressive symptoms as assessed by the RRS could facilitate a more fine grained approach to distinguishing between various aspects of rumination and their requisite relationships with various aspects of depression.

In the current study, there was also some variation in the factor structure identified for males and females. Whilst the factor structure identified for females was highly consistent with that identified in previous studies and in the current

study with the entire sample, the male factor structure yielded four factors. Of those factors, the fourth factor was loaded upon by cross-loading items, and was deemed to be unstable. As such, the three factor model did appear the most appropriate model for the male group. The minor variations in factor structure for the male group may be the result of the smaller sample size for that group. As such, the generalisability of the findings pertaining to the male group in this study may be limited.

Overall, the factor analyses of RRS indicated the three factor structure, consisting of Depression Symptoms, Reflection and Brooding was applicable to the entire sample, the not depressed group, and both males and females, and provided further support for the factors identified by Treynor et al. (2003). Those analyses also provided support for the findings of Whitmer and Gotlib (2011) that the factor structure of the RRS was different for possibly depressed individuals. These findings are important when considering the appropriateness of utilising either the entire RRS or factor structures obtained from non-depressed individuals when investigating rumination in currently or possibly depressed individuals. A more meaningful analysis of the experience of rumination for currently or possibly depressed individuals may be obtained via the consideration of their scores on the five factors identified in the current study, rather than an overall score on the RRS.

4.4.2 Summary of findings - WBSI

Examination of the factor structure of the WBSI was also conducted for the whole sample, a not depressed group, a possibly depressed group, males and females. The findings of this study were consistent with those of Blumberg (2000) and suggested support for the multidimensional nature of the WBSI, which was in

contrast to the findings of Wegner and Zanakos (1994), Muris et al. (1996), and

Palm and Strong (2007), who identified the WBSI as unidimensional. In the

current study, one particularly stable factor was found for each of the groups

investigated. That factor was labelled "Unwanted Intrusive Thoughts", and

represented an exact replication of a factor of that name identified by Blumberg.

The Unwanted Intrusive Thoughts factor was found for each of the groups in this

study. That factor contained four of the six items identified by Palm and Strong as

being "effective" in discriminating across levels of thought suppression (3. "I

have thoughts I cannot stop"; 6. "I wish I could stop thinking of certain things"; 9.

"There are thoughts that keep jumping into my head"; and 15. "Sometimes I stay

busy just to keep thoughts from intruding on my mind") were loading on

Unwanted Intrusive Thoughts in this study. However, one of those items, namely

item 6 cross-loaded on both factors, and was recommended for removal. The

other two items (12. "I often do things to distract myself from my thoughts; and

13. "I have thoughts I try to avoid") loaded on Factor 2 (AUT).

In the entire sample, the remaining items from the WBSI formed an

Avoidance of Unwanted Thoughts factor. This was in contrast to the findings of

Blumberg (2000), in which two additional factors, labelled Self-distraction and

Thought Suppression, respectively, were identified. This discrepancy may be on

account of the different rotations utilised in the current study (direct oblimin

rotation) and Blumberg's (2000) study (promax rotation). Whilst both rotation

methods are non-orthogonal in nature, and therefore appropriate, as they allow the

factors to correlate, promax is recognised as being more efficient and therefore

appropriate in large datasets (Tabachnick & Fidell, 2001). As noted by DiStefano,

Zhu, and Mindrila (2009), variations in rotation are likely to influence factor

structures obtained. It is worthy of note that Blumberg conducted confirmatory

analyses on a single factor, two factor and three factor solution for the WBSI and

found no support for the single factor solution, partial support for the two factor

solution, and compelling support for the three factor solution. As such, Blumberg

and the current study are consistent in the proposition that the WBSI does not

measure a unidimensional construct. These findings are further supported by the

clear conceptual differences that can be identified between the two factors

identified in the current study, and among the three factors identified by

Blumberg.

The factor analysis of the WBSI in which groups were compared on the

basis of their depression levels yielded three factors for both the not depressed

and the possibly depressed groups. The Unwanted Intrusive Thoughts factor

identified for those groups was comprised of the same items as the factor of that

name identified in the entire sample, and by Blumberg (2000). The other two

factors, however, whilst being labelled "Self-distraction" and "Thought

Suppression", consistent with the terminology applied by Blumberg, were less

stable than the Unwanted Intrusive Thoughts factor. Whilst Self-distraction

accounted for greater variance than Thought Suppression in the possibly

depressed group, Blumberg found Thought Suppression accounted for a greater

amount of variance than Self-distraction.

Interestingly, the factor which accounted for the greatest amount of

variance in the possibly depressed group was the Self-distraction factor. This is in

contrast to each of the other samples investigated, in which the Unwanted

Intrusive Thoughts factor was by far the most influential factor in accounting for

variance. This finding is pertinent because it further illustrates the importance of

differentiating between depressed and non-depressed individuals when examining established risk factors for depression such as rumination and thought suppression. Similar to the findings related to the RRS, the most notable variation in factor structure for the WBSI appeared to be for the possibly depressed group.

The gender–based examination of the WBSI identified a three factor solution for males and a two factor solution for females. The factor structure identified for males consisted of the same three factors identified for other samples, but the items loading on those factors were less consistent for this group. This lack of stability of factors may be the result of the smaller sample size included in that analysis. In contrast, the female sample's WBSI factor structure was highly similar to that identified for the entire sample. As such, whilst the generalisability of the findings pertaining to the male group may be limited by its small sample size, the two factor solution identified in the whole sample and female groups appeared to be robust.

Given that Palm and Strong (2007) included only females in their study, the comparison between their findings and those of the current study's results for the female group is particularly relevant. As previously identified, Factor 1 UIT contained four of the six items identified by Palm and Strong as being effective discriminating items. However, one of those items cross-loaded and was recommended for removal. As such, there appeared to be moderate consistency between the two female samples investigated by Palm and Strong and the current study, respectively. Although it is unclear why these differences were identified, it is possible that the different factor analysis techniques utilised may account for these discrepancies (DiStefano, Zhu, & Mindrila, 2009). Whilst Palm and Strong utilised a principal axis factor analysis, in the current study an exploratory factor

analysis with maximum likelihood extraction and direct oblimin rotation was conducted.

This series of factor analyses provided further support for the factor structure identified by Treynor et al. (2003) and Whitmer and Gotlib (2011) for the RRS, which consisted of three factors labelled Depression, Reflection and Brooding. The three factor structure of the WBSI identified by Blumberg (2000) appeared less stable, with the entire sample and the female sample in the current study yielding a two factor structure. Additional support was found for the variability of factor structure for currently or possibly depressed individuals in the RRS, and was duplicated in the current study for the WBSI. These findings suggest it may be important to engage these measures differently when investigating a clinically depressed group, as opposed to a non-depressed group of participants.

4.4.3 Implications

The findings from the current study have direct implications for the utilisation of the RRS to assess rumination and WBSI to assess attempts at thought suppression in different populations. The variations in factor structure between genders and for the possibly depressed group emphasise the importance of recognising the different cognitive experience of males and females, and of people who are currently experiencing depression. An improved understanding of that cognitive experience may be obtained if measures seeking to assess such constructs are adapted to reflect meaningful differences between genders and between depressed and non-depressed individuals. Specifically, items from the RRS and WBSI that have been identified as loading on individual factors derived

from this study could be combined into a brief, yet highly effective, predictor of depression in particular groups.

In addition, the factor structures identified for these measures have implications for improving understanding of the constructs being measured. Based on the findings of the current study, it appears meaningful to consider both rumination and thought suppression as multidimensional constructs. It is suggested that identifying the dimensions inherent in those constructs, as assessed by the RRS and WBSI, may assist in developing a more accurate and specific understanding of the relationship between those constructs and psychological outcomes such as depression. The delineation of factors within those measures could facilitate a more fine grained approach to the exploration of relationships between various constructs, and assist in the clarification of the influence of the various dimensions on the development and/or maintenance of various types of psychopathology. As such, the identification of multiple factors within both the RRS and the WBSI potentially has implications for the utilisation of those tools in both a research and a clinical context.

For example, in a research context, it may inform the development of alternative measures, which focus more specifically on the constructs identified within the broader constructs of rumination and thought suppression. Such measures could potentially represent brief and effective screening tools for various cognitive patterns which may have differential relationships with other constructs of interest. In a clinical context, such specific measures, or scores on the factors derived from the existing measures, may be helpful in the development of prevention and intervention programs. If it can be established, for example, that a particular component within the RRS and/or WBSI is more strongly associated

with negative psychological outcomes than other aspects assessed within those measures, strategies such as psychoeducational programs which target the minimisation of the more harmful cognitive patterns may prove effective in reducing those negative psychological outcomes. In order to develop prevention and/or intervention techniques in relation to those variables, further research is required to explore the influence of the various components identified within the RRS and WBSI on negative psychological outcomes, such as depression. The third study in this research program will address that issue.

4.4.4 Limitations

The generalisability of the findings from this study would be enhanced if particular limitations were addressed. Firstly, whilst this study partially replicated the findings of Whitmer and Gotlib (2011) that the factor structure of the RRS differed for a currently depressed group, as compared to a non-depressed group, the factor structure identified for the possibly depressed group in the current study did not replicate the factor structure identified for the currently depressed group in the Whitmer and Gotlib study. As such, whilst there is evidence that currently and possibly depressed individuals engage with the RRS differently to individuals who are not experiencing depressive symptoms, a stable distinguishing factor structure for the currently and possibly depressed individuals remains to be identified. A possible explanation for the discrepant factor structure identified in the current study is that the possibly depressed group has not been clinically ascertained as suffering from depression. Rather, they were labelled as possibly depressed by virtue of scoring above the arbitrary cutoff point of 10 on EDS, which was identified by Cox, Holden and Sagovsky (1987) as being indicative of the presence of some depressive symptoms. Conversely, Whitmer and Gotlib's

currently depressed group had undergone a Structured Clinical Interview for the DSM-IV prior to being allocated to the currently depressed group. As such, that group may be more reflective of a depressed sample than that used in the current study. In addition, the sample size of the possibly depressed group ($N = 242$) was less than that utilised by Whitmer and Gotlib ($N = 353$). Whilst the sample size in the current study met the assumptions of factor analysis and was deemed appropriate for that analysis, the larger sample size in Whitmer and Gotlib's study may render their results more generalisable than those of the current study. Additional research utilising a clinical sample of depressed individuals should further investigate the factor structure of the RRS and WBSI in order to identify a stable and replicable factor structure for that population.

Small sample size was also identified as a possible limitation in the current study, specifically for the male group. In analyses of the RRS and the WBSI, males were found to have a different factor structure to that of females. However, in both instances, the female factor structure strongly resembled that obtained from the entire sample. As such, it is difficult to draw meaningful conclusions in relation to gender differences in the factor structure of the RRS and WBSI from the current study, due to discrepancies in the sample sizes of the two gender groups. Similar to Blumberg (2000) this study found women scored significantly higher on the WBSI than men. In addition, the female group scored significantly higher on the RRS and the EDS. As such, it is difficult to determine whether gender differences in factor structure identified in this study are best explained by genuine gender differences in these constructs, or whether the smaller sample size of the male group prevented an accurate assessment of those

gender differences. Further research incorporating equal numbers of males and females should be conducted to address this limitation.

4.4.5 Conclusions

Despite these limitations, this study has made a useful contribution to the literature in relation to the factor structure of the RRS and the WBSI. This study replicated the findings of Treynor et al. (2003) and Whitmer and Gotlib (2011) and provided further support for the appropriateness of treating the RRS as a three factor scale, comprised of Depression Symptoms, Reflection and Brooding factors. Further, Blumberg's (2000) identification of an Unwanted Intrusive Thoughts factor in the WBSI was replicated for every group in the current study, which indicated the stability of that factor across different populations. Contrary to the findings of Wegner and Zanakos (1994), Muris et al. (1996), and Palm and Strong (2007), the WBSI emerged as a two factor measure in the current study. Preliminary support was found for meaningful differences in the WBSI between non-depressed and possibly depressed groups, as well as gender differences in the factor structure of that measure. Whilst those findings need to be replicated, they provide support for the existence of gender and depression-level differences in those constructs, both in terms of overall scores and in the factor structure of those scales. The multidimensional nature of the RRS and WBSI has potential research and clinical implications, and suggests a more fine grained understanding of the constructs of rumination and thought suppression could potentially inform intervention and prevention strategies which target cognitive vulnerability to negative psychological outcomes. Further research which investigates the relationships between the individual factors derived from the RRS and WBSI and

other cognitive patterns, along with measures of psychopathology is strongly

recommended.

Chapter 5. Cognitive vulnerabilities for depression in women

5.1 Introduction

5.1.1 Chapter overview

In a recent review of the current status of the literature relating to cognition and depression, Gotlib and Joormann (2010) noted that increasing understanding of the interaction between various cognitive patterns associated with depression is necessary for the advancement of theories of depression and the improvement of the efficacy of treatments for that disorder. Similarly, Mathews and MacLeod (2005) identified the necessity of exploring interactive links among cognitive risk factors for depression. As such, despite the substantial body of literature describing cognitive patterns which represent risk factors for depression, the need for research investigating the combined influence of identified vulnerability factors remains (Mathews & MacLeod, 2005).

Chapter 1 of this thesis identified the high prevalence and associated morbidity of depression in females. It was suggested that cognitive processes hold promise in explaining female vulnerability to depression. In Chapter 2, literature was presented pertaining to a number of potential cognitive risk factors for depression; namely, rumination, thought suppression, self-referent information processing, overgeneral autobiographical memory and intraindividual reaction time variability. Each of those constructs has previously been implicated in depression proneness, and relevant conceptual links can also be made among each of those constructs (see Chapter 2 of this thesis).

As such, it was the specific intention of this research program to address the identified deficits pertaining to literature examining the interactive links

between cognitive risk factors for depression. It was of interest to examine the

individual and combined effects of each of the identified constructs on depression

symptoms. Given the high prevalence of depression in females, it was determined

that the current research would focus specifically on those cognitive variables

within a female sample, in an attempt to better understand female vulnerability to

depression.

The noted benefits of online data collection, including the ease of

accessing a large sample size, lead to the selection of that modality for this

research. In order to ensure testing modality did not interfere with the accuracy

and interpretability of data collected, each of the measures intended for use (with

the exception of the dot probe task, for which the testing administration was

identical in both formats) were evaluated for comparability. That assessment of

comparability indicated only one of the SRIP variables (relating to positive self-

evaluation) and none of the AMT variables were suitable for use in an online

format. The logistics of the current project, specifically related to the

programming of measures in the custom-designed testing website, did not

facilitate the inclusion of alternative measures of self-referent information

processing or autobiographical memory. As such, the constructs able to be

investigated in this research were limited to rumination, thought suppression,

positive self-evaluation, reaction time variability and depression. This chapter will

present some of the key findings pertaining to the rationale and hypotheses for

this study, and then report its findings. The implications, limitations and

conclusions from this study will also be discussed.

5.1.2 Rationale

As identified in Chapter 2 of this thesis, the relationship between rumination and depression has been extensively researched. Rumination has been established as a cognitive risk factor for depression (Just & Alloy, 1997) and as a mediator of other cognitive risk factors for depression (Cox, Enns, & Taylor, 2001; Flynn, Kecmanovic, & Alloy, 2010; Nolan, Roberts, & Gotlib, 1998; Spasojevic & Alloy, 2001). Of particular relevance to the current research is the finding that rumination mediates the influence of thought suppression on depression (Wenzlaff & Luxton, 2003).

Those previous findings informed the current research in several ways. Firstly, given the findings implicating self-referent information processing (Alloy, Abramson, et al., 1997) and intraindividual reaction time variability (Ode, Robinson, & Hanson, 2011) in depression vulnerability, it was recognised that the mediational role of rumination on those particular constructs was worthy of investigation. In addition, given the findings of Study 2 in the current research program that rumination and thought suppression both represent multidimensional constructs, an examination of the relationships among the requisite factors which comprise those constructs was also deemed an important research endeavour.

As such, the rationale for this study was developed in accordance with empirically derived observations which indicated: (a) females are at higher risk of developing depression than males (Australian Bureau of Statistics, 2008; Kessler, 2003); (b) gender-based differences in cognitive patterns, such as ruminative tendencies, represent promising explanations for this gender difference (Nolen-Hoeksema, 1987); (c) several cognitive risk factors for depression have been identified, including rumination (Just & Alloy, 2001), thought suppression

(Wenzlaff, Rude, Taylor, Stultz, & Sweatt, 2001), self-referent information

processing (Alloy, Abramson, et al., 1997) and intraindividual reaction time

variability (Ode, Robinson, & Hanson, 2011); (d) there is a need for the

interactions between cognitive risk factors for depression to be examined

(Mathews & MacLeod, 2005); (e) rumination is likely to mediate the effects of

other cognitive risk factors (Spasojevic & Alloy, 2001); (f) the possible mediating

effects of rumination have not been considered for self-referent information

processing or intraindividual reaction time variability; and (g) rumination has

been found to mediate the effect of thought suppression on depression (Wenzlaff

& Luxton, 2003), however the relationships between individual factors of RRS

and WBSI have not yet been examined in detail. Research conducted by Treynor

et al. (2003) identified differential influences of reflection and brooding on

depression, which further illustrated the importance of utilising a fine-grained

approach in relation to the complex relationship between cognitive vulnerabilities

and depression. It is proposed that these key findings illustrate the empirically

informed development of this study, and provide support for each of the study's

hypotheses.

5.1.3 Hypotheses of the current study

Based on the previous research pertaining to the constructs of interest, it

was hypothesised that the factors of the RRS (depression symptoms, reflection,

and brooding), the factors of the WBSI (unwanted intrusive thoughts, and

avoidance of unwanted thoughts), positive self-evaluation, and intraindividual

reaction time variability, individually and in combination with one another would

predict current depression scores in females. It was further hypothesised that the

influence of the cognitive constructs of interest on depression may be mediated by

all or some of the factors derived from the RRS. Given the possibility that these constructs represent cognitive risk factors for depression, it was expected that between-group comparisons based on previous diagnosis of depression would demonstrate significant differences between the groups on each of the variables of interest. However, it was also considered plausible that the variables may represent symptoms associated with depression rather than cognitive risk factors, and that possibility was also investigated.

5.2 Method

5.2.1 Participants

The participants involved in this study were the 449 female participants who participated in study 2. Those participants ranged in age from 17 to 77 ($M = 29.17$; $SD = 12.55$). The demographic details of those participants are described in Table 4.1 on page 85.

5.2.2 Design

This study utilised a mixed cross-sectional design. Firstly, the factor structures of the Ruminative Responses Scale (RRS) and White Bear Suppression Inventory (WBSI) were evaluated via confirmatory factor analyses. The relationship between cognitive patterns and depression was then explored via multiple regression analysis with factors derived from RRS and WBSI, positive self-evaluation and reaction time variability as predictor variables and depression as the outcome variable. Mediational relationships were explored via the development of a structural equation model.

In addition, between groups differences were examined with previous depression diagnosis and current depressive symptoms as between subjects independent variables and each of the cognitive variables as dependent variables.

5.2.3 Materials

In this study, participants completed an online version of a demographic questionnaire, RRS, WBSI, SRIP, and EDS, each of which have been described in detail in Study 1 (chapter 3). In that study, strong support was found for the equivalence of the online version of RRS, WBSI and EDS, and mixed support was found for the appropriateness of utilising the various components of SRIP in the online environment. However, SRIP1 PDR was found to be equivalent and thus suitable for inclusion in further analyses. As such, SRIP1 PDR was the only SRIP variable to be included in this study. That variable will be referred to as "positive self-evaluation" for ease of interpretation. In addition to those measures, participants completed a dot probe task. The online comparability of that task was not determined as the online format is identical to that of a traditional testing format for that task.

5.2.3.1 Dot probe task (DPT). The version of DPT adopted in this study was based on instructions provided by Beevers and Carver (2003). In this task, pairs of stimuli (usually words) appear simultaneously, three centimetres apart, on a computer screen for 750 milliseconds. The stimuli then disappear and, after a brief pause of 200 milliseconds, one of the stimuli is replaced by a dot. Participants must identify the location of the dot as quickly as possible by pressing a designated key or clicking a nominated box with a mouse. Three types of trials were utilised. In the first instance, participants responded to eight trials where the stimuli were groups of between three and eight repetitions of the letter

"x" (i.e. "xxx", "xxxxxxxx"). An additional eight trials utilised pairs of neutral

words which were matched for length and frequency, using the Affective Norms

for English Words (ANEW) (Bradley & Lang, 1999). Following the neutral trials,

32 pairs of valenced words were used. In each pair, one word was positively

valenced and one word was negatively valenced. The valenced pairs were

matched for valence (positive/negative), frequency and length, using ANEW

(Bradley & Lang, 1999). Valence scores ranged between 1 and 9, with 1

representing highly negative and 9 representing highly positive. The negative

words all had valence scores between 1 and 3, and the positive words had valence

scores between 7 and 9. In order to ensure equivalent strength of valence between

the positive and negative words for each trial, the difference between the

maximum valence score (i.e., 1 for negative and 9 for positive) and the actual

valence score for the selected stimuli was calculated. A between groups t-test was

then conducted to assess whether there were any significant differences between

the groups in the amount of variation from the maximum valence score. That

between groups t-test was not significant $t(62) = 1.15$, $p = .25$, $d = .29$, and the

positive and negative words were deemed to be of comparable valence strength.

To ensure equivalence of frequency scores, a between groups t-test was

conducted. That between groups t-test was not significant $t(62) = .03$, $p = .98$, $d =$

.01, and the two groups of words were considered equivalent in frequency. The

complete list of stimuli utilised in the DPT, along with each word's valence and

frequency rating, are contained in Appendix O.

5.2.4 Procedure

As outlined in study 2, all participants completed testing online, at a

location and time of their choosing. Upon accessing the test website, participants

read an information letter and indicated their informed consent, prior to

proceeding to the test battery. All participants completed the RRS, WBSI, SRIP,

DPT and EDS in the same order.

5.3 Results

5.3.1 Scoring

The scoring procedures for RRS, WBSI, SRIP1 PDR and EDS have

previously been described in Chapter 3, and the scoring procedures for SRIP1

PDR ("positive self-evaluation") and EDS ("depression") provided in Chapter 3

are accurate for the current study. However, in this study, factor scores from the

individual factors within RRS and WBSI identified in Chapter 4 were utilised,

rather than the total scores for those measures.

DiStefano, Zhu and Mindrila (2009) identified a number of possible

approaches to the calculation and utilisation of factor scores. Those approaches

included a number of summation techniques (including summing raw scores on

each factor, summing raw scores of items with loadings above an arbitrarily

defined cut-off on each factor, summing standardised scores and weighting scores

before summing them). The summation techniques are considered non-refined

methods for the calculation of factor scores. Alternative refined methods, such as

the use of regression coefficients from factors, Bartlett's scores and Anderson-

Rubin scores, were also identified by DiStefano et al. (2009).

In the current study, a non-refined method (summing raw scores) and a

refined method (regression coefficients) were utilised to create factor scores on

each of the factors derived from the RRS and WBSI. A consideration of the

models developed with each of those types of factor scores indicated that the

model developed via the summation technique was more easily interpreted than the model developed via the regression coefficient factor scores. This was due to the fact that some of the factor scores obtained via the regression coefficient method had negative values, which created confusion when interpreting relationships among the variables. In addition, it was identified that the use of summed scores, although lacking the refinement of regression coefficients, in particular the consideration of the loadings of each individual item on all factors, was more amenable to replication (DiStefano, Zhu, & Mindrila, 2009). As such, to aid with ease of interpretation and replicability of the models developed in this study, the models reported contain the factor scores created via summation of the raw scores of items loading on each factor.

5.3.1.1 RRS. Factor analyses conducted in study 2 identified three factors of RRS for females. Those factors were labelled depression symptoms, reflection and brooding, respectively. In this study, factor scores derived from each of those factors will be utilised. However, prior to the utilisation of those factor scores, a Confirmatory Factor Analysis (CFA) was conducted to verify the factor structure identified for the female sample. The goodness-of-fit indices for that CFA are displayed in Table 5.1.

Table 5.1

Goodness-of-fit indices for CFA utilising RRS factors for females (N = 449)

χ^2	*df*	χ^2/df	CFI	RMSEA
435.28[***]	132	3.3	.92	.07

Note: ***p< .001; CFI – Comparative Fit Index; RMSEA – Root Mean Square Error of Approximation

When evaluating the goodness-of-fit for a CFA model, it is typical to consider the significance of the chi-square test (χ^2), with a good-fitting model having a non-significant χ^2 (Hair, Black, Babin, Anderson, & Tatham, 2006). However, Barrett (2007) identified the χ^2 test is likely to be overly sensitive in samples where $N >$ 200. As such, the χ^2 statistic is not strictly interpreted in large samples. The general criterion for the χ^2/df test for goodness-of-fit is <2 indicate a good fit (Tabachnick & Fidell, 2001). However, given the relationship between the χ^2 test and sample size, that statistic should not be strictly interpreted in this instance. For the Comparative Fit Index (CFI), values closer to 1 indicate a better fit and values >.90 are considered to indicate acceptable fit (Hair, et al., 2006). Unlike the χ^2 test of goodness-of-fit, the Root Mean Square Error of Approximation (RMSEA) is not influenced by sample size. Schreiber, et al. (2006) recommended RMSEA values <.08 and Hair et al., (2006) recommended RMSEA values <.10 for well-fitting models. As such, although the χ^2 tests of goodness-of-fit for this model did not meet the relevant guidelines, the large sample size in this study may account for those findings. Conversely, the CFI and RMSEA values for this model indicated a good fit, which provided support for the appropriateness of the fit of this model. The model is displayed in Figure 5.1. An examination of that CFA identified moderate, significant correlations between reflection and brooding, $r = .62$, $p <.001$, and reflection and depression symptoms, $r = .57$, $p <.001$, along with a strong, significant correlation between brooding and depression symptoms, $r = .83$, $p <.001$. That pattern of correlations provided support for the convergent validity of the factor structure, as brooding and depression symptoms represent conceptually similar constructs, whilst reflection is considered distinct from those constructs. In addition, the standardised coefficients for each of the items indicated all items were loading on the

appropriate latent factors. One item loading on the reflection factor (#12 "Write down what you are thinking and analyse it") had a noticeably weaker loading (β = .47) than its counterparts on that factor (i.e., #11 "Go away by yourself and think about why you feel this way" β = .91; and #21 "Go someplace alone to think about your feelings" β = .76) and consideration was given to removing that item. However, such a removal would have resulted in a factor comprised of only two items, which was likely to be unstable (Costello & Osborne, 2005). As such, that item was retained in the model. Table 5.2 summarises the standardised and unstandardised coefficients for each of the items.

Figure 5.1. CFA utilising factors derived from RRS in female sample.

Table 5.2

Standardised (β) and Unstandardised (B) Coefficients for CFA with RRS Factors from Female Sample

Observed variable	Latent construct	β	B	S.E.
RRS 1	Brooding	.59	0.79	.07
RRS 5	Brooding	.66	0.96	.07
RRS 10	Brooding	.71	1.04	.08
RRS 13	Brooding	.62	0.85	.07
RRS 15	Brooding	.68	1.03	.08
RRS 16	Brooding	.80	1.22	.08
RRS 18	Brooding	.77	1.20	.08
RRS 22	Brooding	.70	1.00	
RRS 3	Dep symp	.55	0.67	.06
RRS 4	Dep symp	.64	0.82	.06
RRS 6	Dep symp	.72	0.97	.06
RRS 8	Dep symp	.71	1.03	.07
RRS 9	Dep symp	.73	0.95	.06
RRS 14	Dep symp	.78	1.06	.06
RRS 19	Dep symp	.75	1.00	
RRS 11	Reflection	.91	1.00	
RRS 12	Reflection	.47	.49	.05
RRS 21	Reflection	.76	.83	.06

An additional consideration of the model was conducted by evaluating the

internal consistency of each of the factors, by calculating their Cronbach's α

estimate. The examination of internal consistency is a means of assessing both the

reliability and the convergent validity of the model. The Cronbach's α estimates

of internal consistency for each of the factors are contained in Table 5.3.

Table 5.3

Cronbach's α for Depression Symptoms, Brooding and Reflection

RRS factor	Cronbach's α
Depression symptoms	.87
Brooding	.88
Reflection	.76

The internal consistency of the depression symptoms and brooding factors were

within the "very good" category and the reflection factor was within the

"respectable" category, as described by DeVellis (1991). The lower reliability

estimate of the reflection score was unsurprising, given the low number of items

(i.e., 3) loading on that factor.

The evaluation of the factor structure of the RRS for the female sample

indicated that factor structure represented a well-fitting model, with appropriate

item loadings for each of the factors. In addition, the internal consistency of each

of those factors, as estimated via Cronbach's α suggested each of those factors

represented a coherent and internally consistent factor. As such, the factor scores

derived from that exploratory factor analysis were deemed appropriate for

inclusion in further analyses.

5.3.1.2 WBSI. Factor analyses conducted in study 2 identified two factors from the WBSI for females. Those factors were labelled unwanted intrusive thoughts (UIT) and avoidance of unwanted thoughts (AUT). Similar to the factor scores derived from the RRS, factor scores derived from each of the WBSI factors will be included in this study. Consistent with the analysis applied to the RRS factors, a CFA was also conducted for the WBSI, to assess the appropriateness of the factor structure obtained for the female sample from that measure. The goodness-of-fit indices for the CFA conducted on the WBSI factor structure are displayed in Table 5.4.

Table 5.4

Goodness-of-Fit Indices for CFA Utilising WBSI Factors for Females (N = 449)

χ^2	df	χ^2/df	CFI	RMSEA
276.8[***]	64	4.33	.93	.09

Note: ***p< .001; CFI – Comparative Fit Index; RMSEA – Root Mean Square Error of Approximation

Similar to the goodness-of-fit indices for the RRS, the χ^2 indices for the WBSI did not provide support for a well-fitting model. Again, the sample size was likely to have contributed to these unfavourable findings. However, the CFI and RMSEA were both within acceptable limits, which suggested the model was an appropriate fit for this data. The CFA is depicted in Figure 5.2 below.

Figure 5.2. CFA utilising factors derived from WBSI in female sample.

An examination of the CFA conducted on the WBSI factor structure identified a

strong, significant correlation between the factors, $r = .80$, $p < .001$. The

standardised coefficients for each of the items indicated all items were loading on

the appropriate latent factors. Table 5.5 summarises the standardised and

unstandardised coefficients for each of the items.

Table 5.5

Standardised (β) and Unstandardised (B) Coefficients for CFA with WBSI Factors from Female Sample

Observed variable	Latent construct	β	B	S.E.
WBSI 1	AUT	.53	1.00	
WBSI 8	AUT	.54	1.12	.13
WBSI 10	AUT	.73	1.69	.16
WBSI 11	AUT	.75	1.51	.14
WBSI 13	AUT	.78	1.76	.16
WBSI 14	AUT	.83	1.82	.16
WBSI 2	UIT	.65	1.00	
WBSI 3	UIT	.83	1.41	.10
WBSI 4	UIT	.74	1.29	.10
WBSI 5	UIT	.70	1.07	.08
WBSI 7	UIT	.62	1.08	.09
WBSI 9	UIT	.79	1.22	.09
WBSI 15	UIT	.65	1.14	.10

In order to assess the internal consistency and convergent validity of the factors, Cronbach's α was calculated for each of the factors. Table 5.6 displays the

Cronbach's α estimates of internal consistency for both of the factors from the

WBSI.

Table 5.6

Cronbach's α for Unwanted Intrusive Thoughts (UIT) and Avoidance of Unwanted Thoughts (AUT)

WBSI factor	Cronbach's α
UIT	.87
AUT	.85

The internal consistency for both of the WBSI factors came within the "very

good" category, as described by DeVellis (1991).

Consistent with the observations of the factor structure of the RRS, the

evaluation of the factor structure of the WBSI for the female sample indicated that

factor structure represented a well-fitting model, with appropriate item loadings

for each of the factors. The factor scores derived from the earlier exploratory

factor analysis were deemed confirmed and appropriate for inclusion in further

analyses.

5.3.1.3 Dot probe task. Participants' reaction times for each trial were

recorded for the eight neutral trials and 32 valenced trials. A within groups *t*-test

comparing mean reaction times on positively valenced trials with mean reaction

times on negatively valenced trials indicated there were no significant differences

in reaction time as a function of the valence of the trials, $t(448) = .64$, $p = .52$, $r = .01$. As such, a comparison of reaction times on the basis of valence was not

appropriate with this data.

Alternatively, consistent with the conceptualisation of intra-individual reaction time variability as a representation of "mental noise" or executive functioning deficit as described by Ode, Robinson, and Hanson (2011), a reaction time coefficient of variation (RTCV) was calculated for each individual. That calculation was described by Ode et al. (2011), and involved log transformation of raw millisecond reaction times and the substitution of extreme scores with a criterion score. The criterion score was calculated by identifying the grand mean reaction time across trials and adding 2.5 standard deviations to that score. The standard deviation of each individual's reaction time across trials was then divided by their mean reaction time, to give each individual's RTCV.

5.3.2 Data Screening

Prior to analysis, data screening was conducted to assess for accuracy of data input, missing values and breaches of univariate and multivariate assumptions. No data entry errors or out-of-range values were detected. In addition, all variables were found to have plausible means and standard deviations. Data screening for the entire RRS and WBSI scales and for EDS are described in study 2 and are not discussed in this study. Although the RRS and WBSI scales were previously screened, DiStefano, Zhu and Mindrila (2009) recommended factor scores be treated as new variables and subjected to screening procedures prior to inclusion in further analyses. As such, the variables screened in this study were as follows: positive self-evaluation, reaction time variability, RRS depression symptoms (depression symptoms), RRS reflection (reflection), RRS brooding (brooding), WBSI unwanted intrusive thoughts (UIT), and WBSI avoidance of unwanted thoughts (AUT).

5.3.2.1 Missing values. Missing values analysis identified 60 participants (13.4%) did not provide data for positive self-evaluation and one participant did not complete DPT. Given the extremely small percentage of missing data for the DPT, mean substitution was utilised to correct that missing data. An examination of the pattern of missing values of positive self-evaluation indicated the data appeared to be missing at random. Little's MCAR test was not significant, $\chi^2(34)$ = 11.85, p = 1.0, which further supported the randomness of the missing data. As the data were missing randomly, the expectation maximization procedure was utilised to impute the missing values (Tabachnick & Fidell, 2001).

5.3.2.2 Univariate outliers. Boxplots for each of the variables were examined to identify possible outliers. Those boxplots indicated possible outliers on positive self-evaluation, RTCV, depression symptoms, reflection, and avoidance of unwanted thoughts. True outliers were deemed to be those which differed from the mean by more than three standard deviations (Tabachnick & Fidell, 2001) and scores meeting that criterion were identified for positive self-evaluation (low) and RTCV (high). The possible outliers identified from the boxplots of depression symptoms, reflection and avoidance of unwanted thoughts were not significant outliers.

5.3.2.3 Normality. The distributions of each of the variables were considered to assess for breaches of the assumptions of normality. An inspection of the variables' histograms suggested depression symptoms and each of the WBSI factors were approximately normal; positive self-evaluation, reflection and brooding were negatively skewed and leptokurtic; and RTCV was positively skewed and leptokurtic.

The Kolmogorov-Smirnov test of normality was assessed for each of the variables, and found to be significant in each instance. Z-scores of the skew and kurtosis of each of the variables were calculated by dividing their statistic by their standard error. The criterion of $p<.001$ was adopted to assess for significance of skew and kurtosis and it was identified that positive self-evaluation was significantly negatively skewed, RTCV was extremely positively skewed and leptokurtic, and reflection, brooding, and depression symptoms were each significantly positively skewed, whereas unwanted intrusive thoughts and avoidance of unwanted thoughts were significantly negatively skewed.

5.3.2.4 Transformations to correct univariate assumptions. The data screening procedures for assessing breaches of the univariate assumptions with the female sample identified significant outliers for positive self-evaluation and RTCV. In addition, positive self-evaluation, RTCV, and each of the factors from RRS and WBSI were significantly skewed. As such, transformations of those variables were required.

5.3.2.4.1 Positive self-evaluation. A square transformation was performed on positive self-evaluation in an attempt to correct the significant low end outlier and negative skew identified for that variable. That transformation successfully reduced the significance of the outlier and negative skew to non-significant levels, and that square transformed variable was retained for further analyses.

5.3.2.4.2 RTCV. As identified in the previous scoring section, the DPT scores were log transformed and a criterion score of $M + 2.5SD$ was substituted for extreme outliers. In the current study, the grand latency mean (log transformed) was 6.80 and the standard deviation was .31, giving a criterion value of $(.31 \times 2.5) + 6.80) = 7.58$. Upon substitution of that criterion value for all

extreme scores, the mean reaction time and standard deviation of reaction times were calculated for each participant. Reaction time coefficient of variation (RTCV) was then calculated by dividing the standard deviation of reaction time by the mean reaction time, in accordance with the procedure described by Ode, Robinson, & Hanson (2011). Despite the log transformation and substitution of extreme values, that variable remained significantly positively skewed and kurtotic, and contained extreme outliers. However, as reaction time tasks are noted for their positive skew (Ode, Robinson, & Hanson, 2011), this was deemed to be consistent with previous studies, and no further transformation was performed on that variable.

5.3.2.4.3 RRS. Each of the factor scores derived from RRS were significantly positively skewed. The square root of each of the factor scores was taken in an attempt to correct their skew. Those transformations corrected each of the outliers and reduced skew to non-significant levels, and the transformed variables were retained for further analyses.

5.3.2.4.4 WBSI. Unwanted intrusive thoughts and avoidance of unwanted thoughts were significantly negatively skewed. With a square transformation, the negative skew of those variables was reduced to non-significant levels, and the transformed variables were included in additional analyses.

5.3.2.5 Multivariate outliers. A multiple regression analysis was conducted with each of the variables entered as independent variables, and a dummy variable (case id.) as the dependent variable. No influential cases were identified. However, three participants had Mahalanbois distance scores greater than the criterion score of χ^2 at $p<.001$ with 8 degrees of freedom = 26.13. Those cases were deleted. The final sample thus consisted of 446 participants.

5.3.2.6 Multicollinearity. An examination of bivariate correlations between each of the variables indicated an absence of multicollinearity and singularity. No bivariate correlation was .90 or above, tolerance scores ranged between .26 and .98, and variation inflation factors (VIF) ranged from 1.02 to 3.88. As such, these data were considered suitable for multiple regression and structural equation modelling analyses.

5.3.3 Inferential statistics

5.3.3.1 Correlations. Bivariate correlations were calculated for each of the variables. Those correlations are displayed in Table 5.7.

Table 5.7

Bivariate Correlations between Variables of Interest

	1	2	3	4	5	6	7
1. Pos SE							
2. RTCV	-.06						
3. Dep. symp	-.49**	.06					
4. Reflection	-.14**	-.04	.45**				
5. Brooding	-.44**	.07	.73**	.51**			
6. UIT	-.39**	.04	.54**	.28**	.61**		
7. AUT	-.38**	.09	.47**	.24**	.57**	.70**	
8. Depression	-.53**	.13**	.66**	.33**	.69**	.59**	.50**

**p<.001; *Note:*Pos SE = positive self-evaluation; RTCV = dot probe task reaction time coefficient of variation; Dep.symp = depression symptoms; UIT = unwanted intrusive thoughts; AUT = avoidance of unwanted thoughts.

As displayed in Table 5.7, depression was significantly correlated with each of the independent variables, which supported the inclusion of each of those variables in further analyses. Correlations among the independent variables were highly significant, with the exception of RTCV. That variable was not significantly correlated with any of the other independent variables. As previously identified in the CFA of the RRS, reflection was moderately correlated with both depression symptoms and brooding, whereas those two variables were strongly correlated with one another. Brooding shared the strongest correlation with depression, followed by depression symptoms. Of the WBSI factors, unwanted intrusive thoughts emerged with the strongest correlation with depression.

5.3.3.2 Regression analyses. A multiple regression analysis was performed with depression symptoms, reflection, brooding, unwanted intrusive thoughts, avoidance of unwanted thoughts, positive self-evaluation and RTCV as the independent variables and depression as the dependent variable. That model was found to account for 60% of variance in depression scores, $R^2 = .60$, $F(7,438) = 92.22$, $p < .001$, with depression symptoms, brooding, unwanted intrusive thoughts, positive self-evaluation and RTCV making significant contributions to the model. The results of the multiple regression analysis are detailed in Table 5.8.

Table 5.8

Results of Standard Multiple Regression Analysis to Predict Current Depression
Score of Females from other Variables of Interest

	R^2	ΔR^2	B	SE B	B	t	p
	.60[**]	.59[**]					
Dep. Symp			2.22	.49	.22	4.58	.000
Reflection			-.26	.49	-.02	-.52	.60
Brooding			3.13	.49	.33	6.41	.000
UIT			.004	.001	.19	4.17	.000
AUT			2.985E-5	.001	.001	.02	.98
Pos SE			-3.98	.71	-.20	-5.60	.000
RTCV			36.95	15.63	.07	2.36	.02

Note: Dep.symp = depression symptoms; UIT = Unwanted intrusive thoughts; AUT = Avoidance
of unwanted thoughts; Pos SE = positive self-evaluation; RTCV = Dot probe task reaction time
coefficient of variation;

The finding that reflection and avoidance of unwanted thoughts did not

significantly contribute to the predictive model was not in accordance with

expectations, particularly in light of the significant correlations between those

variables and depression. To further explore that finding, and to investigate the

possibility of mediation effects, a hierarchical multiple regression was conducted,

with reflection and avoidance of unwanted thoughts entered in the first step, and

the remaining variables entered in the second step. The results of that hierarchical

multiple regression are displayed in Table 5.9.

Table 5.9

Results of Hierarchical Multiple Regression Analysis to Predict Current
Depression Score of Females from other Variables of Interest

	R^2	ΔR^2	B	SE B	B	t	p
Step 1	.30**	.30**					
AUT			.02	.001	.45	11.05	.000
Reflection			2.96	.55	.22	5.35	.000
Step 2	.60**	.59**					
Dep. Symp			2.22	.49	.22	4.58	.000
Reflection			-.26	.49	-.02	-.52	.60
Brooding			3.13	.49	.33	6.41	.000
UIT			.004	.001	.19	4.17	.000
AUT			2.985E-5	.001	.001	.02	.98
Pos SE			-3.98	.71	-.20	-5.60	.000
RTCV			36.95	15.63	.07	2.36	.02

Note: Dep.symp = depression symptoms; UIT = Unwanted intrusive thoughts; AUT = Avoidance of unwanted thoughts; Pos SE = positive self-evaluation; DPT RTCV = Dot probe task reaction time coefficient of variation;

As evidenced in Table 5.10, avoidance of unwanted thoughts and reflection were both significant contributors to the prediction model of participants' current depression scores when they were entered in Step 1. That model accounted for 30% of variance in depression scores. When the additional variables were included in that model in Step 2, avoidance of unwanted thoughts and reflection were no longer significant contributors to the model. These findings indicated the possibility that the predictive utility of avoidance of unwanted thoughts and reflection for depression were being mediated by some, or all, of the other variables. As such, it was determined that the development of a structural equation model (SEM) would be an appropriate analysis to test for multiple mediation effects.

5.3.3.3 Development of SEM. When developing the SEM, it was identified that depression symptoms and brooding were both highly significant

predictors of depression, and shared an underlying characteristic relating to maladaptive tendencies toward rumination. In addition, the CFA conducted to assess the factor structure identified a strong, significant correlation, $r = .80$, $p <.001$, between those factors. This was in contrast with the other RRS factor, namely, reflection, which may be considered to represent a more adaptive ruminative process, and which was moderately correlated with each of those factors (depression symptoms $r = .57$, $p <.001$; brooding $r = .62$, $p <.001$). As such, depression symptoms and brooding were combined to create a latent variable of "maladaptive rumination" in the SEM. It was also noted that RTCV was not significantly correlated with any of the variables other than depression, and had a very low beta weight (.07) in the regression equation. A preliminary SEM demonstrated that the pathways between RTCV and the other variables were not significant and, as such, that variable did not appear to be contributing substantially to the prediction of depression in combination with the other variables. Given these findings, RTCV was excluded from the SEM.

Therefore, in order to explore the multiple possible mediation effects, a SEM was developed with avoidance of unwanted thoughts and reflection as independent variables (IVs), maladaptive rumination, unwanted intrusive thoughts and positive self-evaluation as possible mediating variables (MVs), and depression as the DV. That SEM is displayed in Figure 5.3.

Figure 5.3. Structural equation model to predict depression.

5.3.3.4 Goodness-of-fit of SEM. To evaluate the goodness of fit of this

model, the chi square test (χ^2) was conducted. That assessment of the model

identified a significant chi square, $\chi^2(6) = 14.78$, $p = .01$. By convention, a non-

significant chi square is preferred for SEM (Hair, Black, Babin, Anderson, &

Tatham, 2006). However, as previously identified, Barrett (2007) argued the χ^2

test for goodness of fit is likely to be overly sensitive in large samples, and

recommended it not be strictly interpreted in samples where $N > 200$. An

additional measure of the goodness of fit was obtained by calculating $\chi^2/df = 2.96$.

A general rule of thumb is that $\chi^2/df <2$ is preferred, however, in keeping with

Barrett's (2007) observations regarding the sensitivity of the χ^2 tests for goodness

of fit in a large sample, that statistic was not deemed problematic in this instance.

Additional indices of goodness of fit, namely the Comparative Fit Index (CFI)

and Normed Fit Index (NFI) were also obtained. Hu and Bentler (1999)

recommended .95 as a cutoff for a good fitting model. For this model, the CFI =

.994 and NFI = .990. As each of those indices surpassed the .95 criterion

recommended by Hu and Bentler, this model was deemed to have an appropriate

fit to the data. The RMSEA for this model was .05, which provided additional

support for the goodness-of-fit, independent of sample size.

5.3.3.5 Description of SEM. Having established the appropriateness of

the model's fit, examinations of the variance explained, along with the direct

pathways, and direct and indirect effects within the model, were conducted.

5.3.3.5.1 Variance explained. As can be identified in the SEM displayed

in Figure 5.3, this model explained 65% of variance in depression scores. In

addition, a substantial amount of variance in each of the mediating variables was

explained by the model, as set out in Table 5.10.

Table 5.10

Variance Explained in Mediators in SEM

MV	% variance explained
Brooding	78
Depression symptoms	68
Maladaptive rumination (latent)	60
Unwanted Intrusive Thoughts	50
Positive self-evaluation	37

Of the mediating variables, brooding had the most variance explained by the model, and positive self-evaluation was the least well explained by this model.

5.3.4.5.2 Direct pathways. A summary of the direct pathways within the model is depicted in Table 5.11. As displayed in Table 5.11, each of the direct pathways between the IVs (reflection and avoidance of unwanted thoughts) and the MVs (maladaptive rumination, unwanted intrusive thoughts and positive self-evaluation) were significant. Both of the direct pathways between the endogenous variables which had been combined to be represented by the latent variable (brooding and depression symptoms) and the latent variable (maladaptive rumination) were significant. In addition, the direct pathways between two of the MVs (maladaptive rumination and positive self-evaluation) and the DV (depression) were significant. The direct pathway from reflection to depression was also significant. However, the direct pathways from the unwanted intrusive thoughts and avoidance of unwanted thoughts to the DV (Depression) were not significant.

Table 5.11

Summary of Direct Pathways within SEM

Pathway	Estimate	S.E.	C.R.	*P*
AUT → UIT	.82	.04	19.35	<.001
Reflection → UIT	.32	.09	3.49	<.001
Reflection → Maladaptive rumination	.66	.07	9.74	<.001
UIT → Maladaptive rumination	.25	.03	7.55	<.001
AUT → Maladaptive rumination	.17	.04	4.38	<.001
Maladaptive rumination → pos SE	-.05	.005	-8.91	<.001
Reflection → Pos SE	.03	.01	4.77	<.001
Maladaptive rumination → Brooding	1.23	.06	21.73	<.001
Maladaptive rumination → Depression	1.12	.13	8.98	<.001
Reflection → Depression	-.31	.12	-2.56	.01
UIT → Depression	.08	.05	1.48	.14
AUT → Depression	-.006	.06	-.10	.92
Pos SE → Depression	-4.03	1.07	-3.78	<.001

Note: AUT = avoidance of unwanted thoughts; UIT = unwanted intrusive thoughts; Pos SE = positive self-evaluation.

5.3.3.5.3 Summary of standardised direct and indirect effects. The

standardised direct and indirect effects were considered for each of the variables

within the model. A summary of those effects is contained in Table 5.12.

Table 5.12

Summary of Standardised Direct and Indirect Effects within SEM

	AUT		Reflection		UIT		Maladaptive rumination		Pos SE	
	Dir	Ind	Dir	Ind	Dir	Ind	Dir	Ind	Dir	Ind
UIT	.67		.12							
Mal.rum	.22	.26	.38	.05	.39					
Pos SE	-.05	-.32	.26	-.29		-.26	-.67			
Dep	-.004	.45	-.11	.31	.07	.32	.70	.11	-.17	
Dep.sym		.40		.35		.32	.83			
Brood		.43		.38		.34	.89			

Note: AUT = avoidance of unwanted thoughts; UIT = unwanted intrusive thoughts; Mal.rum = Maladaptive rumination; Dep.sym = Depression symptoms; Pos SE = positive self evaluation; Brood = brooding.

As can be seen in Table 5.12 above, the pathways between the IVs (reflection and avoidance of unwanted thoughts) and the DV (depression) have very small regression coefficients. As identified in Table 5.12 above, the direct pathway from reflection to depression was significant; however the pathway from avoidance of unwanted thoughts to depression was not. However, the regression coefficients for the indirect pathways between the IVs and the DV were .31 (reflection) and .45 (avoidance of unwanted thoughts). The increase in regression coefficients via the indirect pathways indicates mediation is occurring for those variables. A similar pattern of mediation also emerged for unwanted intrusive thoughts, whereby its direct pathway to depression was not significant and had a very small regression coefficient of .07, whereas its indirect pathway was .32. In contrast, the direct pathway from maladaptive rumination to depression was .70, compared to its smaller indirect regression coefficient of .11.

5.3.3.6 Between-group comparisons on basis of diagnosis. The

examination of the interrelationships between the variables of interest in this

study via multiple regression and structural equation modelling identified several

interesting findings pertaining to the ability of those variables to predict

depression individually and in combination with one another. It was considered

beneficial to further explore those relationships by testing for differences on the

variables of interest between, firstly, participants who had previously been

diagnosed with depression and those who had not received that diagnosis; and

secondly, between participants whose current depression scores indicated that

they were not depressed and participants whose current depression scores

indicated they were possibly currently depressed. The results of those t-tests are

contained in Table 5.13 and 5.14 respectively.

Table 5.13

Comparisons Between Those With (N = 133) and Without (N = 313) a Previous Diagnosis of Depression

	No previous diagnosis M(SD)	Previous diagnosis M(SD)	t-test
PosSE	.62(.30)	.51(.32)	$t(444) = 3.46, p < .001, r = .17$
RTCV	.03(.01)	.03(.01)	$t(444) = .43, p = .67, r = 0$
Dep.symp	3.69(.61)	3.87(.54)	$t(280.92) = 3.30, p = .001, r = -.15$
Reflection	2.31(.44)	2.42(.45)	$t(444) = 2.30, p = .02, r = -.12$
Brooding	3.94(.65)	4.16(.60)	$t(444) = 3.24, p < .001, r = -.17$
UIT	543.99(256.87)	625.02(253.92)	$t(444) = 3.06, p < .01, r = -.16$
AUT	407.50(184.36)	452.53(180.35)	$t(444) = 2.38, p = .02, r = -.12$
Depression	9.13(5.86)	10.92(6.39)	$t(444) = 2.86, p < .01, d = -.14$

Note: PosSE = positive self-evaluation; RTCV = Dot probe task reaction time coefficient of variation; Dep.symp = depression symptoms; UIT = unwanted intrusive thoughts; AUT = avoidance of unwanted thoughts

As identified in Table 5.13 above, there were significant differences between those who had previously been diagnosed with depression and those who had not received a depression diagnosis on each of the variables, with the exception of RTCV.

Between groups *t*-tests were also conducted to compare participants whose current scores indicated an absence of depressive symptoms (EDS scores of less than or equal to 9) ("not depressed") and those participants who scored in the "possibly depressed" range of 10 and above. The means and standard deviations of each of those groups, and the results of each of those *t*-tests are reported in Table 5.14.

Table 5.14

Comparisons Between Not Depressed (N = 235) and Possibly Depressed (N = 211) Groups

	Not currently depressed *M*(SD)	Possibly depressed *M*(SD)	*t*-test
PosSE	.74(.26)	.43(.28)	$t(444) = 11.98, p <.001, r = .49$
RTCV	.027(.01)	.030(.01)	$t(444) = -2.55, p = .01, r = -.15$
Dep.symp	3.43(.49)	4.10(.51)	$t(444) = -14.09, p <.001, r = -.56$
Reflection	2.21(.42)	2.49(.43)	$t(444) = -6.87, p <.001, r = -.31$
Brooding	3.64(.51)	4.41(.53)	$t(444) = -15.54, p <.001, r = -.59$
UIT	446.49(231.68)	703.64(215.99)	$t(444) = -12.08, p <.001, r = -.50$
AUT	353.06(173.32)	496.51(165.76)	$t(444) = -8.91, p <.001, r = -.39$
EDS	4.96(2.82)	14.90(4.12)	$t(365.91) = -29.38, p <.001, r = -.82$

Note: PosSE = positive self-evaluation; RTCV = Dot probe task reaction time coefficient of variation; Dep.symp = depression symptoms; UIT = unwanted intrusive thoughts; AUT = avoidance of unwanted thoughts

As displayed in Table 5.14 above, significant differences were found between those who were deemed to be currently "not depressed" and those who were identified as "possibly depressed" on each of the variables. It was of interest to note that the effect sizes for the differences between the currently "not depressed" and "possibly depressed" were larger than the effect sizes for the differences between the group who had previously been diagnosed and the group who had not been diagnosed.

In order to explore whether the group differences based on previous diagnosis remained significant when current symptoms were controlled for, an analysis of covariance (ANCOVA) was conducted with previous diagnosis (yes/no) as the independent variable, current symptoms (not depressed/possibly depressed) as the covariate, and positive self-evaluation, RTCV, depression symptoms, reflection, brooding, unwanted intrusive thoughts, avoidance of unwanted thoughts and depression as the dependent variables. Table 5.15 summarises the results of that ANCOVA. As set out in Table 5.15, the covariate, current levels of depression, was significantly related to each of the independent variables. When that relationship was controlled for, significant differences based on previous diagnosis remained for positive self-evaluation, depression symptoms, brooding and unwanted intrusive thoughts. Those differences were no longer significant for reflection and avoidance of unwanted thoughts. As identified in the between groups *t*-test, no significant differences between the groups existed for RTCV.

Table 5.15

Results of ANCOVA Assessing Differences Based on Previous Diagnosis and Controlling for Current Symptoms

	Df	F	*p*	η^2	Observed power
Current depression (CV)					
PosSE	1	136.09	.000	.24	>.995
RTCV	1	6.85	.009	.02	.743
Dep. symp	1	190.66	.000	.30	>.995
Reflection	1	44.16	.000	.09	>.995
Brooding	1	232.27	.000	.34	>.995
UIT	1	139.15	.000	.24	>.995
AUT	1	75.32	.000	.15	>.995
Previous diagnosis (IV)					
PosSE	1	6.46	.01	.01	.72
RTCV	1	.55	.46	.001	.12
Dep. symp	1	3.78	.05	.008	.49
Reflection	1	2.57	.11	.006	.36
Brooding	1	4.68	.03	.01	.58
UIT	1	4.32	.04	.01	.55
AUT	1	2.31	.13	.01	.33

Note: DPT RTCV = Dot probe task reaction time coefficient of variation; Dep.symp = depression symptoms; UIT = Unwanted intrusive thoughts; AUT = Avoidance of unwanted thoughts

5.4 Discussion

5.4.1 Summary of findings

5.4.1.1 Validating factors via CFA. In this study, the factors derived from the RRS and the WBSI in Study 2 were examined via confirmatory factor analyses. The purpose of those analyses was to validate the identified factors in order to justify the use of factor scores derived from those factors in additional analyses, specifically for the prediction of depression and the investigation of the interrelationships between rumination, thought suppression, positive self-evaluation and reaction time variability.

5.4.1.1.1 RRS. The CFA for the RRS provided support for the three-factor structure of that measure, consisting of depression symptoms, reflection and brooding. In addition, an examination of the internal consistency of each of those factors indicated they were coherent factors. One of the items loading on the reflection factor, namely, Item 12 "Write down what you are thinking about and analyse it" was identified as having a weaker loading than its counterparts on that factor. That item was also identified as problematic by Whitmer and Gotlib (2011), due to its small initial communality and failure to load on any factors in that study. Those authors recommended that item be replaced with an alternative item, namely, "Isolate yourself and think about the reasons you feel sad". When Whitmer and Gotlib performed that substitution, they elicited a more interpretable factor solution for the RRS.

The findings from the current study were consistent with Whitmer and Gotlib's (2011) identification that Item 12 does not appear to fit with the other items from the RRS as coherently as the other items appear to fit together. It is

proposed that the very specific activity described by Item 12, namely, that an individual will write things down in order to analyse them, may not necessarily represent rumination-prone tendencies. By definition, rumination involves repetitive, self-focussed thought (Nolen-Hoeksema, 1991). In addition, ruminative tendencies are inferred to prohibit an individual from actively engaging in strategies to alleviate their negative symptoms (Nolen-Hoeksema, 1998). As such, the inclusion of Item 12, which refers specifically to an activity external to the repetitive thought process represented by rumination, may not be entirely consistent with the typical behaviour of people engaging in rumination. Therefore, although the CFA indicated the factor solution was a well-fitting model, the coherence of the reflection factor may be enhanced by removing Item 12, or, alternatively, including a substitute for that item that is consistent with the emphasis on thought processes involved in rumination, but also represents the more proactive approach towards rumination depicted by reflection. A possible item that meets those criteria could be, "Think about what needs to change to help you feel better."

Another possible strategy for improving the reflection factor is to develop additional items that are likely to load on that factor. Reliability estimates tend to improve with increased numbers of items (Kaplan & Saccuzzo, 2005). As such, the lower reliability estimate of the reflection factor, as compared to the brooding and depression symptoms factors, may be enhanced if additional items were developed for that factor. The adapted Spearman-Brown formula (Kaplan & Saccuzzo, 2005), which is used to calculate the number of new items required to increase reliability to a desired level, indicates an additional nine items would be required to increase the reliability estimate of the reflection factor from its current

estimate of α = .76 to an optimal α=.90. The potential clinical and research implications of utilising each of the rumination scale factors are such that an attempt to develop and evaluate additional reflection factor items appears meritorious.

5.4.1.1.2 WBSI. The CFA for the WBSI provided support for the two-factor structure identified in Study 2, which consisted of an unwanted intrusive thoughts factor and an avoidance of unwanted thoughts factor. The estimates of internal consistency for both of those factors also indicated reliable and valid factors had been identified. Those analyses were interpreted as providing support for the appropriateness of the factor structures obtained in Study 2, and factor scores derived from those factors were included in additional analyses.

As discussed in Study 2, the two factor structure of the WBSI was somewhat consistent with the findings of Blumberg (2000) that the WBSI was multidimensional, but inconsistent with the findings of Wegner and Zanakos (1994) and Palm and Strong (2007), who identified the WBSI as unidimensional. In the current study, the two dimensions identified within the WBSI were found to vary in their relationships with other constructs, and in their ability to predict current depression scores in females. It is suggested that, if the WBSI was unidimensional, this variation would not have been observed. The two factors were also found to be interpretable and coherent, which lent further support to the multidimensional nature of this measure. The very good estimates of internal consistency, as calculated using Cronbach's α, also suggested the appropriateness of this two factor structure. As such, the findings of the current study appear to provide compelling support for the multidimensional nature of the WBSI. These findings are of relevance in both clinical and research contexts, as they suggest a

more specific understanding of the respective components of thought suppression is required in order to better understand the previously identified relationship between thought suppression and negative psychological outcomes.

5.4.1.2 Predicting depression from variables of interest. When depression was predicted from the RRS and WBSI factors, along with measures of positive self-evaluation and reaction time variability, a significant model was obtained which accounted for 60% of variance in depression scores. This finding provided support for the hypothesis that these cognitive variables, in combination, would predict current depression scores in females.

An examination of that model identified that reflection and avoidance of unwanted thoughts were not significant predictors of depression, whereas each of the other variables made significant contributions to the model. These findings were somewhat contrary to the hypotheses regarding those variables, as a substantial body of previous literature had indicated that rumination (from which the reflection factor had been derived) (Just & Alloy, 2001) and thought suppression (from which the avoidance of unwanted thoughts factor had been derived) (Wenzlaff & Luxton, 2003) were predictive of depression. Given the strong relationships between rumination, thought suppression and depression (Wenzlaff & Luxton, 2003), it was anticipated that each of the factors within the RRS and WBSI would also contribute to the prediction of depression.

Although the specific predictions regarding reflection as a predictor of depression were not supported in this study, this finding of non-significance was not without precedent. For example, Treynor et al. (2003) also found reflection failed to significantly predict depression, however, that finding was limited to a longitudinal analysis. In that study, Treynor et al. found that although both

reflection and brooding predicted depression in concurrent analyses, reflection failed to predict depression when the analysis was extended to a longitudinal context. A notable similarity between the current study's findings and those of Treynor et al. was that, in both studies, brooding was found to mediate the influence of reflection on depression.

The mixed findings of these two studies in combination can be interpreted to indicate the relationship between reflection and depression is different to the relationship between brooding and depression. In addition, the possibility that reflection is only predictive of depression in the context of current depressive symptoms can be supported from these findings in two ways. Firstly, it is likely that reflection emerged as a predictor of depression in Treynor et al.'s (2003) concurrent analysis due to the mediating influence of brooding which, as identified by Treynor et al. and in the current study, is highly predictive of depression. Secondly, the fact that reflection did not significantly predict depression in the longitudinal analysis conducted by Treynor et al. is consistent with the findings of the current study that reflection, in and of itself, is unlikely to predispose an individual to depression. However, in the presence of other, more maladaptive ruminative tendencies (i.e., brooding), reflection may also predict current depression scores in females. As such, these findings provided additional support for the utility of examining the unique influence of various factors within rumination on depression and other psychological outcomes.

A closer examination of the items loading on the reflection factor and the avoidance of unwanted thoughts factor identified a conceptual commonality between those factors. Both reflection and avoidance of unwanted thoughts appeared to represent a more proactive approach to the typically

counterproductive processes of rumination and thought suppression. For example, Item 11 from the RRS, "Go away by yourself and think about why you feel this way", appears to indicate a willingness to explore the factors contributing to one's current feelings of depression, rather than a hopeless feeling associated with the unchangeable nature of those feelings. Similarly, Item 13 from the WBSI, "I often do things to distract myself from my thoughts", appears to portray a willingness to engage in strategies to prevent the experience of unwanted thoughts, rather than passively wishing those thoughts would stop. As such, it appeared those factors shared a theme of taking proactive steps to understand or avoid the unwanted consequences associated with rumination and thought suppression.

It was therefore hypothesised that those factors may represent a more adaptive approach within rumination and thought suppression, respectively. That hypothesis was preliminarily supported in the hierarchical multiple regression analysis whereby both of those factors were predictive of depression when entered into the first step of that model. This finding supported the somewhat detrimental impact of all facets of rumination and thought suppression. However, once the additional variables were entered into the model, those factors ceased to be predictive of depression. This finding suggested that, although reflection and avoiding unwanted thoughts may represent a measure of cognitive vulnerability to depression, they are not the factors which render an individual most vulnerable.

The results of the hierarchical multiple regression indicated the possibility that the capacity of reflection and avoidance of unwanted thoughts to predict current depression scores of females were being mediated by the other variables. As such, an investigation of mediation effects was warranted. Although Baron and Kenny (1986) identified the process for assessing mediation of a single

independent variable by a single mediating variable, this set of variables indicated the possibility of multiple variables being mediated, and multiple possible mediators. As such, it was identified that the most appropriate means of assessing those possible mediating relationships was via structural equation modelling.

5.4.1.3 Interrelationships between variables of interest. In order to explore the possible mediating effects within this combination of cognitive risk factors for depression, a structural equation model (SEM) was developed. Based on the findings from the standard and hierarchical multiple regression analyses conducted, reflection and avoidance of unwanted thoughts were identified as the independent variables (IVs) for the SEM; brooding, depression symptoms, unwanted intrusive thoughts, positive self-evaluation and reaction time variability were identified as possible mediating variables (MVs); and depression was included as the dependent variable (DV). Within the MVs, brooding and depression symptoms were recognised as sharing some fundamental characteristics pertaining to a preoccupation with one's own depressive experience, and were combined to form a latent variable labelled "maladaptive rumination". Preliminary analyses indicated that reaction time variability was not making a significant contribution to the model, and that variable was subsequently excluded from further analyses.

The SEM developed on the rationale informed by the regression analyses was found to be a well-fitting model, which accounted for 65% of variance in depression scores. A substantial amount of variance was also explained in each of the MVs, with the exception of positive self-evaluation, for which a low-to-moderate percentage of variance was explained. These findings indicated that this combination of variables was effective in predicting depression. They also

suggested that these variables, particularly each of the factors derived from the RRS and WBSI were highly related to, and predictive of, one another.

5.4.1.3.1 Direct effects of reflection. The influence of reflection on other variables in the model elicited some interesting findings. Reflection was positively predictive of maladaptive rumination, unwanted intrusive thoughts, and positive self-evaluation. In addition, it was negatively predictive of depression. This pattern of findings suggested that reflection has a multifaceted impact on a range of psychological outcomes. For example, individuals who engage in reflection are also more likely to engage in maladaptive rumination and to experience unwanted intrusive thoughts, both of which are highly associated with negative psychological outcomes. However, reflection was positively associated with positive self-evaluation which, in turn, is associated with better psychological outcomes. This finding suggests that an individual who engages in reflection may also be more likely to consider themselves in a positive manner which, in turn, has beneficial consequences for their psychological wellbeing. Reflection's negative direct relationship with depression is also illustrative of the potentially adaptive nature of reflection. The significant negative pathway from reflection to depression suggests that an individual who engages in reflection may be less vulnerable to depression than an individual who does not engage in reflection.

As such, the direct pathways from reflection within this model portray reflection as potentially adaptive, when it is associated with positive self-evaluation, or when it is engaged in as a separate activity from the more detrimental ruminative patterns of brooding and focussing on depressive symptoms. However, reflection is also associated with other cognitive patterns

which are highly predictive of depression. As such, reflection may be understood as a potential protective and risk factor for depression. Intervention strategies which target the enhancement of reflection, rather than its associated brooding and focussing on depressive symptoms, could potentially reduce the risk of depression associated with tendencies toward reflection.

5.4.1.3.2 Direct effects of avoidance of unwanted thoughts. Unlike reflection, avoidance of unwanted thoughts was not significantly predictive of depression. Avoidance of unwanted thought's non-significant pathway to depression suggests that, if the well-established rebound effect of actively seeking to avoid unwanted thoughts can be avoided (Wegner, Schneider, Carter, & White, 1987), strategies engaged in to avoid unwanted thoughts are likely to have no impact on one's vulnerability to depression. However, the pathway from avoidance of unwanted thoughts to unwanted intrusive thoughts indicated avoidance of unwanted thoughts was an effective predictor of unwanted intrusive thoughts. As such, although avoidance of unwanted thoughts alone does not appear to represent a cognitive risk factor for depression, its close relationship with, and ability to predict, unwanted intrusive thoughts, suggests the potentially detrimental impact of avoidance of unwanted thoughts. Similarly, avoidance of unwanted thoughts was associated with maladaptive rumination, which is a considerable risk factor for depression. In addition, the pathway from avoidance of unwanted thoughts to positive self-evaluation, which may serve as a protective mechanism against depression, was not significant. In summary, the direct pathways from avoidance of unwanted thoughts within this model indicate that avoidance of unwanted thoughts as a stand-alone construct may not represent cognitive vulnerability to depression. However, its relationship with other risk

factors and lack of relationship with protective factors suggests the potentially detrimental outcomes associated with strategies aimed at avoiding unwanted thoughts.

5.4.1.3.3 Summary of direct effects of IVs. As previously identified, reflection and avoidance of unwanted thoughts appeared to share a common theme of representing more adaptive approaches to rumination and thought suppression, respectively. Whilst reflection could be considered a more proactive attempt at making meaning from one's depressive symptoms, avoidance of unwanted thoughts could be considered a more proactive attempt to avoid the experience of unwanted thoughts. The adaptiveness of reflection was supported by the finding that, within the SEM, the direct pathway from reflection to depression had a negative coefficient, indicating that reflection was negatively related to depression. In addition, the direct pathway from avoidance of unwanted thoughts to depression was not significant which indicated that avoidance of unwanted thoughts was not an effective predictor of depression within this model.

In combination, those findings suggest that reflection and avoidance of unwanted thoughts as stand-alone constructs do not appear to represent effective predictors of depression. Reflection's negative relationship with depression indicates reflection (when conducted in the absence of other less adaptive ruminative processes, such as brooding and focus on depression symptoms) may be considered something of a protective mechanism against depression. However, the mixed relationships between reflection and other variables within the model, as well as those of avoidance of unwanted thoughts and other variables, indicate the potential for each of those constructs to be considered cognitive risk factors for depression. The relationships between reflection and depression, and

avoidance of unwanted thoughts and depression, were significantly influenced by the other variables within the model. The indirect pathways within the model and the clinical implications of these findings will be discussed in a subsequent section of this Discussion.

5.4.1.3.4 Direct effects of maladaptive rumination. The direct pathways from maladaptive rumination to brooding and depression symptoms indicated maladaptive rumination was highly predictive of each of the endogenous constructs of which it was comprised. In addition, maladaptive rumination was very effective in predicting depression. An interesting finding was the highly significant and negative pathway from maladaptive rumination to positive self-evaluation, which indicated that people with high scores on maladaptive rumination were likely to have low scores of positive self-evaluation.

These findings provide further support for the detrimental nature of maladaptive rumination due to its close relationship with negative psychological outcomes, such as depression, but also because it appears to render the likelihood of engaging in protective cognitive patterns, such as positive self-evaluation, unlikely. In combination, the direct pathways from maladaptive rumination confirm the vulnerability to negative psychological outcomes which are associated with that construct.

5.4.1.3.5 Direct effects of unwanted intrusive thoughts. The direct pathways from unwanted intrusive thoughts were illustrative in identifying where the predominant mediation effects were occurring within the model. The direct pathway from unwanted intrusive thoughts to depression was not significant, which indicated unwanted intrusive thoughts was not a significant predictor or direct mediator within this model. However, the pathway from unwanted intrusive

thoughts to maladaptive rumination was highly significant. This pattern of results indicated that unwanted intrusive thoughts may not be directly associated with the negative psychological outcome of depression, however, its ability to predict maladaptive rumination which, in turn was highly predictive of depression, warrants its identification as a cognitive risk factor for depression.

5.4.1.3.6 Direct effects of positive self-evaluation. The only direct pathway originating at positive self-evaluation was the pathway to depression. That pathway was highly significant and negative, which indicated that an increase in positive self-evaluation was predictive of a decrease in depression. This finding provides support for the hypothesis that positive self-evaluation represents a cognitive protective mechanism against negative psychological outcomes such as depression.

5.4.1.3.7 Indirect effects of reflection. Reflection's capacity to predict current depression scores in females was significantly mediated by reflection's relationship with maladaptive rumination, as evidenced by the significant positive indirect effect of reflection on depression, via maladaptive rumination. According to this model, although an individual who engages in reflection is not necessarily prone to depression; individuals who tend to reflect are also likely to be prone to maladaptive rumination which, in turn, renders them highly susceptible to depression.

Reflection was also mediated by unwanted intrusive thoughts, but only via the pathway that included maladaptive rumination. This mediation effect was observed by the significance of the pathways from reflection to depression, via unwanted intrusive thoughts and maladaptive rumination. These pathways suggested that an individual who engages in reflection is also somewhat likely to

experience unwanted intrusive thoughts, which, in turn, is predictive of maladaptive rumination and, finally, depression. However, a stronger relationship was identified between reflection and avoidance of unwanted thoughts, than that between reflection and unwanted intrusive thoughts. Avoidance of unwanted intrusive thoughts was also found to be highly predictive of unwanted intrusive thoughts. As such, although reflection is slightly predictive of unwanted intrusive thoughts, an individual who engages in reflection is somewhat more likely to utilise strategies aimed at avoiding the experience of unwanted thoughts which, in turn, is likely to lead to the experience of unwanted intrusive thoughts.

The third mediating variable, positive self-evaluation was also found to mediate the effect of reflection in the prediction of depression. Specifically, the pathway from reflection to positive self-evaluation was significant, with a small to moderate regression coefficient. The pathway from positive self-evaluation to depression was, in turn, negative and minimally predictive of depression. This finding suggested that an individual with a tendency toward reflection may also be inclined to engage in positive self-evaluation which may, in turn, mediate the effect of reflection on depression.

This examination of the indirect effects of reflection within this model clearly indicated maladaptive rumination was the most influential mediating variable for reflection. Of the independent variables, reflection was most highly predictive of maladaptive rumination which, in turn, was most highly predictive of depression. These findings provide additional support for the identification of maladaptive rumination, consisting of brooding and focussing on depressive symptoms, as a problematic cognitive pattern associated with negative psychological outcomes.

5.4.1.3.8 Indirect effects of avoidance of unwanted thoughts. Mediation was also evident for avoidance of unwanted thoughts, via unwanted intrusive thoughts. However, that mediation only occurred when the pathway from unwanted intrusive thoughts to maladaptive rumination was included in the analysis. According to this model, an individual who attempts to avoid unwanted thoughts is not necessarily susceptible to depression. In addition, the experience of unwanted intrusive thoughts is not significantly predictive of depression. However, a person who attempts to avoid unwanted thoughts is highly likely to experience the rebound effect of unwanted intrusive thoughts which, in turn, is associated with maladaptive rumination tendencies, which is highly predictive of depression.

In addition to the mediation effect of maladaptive rumination via unwanted intrusive thoughts, avoidance of unwanted thoughts was also mediated by maladaptive rumination directly. Although the capacity of avoidance of unwanted thoughts to predict maladaptive rumination was not as strong as reflection's capacity to predict that construct, there was a significant pathway from avoidance of unwanted thoughts to maladaptive rumination which, in turn, was highly predictive of depression. As such, maladaptive rumination again emerged as the most influential mediating variable. The pathway from avoidance of unwanted thoughts to positive self-evaluation was not significant, which indicated that variable was not mediating the capacity of avoidance of unwanted thoughts to predict current depression scores in females.

This pattern of findings indicated that an individual who attempts to avoid unwanted thoughts is also likely to experience the rebound effect of unwanted intrusive thoughts which, in turn, is predictive of maladaptive rumination which,

in turn, is predictive of depression. Those findings were consistent with the research of Wenzlaff and Luxton (2003), whereby thought suppression was found to be associated with rumination and, in turn, predictive of depression. However, the factors derived from the WBSI, namely avoidance of unwanted thoughts and unwanted intrusive thoughts, in combination, did not significantly predict current depression scores of their own accord in the current study. In addition, there was no mediating effect of positive self-evaluation on avoidance of unwanted thoughts. These findings provide additional support for the highly influential nature of maladaptive rumination within this model.

5.4.1.3.9 Indirect effects of maladaptive rumination. The effects of maladaptive rumination on depression were also mediated by positive self-evaluation. The significant negative pathway from maladaptive rumination to positive self-evaluation and the subsequent significant negative pathway from positive self-evaluation to depression indicated that high levels of maladaptive rumination were predictive of low levels of positive self-evaluation. Low levels of positive self-evaluation were, in turn, associated with high levels of depression.

5.4.1.3.10 Summary of SEM. This model provided useful insight into the relationships between each of the variables of interest and their individual and combined effectiveness in predicting one another and depression. Reflection and avoidance of unwanted thoughts were identified as sharing a potentially adaptive focus within the more problematic general constructs of rumination and thought suppression. The potentially adaptive natures of reflection and avoidance of unwanted thoughts were somewhat supported by the negative relationship between reflection and depression, and the non-significant relationship between avoidance of unwanted thoughts and depression.

Further, this SEM provided support for the mediating effect of maladaptive rumination, and positive self-evaluation on reflection, and for the mediating effect of maladaptive rumination on the avoidance of unwanted thoughts. Unwanted intrusive thoughts also mediated both of those variables, but only via maladaptive rumination. In addition, this model identified that, although this particular combination of variables was effective at predicting depression, the most influential factor in that prediction capability was maladaptive rumination. Some preliminary support was also found for the protective role of positive self-evaluation in combating the negative consequences associated with the other variables of interest and, especially, those of maladaptive rumination.

5.4.1.4 Between-group comparisons on basis of previous depression diagnosis. When participants who had previously been diagnosed with depression were compared with participants who had not previously been diagnosed with depression, there were significant differences between the groups on positive self-evaluation, depression symptoms, reflection, brooding, unwanted intrusive thoughts, avoidance of unwanted thoughts, and depression. A comparison of the mean scores for each of those variables indicated that participants who had previously been diagnosed with depression had significantly lower positive self-evaluation scores and reflection scores, and higher scores on measures of depression symptoms, brooding, unwanted intrusive thoughts, avoidance of unwanted thoughts and depression.

Those findings were consistent with the suggestion that positive self-evaluation may represent a protective factor against depression, as identified in the SEM. The finding that participants who had not previously received a diagnosis of depression had higher reflection scores was also consistent with the

suggestion that reflection represents a more adaptive version of rumination than either brooding or focussing on depression symptoms. Contrary to the hypothesis that reaction time variability may represent an executive functioning deficit that may predispose an individual to depression, there were no significant differences between the groups on that variable.

However, when the participants were compared on the basis of their current depressive symptoms, there were significant differences between the groups on all variables, including reaction time variability. This series of findings suggested, contrary to the proposition of Ode, Robinson and Hanson (2011) that reaction time variability may represent a cognitive risk factor for depression; it was more meaningful to identify reaction time variability as a symptom of possible depression. That finding was consistent with previous research of Hertel and Gerstle (2003) and Langenecker et al. (2005) which identified executive functioning deficits, particularly in relation to attentional control, in the presence of depressive symptoms. It is possible that the findings from the current study were inconsistent with the findings of Ode at al. (2011) due to the utilisation of different measures of reaction time variability. Although reaction time variability was calculated in accordance with the procedure described by Ode et al. those authors did not utilise the dot probe task in their study. The simple decision reaction time tasks described by those authors appeared sufficiently similar to the dot probe task in order to justify the inclusion of the dot probe task as a measure of reaction time variability. However, the inconsistent findings between Ode et al. and the current study suggest the dot probe task may not have accurately captured reaction time variability as it was assessed by those authors. As such, it is feasible to conclude that reaction time variability may represent a cognitive precursor to

depression however the dot probe task, as administered in the current study, may not be appropriate for measuring that reaction time variability. Additional measures of reaction time variability should be utilised in order to further explore these apparently discrepant findings.

In combination, these findings suggested each of the variables, other than reaction time variability (as assessed by the dot probe task), may constitute a risk factor for depression, given the significant differences between individuals who had not previously been diagnosed with depression and those who had. It was also noteworthy that the effect sizes of the significant differences were larger when comparing those who were not depressed and those who were possibly depressed, rather than those who had previously been diagnosed with depression and those who had not. The larger effect sizes in the comparison based on differences in current symptoms suggested an amplification of those cognitive tendencies in people who are currently experiencing depressive symptoms. In addition, the significant difference in reaction time variability between those who were not depressed and those who were possibly depressed suggested that reaction time variability is more likely to occur concurrently with depressive symptoms, rather than to exist prior to the onset of symptoms.

In summary, those findings suggested that, although the variables of interest, with the exception of reaction time variability, could meaningfully distinguish between those who had previously been diagnosed with depression and those who had not, the differences in each of the variables were more meaningful when comparing participants with current depressive symptoms and those who were not currently depressed. Those findings suggest partial support for the hypothesis that the cognitive patterns under investigation, with the

exception of reaction time variability, may represent risk factors for depression, as represented by the significant differences between those who have previously been diagnosed with depression and those who have not received that diagnosis.

However, it has previously been noted that it is difficult to distinguish cognitive risk factors that precede the onset of depression symptoms from cognitive remnants that represent "scars" from that episode (Alloy, Lipman, & Abramson, 1989). This difficulty is one of the criticisms of attempting to identify cognitive risk factors for depression retrospectively by comparing previously depressed with never depressed individuals (Alloy, Lipman, & Abramson, 1992). This methodological limitation is relevant in the current study, as data was collected on a single occasion, and no prospective analyses were possible.

A previous episode of depression is a noted risk factor for future episodes (Lewinsohn, Hoberman, & Rosenbaum, 1988; Spasojevic & Alloy, 2001). Therefore, it was deemed necessary to ensure the observed group differences between the group with a previous diagnosis and the group with no previous diagnosis were not as a result of the previous diagnosis group's higher likelihood of currently experiencing depression symptoms. An analysis of covariance (ANCOVA) between the groups on the basis of diagnosis was conducted, with current depressive symptoms entered as a covariate in that analysis, to control for the effect of current symptoms on the differences between the groups. The results of that ANCOVA indicated that, when controlling for the effect of current depressive symptoms, significant differences between the diagnostic groups remained for positive self-evaluation, unwanted intrusive thoughts and brooding, and the difference was approaching significance for depression symptoms ($p =$ .053). The group differences on reflection and avoidance of unwanted thoughts

were no longer significant, and there were no significant differences between the groups on reaction time variability.

The findings of significant differences between the groups on positive self-evaluation, unwanted intrusive thoughts, brooding and depression symptoms provided further support for the proposition that those variables represented cognitive risk factors (in the case of unwanted intrusive thoughts, brooding and, to a lesser extent, depression symptoms), and a cognitive protective factor (in the case of positive self-evaluation) for depression. The findings of non-significant differences between the groups on reflection and avoidance of unwanted thoughts provided further support for the multifaceted relationship between reflection and depression, and avoidance of unwanted thoughts and depression, respectively. The finding that controlling for current symptoms rendered differences between the groups non-significant for those variables suggested that, in the absence of current depressive symptoms, individuals with and without a history of depression were similarly inclined to engage in those cognitive strategies. This may be considered a further demonstration of the previous finding in the SEM that, in their individual capacities, reflection and avoidance of unwanted thoughts are not highly associated with depression. However, they are mediated by the influence of other variables, such as the constructs representing maladaptive rumination. This suggests that reflection and avoidance of unwanted thoughts may only become problematic in the presence of other cognitive patterns, such as maladaptive rumination.

Although it is acknowledged that this analysis was insufficient to overcome the methodological limitation associated with the inability to definitively distinguish cognitive patterns which precede the onset of depression

from cognitive remnants of depression, it was considered instructive in identifying the ways in which individuals with a previous diagnosis of depression may differ from those without that diagnosis, in the absence of depressive symptoms.

5.4.2 Implications and applications for future research

The findings of this research have substantial implications for the theoretical understandings of the constructs under investigation. In addition, these findings have implications within research and clinical contexts which are informed by cognitive theories of psychopathology. Although several findings have been reported in this study, it is proposed that the finding of greatest consequence for future research is that which identified that rumination and thought suppression need to be considered multidimensional constructs which are comprised of factors that have different relationships with other cognitive variables. In addition, the findings of this research indicated that, although the combination of variables under investigation in this study was effective at predicting depression, the most influential variable was maladaptive rumination. Together, these findings have implications for the refinement of research methodology involving rumination and thought suppression, and for the utilisation of strategies which target particular cognitive patterns in an endeavour to reduce or prevent the experience of depression.

5.4.2.1 CFA of RRS. This study has provided additional support for the findings of Treynor et al. (2003) and Whitmer and Gotlib (2011), as well as the findings from Study 2 in the current research program, in relation to the factor structure of the RRS. The confirmatory factor analysis conducted in this study supported the three factor structure of the RRS comprised of depression

symptoms, reflection and brooding. That confirmation has implications for the conceptualisation of the broad construct of rumination, which has featured eminently in research pertaining to a diverse range of negative psychological outcomes and, in particular, depression.

A substantial body of literature has implicated rumination as a risk factor (Just & Alloy, 1997), and as a mediating factor for a range of other risk factors (Spasojevic & Alloy, 2001), in a number of negative psychological outcomes, most predominantly, depression. Whilst the findings of the current research are consistent with this body of literature, the confirmation that rumination, as measured by the RRS, is appropriately considered a multidimensional construct may have important ramifications for future rumination research. Of particular interest were the current study's findings that the factors derived from the RRS have some conceptual variation, and different relationships with other constructs of interest. These findings indicate that to consider rumination as a generic construct may be too simplistic, and could result in a lack of clarity in relation to the precise relationships between the components of rumination and other constructs.

As such, in future rumination research, the three factors of the RRS should be considered to represent different facets of rumination and a better understanding of the individual and combined influence of those factors should be investigated. It is recommended that attempts be made to improve the reliability of the reflection factor by replacing the problematic Item 12, and including an additional nine items for that factor. If such improvements successfully enhance the reliability of that factor, future research should seek to establish the

relationships between each of the rumination factors and other variables with which the generic rumination construct has been implicated.

5.4.2.2 CFA of WBSI. The current study identified a two-factor solution for the WBSI, which was confirmed as a good-fitting model, via confirmatory factor analysis. This finding has implications for the operationalisation of thought suppression, and its subsequent involvement in psychological research. Previous findings have related thought suppression to a number of negative psychological outcomes, including obsessive thinking, depressive responding, state-anxiety, trait-anxiety and depression in those who were particularly averse to experiencing negative thoughts (Wegner & Zanakos, 1994). Given the apparently multidimensional nature of the construct of thought suppression, as assessed by the WBSI, it may be necessary to consider the individual and combined influence of the two factors within the WBSI on those negative outcomes previously identified, and others which may be relevant. Future research regarding shared and unique variance accounted for by each of the factors within the WBSI could potentially improve understanding of this construct and its possible role as a cognitive risk factor for negative psychological outcomes.

5.4.2.3 Predicting depression. This research identified that depression could be accurately predicted from a combination of cognitive variables, including reflection, brooding, depression symptoms, unwanted intrusive thoughts, avoidance of unwanted thoughts, positive self-evaluation and reaction time variability. It also articulated the multifaceted nature of the interrelationships among these variables, and their differing contribution to depression vulnerability. Of the variables under investigation, maladaptive rumination emerged as the

strongest predictor of depression, and as a significant mediator of several other variables.

In a clinical context, these findings suggest that clinicians whose clients exhibit these tendencies may be at increased risk of suffering depression, with the exception of those displaying positive self-evaluation tendencies. Those displaying positive self-evaluation tendencies may in fact be at a reduced risk of depression. The substantial amount of variance in depression scores accounted for by the SEM developed in this study suggests that assessing clients on each of these measures could assist in the early identification of depression prone individuals. It may also provide guidance in the development of intervention programs which are aimed at increasing cognitive resilience, and treatment programs which are intended to assist in the adjustment of problematic cognitive patterns. The recognition that maladaptive rumination was the most significant predictor of depression suggests that treatments which focus on discouraging maladaptive rumination may be of benefit. Such programs may reduce an individual's likelihood of depression, and may also reduce the likelihood of engaging in other cognitive patterns which also contribute to the experience of depression. Individuals who are identified as being inclined to engage in reflection may benefit from strategies which encourage the adaptive nature of reflection (such as seeking to make meaning from one's depressive feelings), whilst preventing the maladaptive strategies of brooding and focussing on one's depressive symptoms. Such strategies are likely to maximise the protective capacity of reflection, whilst reducing the likelihood of engaging in the self-sabotaging tendencies of maladaptive rumination. For example, cognitive behavioural therapies which require clients to complete homework activities

could be utilised, and clients provided with tasks aimed at identifying detrimental cognitive patterns, such as brooding and focussing on depressive symptoms, and considering ways of reframing those detrimental thought patterns.

Psychoeducational programs which assist clients to recognise the difference between, for example, brooding and reflection, could potentially facilitate the identification of appropriate strategies which are more indicative of reflection and less indicative of brooding and focussing on depressive symptoms. Encouraging clients to reframe their thoughts from the passive stance associated with brooding (e.g., "Think about how passive and unmotivated you feel") towards the more proactive stance of reflection (e.g., "Go away by yourself and think about why you feel this way") could theoretically assist in this process.

Similarly, prevention and early intervention programs which encourage positive self-evaluation could potentially increase cognitive resilience and reduce the likelihood of depression. Psychoeducational programs which inform clients of the positive mental health outcomes associated with positive self-evaluation, as well as the identification of strategies which encourage such positive self-evaluation, may be of benefit. Assisting clients to understand the relationship between these cognitive processes and depression could foreseeably assist them to recognise problematic patterns within their own thinking, and to develop appropriate strategies to enhance beneficial patterns and reduce the detrimental patterns, particularly maladaptive rumination.

Whilst the factors derived from the WBSI were not effective predictors of depression within the SEM, they were predictive of maladaptive rumination which, in turn, was highly predictive of depression. As such, assisting clients to recognise thought suppression tendencies, and the likelihood of those tendencies

contributing towards maladaptive rumination tendencies, may be of benefit. Previous research has identified that the relationship between thought suppression and rumination is particularly salient in times of external stressors (Wenzlaff & Luxton, 2003). The detrimental effects of thought suppression have also been noted to be exacerbated when an individual's ability to effectively suppress unwanted thoughts is interrupted by cognitive load (Wenzlaff & Bates, 1998). In combination, those findings, and the findings of the current study, suggest the potential benefits of assisting clients with stress management techniques for the purpose of preventing an escalation of thought suppression and rumination which, in turn, may contribute to depression.

Another potentially useful strategy to minimise thought suppression and rumination is that of distraction. Previous research has identified that active distraction techniques are associated with a reduction in ruminative tendencies (Morrow & Nolen-Hoeksema, 1990). However, it has also been observed that the paradoxical rebound effect of thought suppression can be exacerbated if one's attempts at avoidance are unsuccessful as a result of being disrupted by increased cognitive load (Wenzlaff & Wegner, 2000). These findings suggest that distraction techniques which are active rather than passive, and involve activities as opposed to merely attempting to introduce alternative thoughts, have a greater likelihood of success in reducing thought suppression and ruminative tendencies. As such, clinicians may be able to assist clients to develop distraction strategies to be implemented upon recognition of repetitive thought patterns which represent either unsuccessful attempts at thought suppression or rumination. Such strategies could involve exercise, journal writing, or other similar activities which are likely to divert one's attention from the problematic thoughts. It is acknowledged that

such strategies are already commonly adopted within clinical contexts. The results of the current study can be interpreted as providing additional support for the appropriateness of such techniques.

In summary, it is recommended that additional research be conducted in relation to improving the reliability of the reflection factor within the RRS, and to better understand the unique and shared influence of each of the identified factors within the RRS and WBSI on a range of psychological outcomes. Of particular interest would be the investigation of the influence of the rumination and thought suppression factors identified in this study on anxiety and worry. The substantial comorbidity between depression and anxiety, as well as the overlap between anxiety and worry, suggest that cognitive patterns which are implicated in depressive symptoms should also be considered in the context of those other psychological disorders. In addition, it is proposed that the SEM developed in the current study could potentially assist clinicians in the identification of depression prone individuals and in the design of prevention and early intervention programs which specifically target the cognitive patterns identified as representing risk factors for depression. Additional research could consider the development and evaluate the efficacy of such prevention and intervention programs.

5.4.2.4 Between-groups comparisons. This study identified meaningful differences between groups on the basis of previous diagnosis of depression, and on the basis of current depressive symptoms. These findings have implications for categorising which of the variables of interest may represent cognitive risk factors for depression, and which variables are more accurately understood as cognitive deficits associated with depression. It appeared that reaction time variability may be more accurately considered an executive functioning deficit that occurs in the

presence of depressive symptoms, rather than a precursor to depressive symptoms. However, it was noted that this finding requires clarification, due to its discrepancy with the findings of Ode, Robinson, and Hanson (2011). As such, additional research is recommended which includes alternative measures of reaction time variability, in order to more closely examine the precise nature of the relationship between reaction time variability and depression.

Further clarification is also required in relation to whether the variables of interest that differed significantly between the groups based on previous diagnosis of depression when current symptoms were controlled for represent cognitive risk factors for depression or cognitive remnants of a previous depressive episode. In order to properly examine this question, a prospective longitudinal design is required. Whilst the results of this study are influential in suggesting that people who are prone to depression differ significantly from people who are not prone to depression on their tendencies toward brooding, depression symptoms and positive self-evaluation, additional research is required.

5.4.3 Limitations and recommendations for future research

When considering the applicability and generalisability of the current research, some limitations need to be acknowledged. At a very general level of consideration, it is important to recognise that the participants in this study were all female. In order to extend these findings to different groups, such as males, children, adolescents and/or older adults, the study would need to be replicated using participants from each of those groups. In addition, this study did not utilise a clinical sample. Rather, the sample consisted of a community-based convenience sample and participants did not undergo a diagnostic interview or similar structured diagnostic protocol. Therefore, the designation of "possibly

depressed" and "not depressed" was based on the arbitrarily defined cutoff described by Cox, Holden and Sagovsky (1987), rather than clinical diagnosis. Replication of the current study with a clinical sample is recommended in order to examine the relevance of these findings to those who are clinically depressed.

The online data collection method utilised within this study may also represent a limitation. Although the variables included in this study were assessed for comparability in Study 1, it is acknowledged that the online testing environment lacks the control of the laboratory. In addition, the dot probe task was not assessed for comparability, given the identical nature of the online versus offline administration of that task. However, the lack of control afforded by the online testing environment makes it impossible to ensure participants completed the tasks in optimal testing conditions. As such, the lack of predictive utility of reaction time variability in the current study may have been the result of inaccurate performance in an uncontrolled environment. The interpretation of those discrepant findings, in relation to the different reaction time tasks used in previous research, also appears plausible.

The online testing environment also introduced another minor limitation. In Study 1, the only SRIP variable found to be comparable in both online and offline testing modalities was that of SRIP1PDR, which assessed positive self-evaluation. As such, that variable was the only measure from that task included in additional analyses. Whilst the findings pertaining to positive self-evaluation were informative and easily interpreted, it is acknowledged that the act of evaluating oneself positively does not equate to an absence of evaluating oneself negatively. As such, additional research should consider the inclusion of a measure of negative self-evaluation in order to more fully explore the relationship between

self-evaluation and cognitive vulnerability to depression. Given the lack of robust

support for the online measurement of self-evaluation as operationalised by SRIP,

future research could consider assessing the suitability for online use of other self-

referent information processing measures or, alternatively, use the traditional

administration format to assess that construct.

Another potential limitation pertaining to scoring relates to the use of

factor scores. Although the confirmatory factor analyses indicated the factor

structures identified in the previous study represented appropriate models for the

RRS and WBSI, DiStefano, Zhu and Mindrila (2009) identified some challenges

associated with the use of factor scores. Specifically, because factor scores are

contingent upon the extraction and rotation methods utilised, they can be difficult

to replicate. In recognition of this, the decision was made in the current study to

utilise the summation of raw scores method to calculate factor scores, which is

recognised as more easily replicated than the other methods of calculating factor

scores. However, whilst increasing replicability, this method fails to take into

account the fact that individual items have different loadings on the factors. In the

summation of raw scores method, all items loading on a factor are given equal

consideration. By contrast, alternative refined methods, such as the utilisation of

regression coefficients, take those factor loadings into account.

Whilst the use of summated raw scores could be considered a minor

limitation of this study, it is worthy of note that the regression coefficient method

of calculating factor scores was also utilised and there were no substantial

differences within the two models. The summated raw scores model accounted

for a slightly higher amount of variance in depression, and the pathways were

more easily interpreted. These findings, in conjunction with the easier replication

associated with the summation method, influenced the decision to report the models which included those scores in this study.

5.4.4 Conclusions

This study has made some important psychometric and theoretical contributions to the extant literature, most particularly in relation to rumination and thought suppression, and their respective relationships with depression. It has identified the importance of recognising rumination and thought suppression as multidimensional constructs. This finding is of particular relevance in the research context, in which the relationships between those constructs and other relevant constructs have been of interest. The current research has provided compelling support for the appropriateness of adopting a more fine grained approach to conceptualisations of rumination and thought suppression in order to accurately investigate their potential roles as cognitive risk factors for depression and other negative psychological outcomes.

This research has identified that reflection, as a subscale of rumination, can be both adaptive and maladaptive. These findings have implications for research involving rumination, and also clinical contexts in which cognitive processes are deemed relevant to psychological functioning. In addition, maladaptive rumination, comprised of brooding and focussing on depressive symptoms, emerged as a highly detrimental cognitive pattern. Maladaptive rumination was the most significant predictor of depression in its individual capacity, and largely mediated the effects of the other variables within the SEM. As such, these findings suggest the importance of recognising tendencies toward maladaptive rumination and targeting them with prevention and intervention strategies which aim to reduce those cognitive patterns.

The findings of previous research that thought suppression was associated with increased tendencies toward rumination which, in turn, was related to depression (Wenzlaff & Luxton, 2003) were replicated in this study. However, the inclusion of the two factors derived from the WBSI identified different influence of avoidance of unwanted thoughts and unwanted intrusive thoughts on depression. Those differences were able to be interpreted on the basis of conceptual variations between those factors, whereby avoidance of unwanted thoughts represented a more proactive approach which was deemed less likely to predispose an individual to depression than its counterpart, unwanted intrusive thoughts. The unwanted intrusive thoughts factor was identified as representing a more passive and submissive approach to the experience of unwanted thoughts, which was considered more maladaptive than the proactive approach indicated by avoidance of unwanted thoughts.

Positive self-evaluation was identified as a potential protective factor against depression. Participants who had not previously been diagnosed with depression were found to have significantly higher levels of positive self-evaluation compared to participants who had not received that diagnosis. Similarly, high levels of positive self-evaluation were associated with lower levels of depression. These findings suggested that encouraging individuals to engage in positive self-evaluation may have the capacity to increase cognitive resilience and, in the presence of depressive symptoms, to reduce the severity of those symptoms.

The findings pertaining to reaction time variability were less clear in this study. Although reaction time variability was found to have no predictive capacity within the SEM, and to be minimally influential within the regression models,

those findings may be a result of methodological limitations rather than theoretical robustness. It is acknowledged that the use of the dot probe task as a measure of reaction time variability may account for the differences between the current study and that of Ode, Robinson and Hanson (2011), which identified reaction time variability as a predictor of negative psychological outcomes. As such, further research is recommended in relation to these discrepant findings.

In conclusion, this study has identified several noteworthy findings which have contributed to the clarification of the interrelationships between a number of cognitive variables and depression. Several recommendations for further research have been articulated and recommended. Despite the limitations identified, it is suggested that this research has made a number of important contributions pertaining to understandings of the variables of interest and their individual and combined influence on depression.

Chapter 6 General Discussion

6.1 Summary of findings

This program of research has identified several noteworthy findings. In Study 1, it was identified that the Likert-scale measures of Ruminative Responses Scale (RRS), White Bear Suppression Inventory (WBSI) and Edinburgh Depression Scale (EDS) were comparable in an online testing modality to the traditionally administered paper-and-pencil version of those measures. Of the variables measured by the Self-referent Information Processing Task (SRIP), only SRIP1 PDR, which assesses an individual's tendency to endorse positive adjectives as being descriptive of their own personal traits, emerged as comparable in the two testing modalities. The Autobiographical Memory Test (AMT) was not comparable in the two testing modalities, and was therefore considered unsuitable for use in the online context. These findings indicated that a fixed response style (i.e., Likert scale) may facilitate the transferability of tasks to the online testing modality. It was suggested that the mixed support for the SRIP and the lack of support for the AMT may have been the result of the free response styles associated with those measures. This study reaffirmed the need for each individual measure to be assessed for comparability prior to use in the online testing modality.

In Study 2, the factor structures of the RRS and WBSI were examined in a number of groups. Those analyses identified a structure for the RRS that largely replicated previous findings in the entire sample and the female group. Variations in factor structure were evident for the male group and the possibly depressed group. The most robust factor structure consisted of three factors, namely "depression symptoms", "reflection" and "brooding". The factor structure of the

possibly depressed group indicated it was meaningful for those experiencing depressive symptoms to differentiate between the type of symptoms (i.e., physical, cognitive, behavioural, emotional), as evidenced by additional factors pertaining to symptom categories for that group. Multiple factors were identified for each of the groups, which provided additional empirical support for the multidimensional nature of rumination, as assessed by RRS.

Similarly, the factor structure identified for the WBSI indicated thought suppression, as assessed by that measure, is multidimensional. A particularly stable factor, labelled "unwanted intrusive thoughts", was identified in all groups under consideration. The remaining items were found to load on a single additional factor in the entire sample and the female group, and to divide into two additional factors for the other groups. The second factor identified for the entire sample and the female group, and thus included in additional analyses, was labelled "avoidance of unwanted thoughts".

The focus of Study 3 was to examine the individual and combined influences of a number of variables on depression. In order to justify the use of factors obtained in Study 2, confirmatory factor analyses were conducted which provided support for the appropriateness of the fit of the factor structures derived from the female sample for both the RRS and the WBSI. In addition, each of those factors was found to have acceptable levels of internal consistency, despite, in some cases, having only a small number of items loading on a particular factor. The robustness of those factor structures was interpreted as providing support for the appropriateness of utilising factor scores obtained from those factors in an endeavour to adopt a more fine grained approach to an investigation of the interactions between a number of noted cognitive risk factors for depression.

The cognitive risk factors for depression included in Study 3 were identified from the literature as demonstrating a relationship with depression vulnerability. In addition, each of the constructs was identified as having either conceptual overlap or previously established relationships with the other constructs under investigation. The constructs were further refined by the results of Study 1, which demonstrated the appropriateness (or otherwise) of utilising particular measures in the online domain. As such, the variables included in Study 3 had been empirically derived, methodologically assessed (in Study 1) and, in the case of rumination and thought suppression, psychometrically evaluated (in Study 2 and 3).

Having established their theoretical relationships, their methodological appropriateness for assessment in the online context, and their psychometric validity, the factors from the RRS and WBSI were included in regression analyses, along with positive self-evaluation and reaction time variability. The hypothesis that each of those constructs would contribute to the prediction of depression was partially supported. Whilst the combination of variables accounted for a substantial proportion of variance in depression, the influence of reflection and avoidance of unwanted thoughts were mediated by maladaptive rumination and, to a lesser extent, unwanted intrusive thoughts and positive self-evaluation.

Reflection was identified as potentially adaptive, when engaged in as a unitary process, or in conjunction with positive self-evaluation; and as maladaptive when it lead to the tendency to focus on one's depressive symptoms and to brooding. The distinction between reflection as potentially adaptive, and maladaptive rumination as detrimental, may be understood in terms of the

attributional reformulation of the learned helplessness theory of depression (Abramson, Seligman, & Teasdale, 1978). According to that theory, individuals who perceive an inability to change their circumstances are likely to feel helpless which, in turn, contributes to feelings of depression. In the context of the current findings, the more proactive approach of reflection could be inferred to represent a willingness to explore possibilities for change which is not indicative of helplessness. Conversely, maladaptive rumination, with its repetitive focus on the self and negative circumstances pertaining to feelings of depression, may represent the personal helplessness described by Abramson, Seligman, and Teasdale (1978). Maladaptive rumination items such as, "Why do I have problems other people don't have" appear consistent with personal helplessness, whereby the individual believes they "cannot solve solvable problems" (Abramson, Seligman, & Teasdale, 1978, p. 54). The finding that positive self-evaluation emerged as a potential protective factor against depression can also be considered consistent with the attributional reformulation of the learned helplessness theory of depression, as positive evaluations of the self are inconsistent with feelings of helplessness, and indicative of confidence in one's own ability to problem solve effectively. The two factors from the WBSI were identified as being predictive of depression only through their respective relationships with maladaptive rumination. Reaction time variability was not found to contribute to the prediction of depression.

An interesting finding pertaining to reaction time variability was obtained when groups were compared on the basis of, firstly their previous depression diagnosis status (previous depression diagnosis versus no previous depression diagnosis) and, secondly, on the basis of their current depressive symptoms.

There were no significant differences in reaction time variability on the basis of previous diagnosis; however, there were significant differences in that variable when current depressive symptoms were taken into account. These findings, in combination, suggested reaction time variability is not an effective predictor of depression however it is likely to be identified in the presence of current depressive symptoms.

Other pertinent findings from those between group comparisons related to reflection and avoidance of unwanted thoughts, which were significantly different between the groups on the basis of previous diagnosis, but ceased to be significantly different when current depressive symptoms were controlled for. These findings suggested tendencies toward reflection and avoidance of unwanted thoughts may be exacerbated in the presence of other depressive symptoms. It was apparent that, currently non-depressed people, whether they have previously been diagnosed with depression or not, did not appear to differ on those variables. As such, those tendencies may not represent cognitive vulnerabilities to depression, but rather cognitive patterns which become more defined in the presence of other depressive symptoms. These findings have implications in both research and clinical contexts.

6.2 Implications

The findings of Study 1 indicated that researchers may utilise the RRS, WBSI and EDS in an online context with confidence that the testing modality is unlikely to adversely affect the accuracy of their data, as compared to traditional data collection methods. Whilst those findings were interpreted in terms of the fixed nature of the responses required by those measures, the generalisability of those findings is limited to the particular measures assessed for comparability. As

such, one of the major implications of the results of Study 1 is the reiteration of the necessity for each psychological measure to be assessed for comparability prior to adaptation for online use.

The major implications of Study 2 pertain to the appropriateness of considering each of those measures multidimensional, and the need for additional research in relation to the factor structures of the RRS and WBSI in different groups. Preliminary support was found for meaningful differences according to gender and current levels of depression symptoms, and these differences should be further examined. Confirmatory factor analyses on the structures identified for each of the groups would provide additional insight into the robustness of those factor structures and their applicability within different groups.

The finding that both RRS and WBSI are multidimensional measures has implications for the use of those measures, particularly in the research context. It is recommended that future research take into account the individual factors within those measures, rather than considering those measures to assess a generic construct. Recognising the varying relationships between individual factors and other cognitive patterns may facilitate improved understanding of the multifaceted influence of cognition on psychological outcomes.

That fine grained approach to understanding interrelationships among variables was adopted in Study 3 and it informed the development of a model for predicting depression from the factors from the RRS and WBSI, along with positive self-evaluation and reaction time variability. That model clarified the complex interactions among those variables, and provided insight into the respective contributions of those variables in the prediction of depression. It is proposed that model could be utilised to inform the development of early

intervention and treatment programs for depression. The identification of different relationships between the factors derived from RRS and WBSI implies the importance of this fine grained approach in future research.

6.3 Limitations and recommendations for further research

The generalisability of the findings of this research may be limited by a number of relevant considerations. Firstly, Study 1 utilised a between-groups design, with non-random allocation. Whilst the between-groups design was beneficial in avoiding fatigue or practice effects, the non-random allocation raises a possibility that factors other than the testing modality may have influenced the findings of that study. However, deliberate steps were taken to minimise this risk, by assessing between-group differences on all the demographic variables of interest. As such, it is proposed that the likelihood of extraneous variables influencing the findings of that study is minimal. It is proposed that additional research could consider the equivalence of these variables in the online context utilising either a within-groups design or a between-groups design with random allocation, in order to more definitively eliminate the possibility that extraneous variables may have influenced these findings.

Another limitation of Study 1 was its small sample size and the fact that only females were included. Although these issues are acknowledged as potentially limiting the generalisability of that study's findings, they were not considered particularly problematic in the current context for two reasons. Firstly, the purpose of that study was essentially to conduct a pilot study to assess the appropriateness of the online use of the measures of interest. As such, the small sample size was deemed appropriate. In addition, the focus of this research was predominantly on cognitive vulnerability to depression in females, so the use of

female participants in Study 1 was consistent with that research question. To increase the generalisability of the findings of Study 1, the use of a larger and more heterogeneous sample is recommended.

It was also identified that the presence of the researcher for the traditionally administered condition may have represented a confounding variable, as the researcher was not present in the online administration condition. Although this variation in testing modalities is acknowledged as a potential confound, it is not easily avoided. The predominant barrier to the avoidance of this potential limitation is the fact that some of the tasks being investigated (namely, AMT and SRIP) included components which needed to be completed under timed conditions. Such time-keeping was most logically performed by the researcher, as the only alternative would appear to be for the participant to keep time themselves. However, it would appear that adapting the testing conditions so that the participant was responsible for the time keeping of their own performance would represent a likely distraction and, by definition, become an alternative, but similarly problematic, confound. Conversely, to introduce the researcher to the online context was not feasible, as the presence of the researcher would require face-to-face contact between the researcher and each participant which would, of necessity, reduce the major benefit associated with online data collection i.e., the capacity to obtain a large sample by reducing the need for participants to be physically present with the researcher. As such, although the confound represented by the presence of the researcher in one context is acknowledged, it is proposed that no alternative was feasible in the current study. Additional research could evaluate the comparability of the untimed tasks without a researcher present in either testing condition, to overcome this limitation.

A potential limitation of Study 2 was the arbitrary cut-off used to create the "possibly depressed" group for the purposes of comparing the factor structure of the RRS and WBSI in "not depressed" and "possibly depressed" groups. Whilst the cut-off utilised was that recommended by the authors of the EDS, the use of that cut-off may prohibit the generalisation of that study's findings to a clinically depressed group. Further, it is proposed that the use of the arbitrary cut-off to distinguish the possibly depressed group from the not depressed group may have implications for the interpretation of discrepancies between the findings of Study 2 and Whitmer and Gotlib (2011) in relation to the factor structure of the RRS in a currently depressed group. Given Whitmer and Gotlib utilised participants who had been assessed as clinically depressed via a structured clinical interview, their findings are likely to more accurately reflect the factor structure of a clinically depressed group than the findings of Study 2. However, whilst the factor structure identified by Whitmer and Gotlib for the depressed group was not replicated in Study 2, a consistent trend emerged across both studies, whereby people suffering from depressive symptoms elucidated a different factor structure for the RRS compared to participants who were not experiencing depressive symptoms. As such, although the arbitrary cutoff may prevent the generalisation of this study's findings to a clinically depressed group, it has still made a worthwhile contribution to the literature and provided further support for the notion identified by Whitmer and Gotlib that people experiencing depressive symptoms appear to engage with the RRS differently to individuals not currently experiencing those symptoms. Additional research which included a not depressed, a possibly depressed and a clinically depressed group (as diagnosed via appropriate procedures) could meaningfully examine the differences between

those groups and provide a compelling presentation of the factor structures for each of those groups.

Study 2 provided preliminary support for gender and depression-level differences in the factor structures of RRS and WBSI. In order to investigate gender and depression-level differences in the factor structures of RRS and WBSI in greater detail, additional research which included a sufficient number of participants to facilitate the development of four groups (as follows) would be beneficial: (a) male/not depressed; (b) male/possibly depressed; (c) female/not depressed; (d) female/possibly depressed. Such delineation of participants would facilitate meaningful comparisons both on the basis of gender and depression symptoms, and elucidate a clearer understanding of the differences between those groups. The factor structures derived for each of those groups could also be confirmed via confirmatory factor analyses, as a further rationale for the appropriateness of those structures.

A limitation of Study 3 was the inclusion of positive self-evaluation as a possible cognitive influencer of depression, whereas the more logical inclusion would appear to have been that of negative self-evaluation. The rationale for the exclusion of negative self-evaluation was purely methodological in nature. That variable was not deemed comparable in the online modality when it was assessed in Study 1 and was subsequently excluded from additional analyses. Therefore, whilst the exclusion of that variable was consistent with the findings of Study 1, it may have reduced the capacity of Study 3 to fully consider the influence of self-evaluation on cognitive vulnerability to depression. The interesting findings pertaining to positive self-evaluation suggest the inclusion of that variable was not without justification. However, it is acknowledged that a consideration of the

influence of negative self-evaluation on depression would have been meritorious. Additional research which does not rely on online data collection and can therefore consider negative self-evaluation would be beneficial to more fully investigate the relationship between self-evaluation and depression.

Similarly, substantial research evidence has implicated overgeneral autobiographical memory in depression vulnerability. As outlined in Chapter 2 above, at the commencement of this research it was intended to further explore that direct relationship, and to examine potential mediational or interactive effects between overgeneral autobiographical memory and the other cognitive vulnerability variables of interest in this research. However, the findings of Study 1 indicated the utilisation of the Autobiographical Memory Task (AMT) online was not appropriate. It was determined that the overall benefit of obtaining a large sample in order to examine the other variables of interest (via online testing) exceeded the benefit of adjusting the testing modality to facilitate the inclusion of the AMT. As such, further research is recommended which investigates the relationship between overgeneral autobiographical memory, rumination, thought suppression, self-evaluation and depression.

In addition, the appropriateness of the SEM developed in Study 3 should be further investigated in different populations, in order to increase its generalisability and as a means of clarifying similarities and differences between groups in the cognitive pathway to depression. Identification of the components of the model which apply to other populations (such as males) would further consolidate the identified relationship between those variables and depression. Conversely, identifying aspects of the model which do not generalise to other

populations may also provide insight into meaningful between group differences in cognitive vulnerability to depression.

A noted limitation of Study 3 was the inability to definitively identify variables as cognitive risk factors for depression as opposed to cognitive remnants of a depressive episode. The between-group comparisons on the basis of previous diagnosis when controlling for current symptoms provided preliminary suggestions in relation to cognitive patterns, such as brooding, which may predispose an individual to depression, and cognitive patterns such as reflection which only appear problematic during episodes of current symptoms. However, longitudinal analyses are required in order to properly examine the role of predisposing factors and facets of cognitive experience which are either magnified in the presence of depressive symptoms, or are cognitive "scars" of a previous episode of depression. A combination of prospective and retrospective analyses is recommended to properly examine this question. The identification of cognitive patterns which are evident prior to the onset of a depressive episode (prospective) and which can meaningfully differentiate between individuals who have and have not experienced a previous episode of depression (retrospective) would provide convincing empirical justification for such patterns to be considered cognitive risk factors for depression.

6.4 Conclusions

This research program has made methodological, psychometric and theoretical contributions to the literature. The findings from Study 1 suggest each psychological measurement instrument that is adapted for use in the online context should be evaluated for comparability with the traditional administration prior to use in research or clinical practice. The cumulative findings of the two

subsequent studies conducted in the course of this research indicated a fine

grained approach to understanding the interrelationships between cognitive

processes and depression provided interesting insight into the complex and

multifaceted influence of cognitive patterns on depression, specifically in females.

Such findings suggest the importance of considering cognitive constructs in their

simplest form as a means of clarifying the mechanisms underlying the

relationships between those constructs and psychological outcomes such as

depression.

References

Abramson, L.Y., Alloy, L.B., Hogan, M.E., Whitehouse, W.G., Donovan, P.,

    Rose, D.T., Panzarella, C., & Raniere, D. (1999). Cognitive vulnerability

    to depression: Theory and evidence. *Journal of Cognitive Psychotherapy,*

    13(1), 5 – 20.

Abramson, L.Y., Metalsky, G.I., & Alloy, L.B. (1989). Hopelessness depression:

    A theory-based subtype of depression. *Psychological Review, 96*, 358 –

    372.

Abramson, L.Y., Seligman, M.E.P., & Teasdale, J.D. (1978). Learned

    helplessness in humans: Critique and reformulation. *Journal of Abnormal*

    Psychology, 87(1), 49 – 74.

Alloy, L.B., & Abramson, L.Y. (1999). The Temple-Wisconsin cognitive

    vulnerability to depression project: Conceptual background, design, and

    methods. *Journal of Cognitive Psychotherapy, 13*(3), 227 – 262.

Alloy, L.B., Abramson, L.Y., Murray, L.A., Whitehouse, W.G., & Hogan, M.E.

    (1997). Self-referent information-processing in individuals at high and low

    cognitive risk for depression. *Cognition & Emotion, 11*(5/6), 539 – 568.

Alloy, L.B., Abramson, L.Y., Walshaw, P.D., & Neeren, A.M. (2006). Cognitive

    vulnerability to unipolar and bipolar mood disorders. *Journal of Social*

    and Clinical Psychology, 25(7), 726 – 754.

Alloy, L.B., Lipman, A.J., & Abramson, L.Y. (1992). Attributional style as a

    vulnerability factor for depression: Validation by past history of mood

    disorders. *Cognitive Therapy and Research, 16*(4), 391 – 407.

Alloy, L.B., & Riskind, J.H. (Eds). (2006). *Cognitive vulnerability to emotional*

    disorders. New York: Lawrence Erlbaum Associates.

American Psychological Association. (2000). *Diagnostic and statistical manual*

    of mental disorders: DSM-IV-TR (4th ed.). Washington, D.C.: The

    Association.

Austin, M.P., & Lumley, J. (2003). Antenatal screening for postnatal depression:

    A systematic review. *Acta Psychiatrica Scandinavica, 107*, 10 - 17.

Australian Bureau of Statistics. (2008). *National survey of mental health and*

    wellbeing: Summary of results. Retrieved 8 February 2012 from

    http://www.ausstats.abs.gov.au/ausstats/subscriber.nsf/0/6AE6DA447F98

    5FC2CA2574EA00122BD6/$File/43260_2007.pdf.

Bagby, R. M., & Parker, J. D. A. (2001). Relation of rumination and distraction

    with neuroticism and extraversion in a sample of patients with major

    depression. *Cognitive Therapy & Research, 25*, 91 - 102.

Barchard, K. A., & Williams, J. (2008). Practical advice for conducting ethical

    online experiments and questionnaires for United States psychologists.

    Behavior Research Methods, 40(4), 1111 - 1128.

Barnard, P.J., Watkins, E.R., & Ramponi, C. (2006). Reducing specificity of

    autobiographical memory in nonclinical participants: The role of

    rumination and schematic models. *Cognition & Emotion, 20*(3/4), 328 –

    350, doi: 10/1080/02699930500342589.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable

    distinction in social psychological research: Conceptual, strategic, and

    statistical considerations. Journal of Personality and Social Psychology,

    51, 1173-1182.

Barrett, P. (2007). Structural equation modelling: Adjudging model fit. *Personality and Individual Differences, 42*(5), 815 – 824, doi: 10.1016/j.paid.2006.09.018.

Beck, A.T. (2008). The evolution of the cognitive model of depression and its neurobiological correlates. *American Journal of Psychiatry, 196*, 969 – 977.

Beck, C.T. (1993). Teetering on the edge: A substantive theory of postpartum depression. *Nursing Research, 42*(1), 42 – 48.

Beevers, C.G., & Carver, C.S. (2003). Attentional bias and mood persistence as prospective predictors of dysphoria. *Cognitive Therapy & Research, 27*(6), 619 – 637.

Beevers, C.G., Wenzlaff, R.M., Hayes, A.M., & Scott, W.D. (1999). Depression and the ironic effects of thought suppression: Therapeutic strategies for improving mental control. *Clinical Psychology: Science and Practice, 6*(2), 133 – 148, doi: 10.1093/clipsy.6.2.133.

Beggs, S., Vos, T., Barker, B., Stevenson, C., Stanley, L., & Lopez, A.D. (2007). The burden of disease and injury in Australia 2003. PHE82. Canberra: AIHW.

Benvenuti, P., Valoriani, V., Geurrini Degl'Innocenti, B., Favini, I., Hipwell, A., & Pazzagli, A. (2001). Postnatal depression and the impact on infant-carer attachment strategies. *Archives of Women's Mental Health, 3*, 155 – 164.

Bertakis, K.D., Helms, L.J., Callahan, E.J., Azari, R., Leigh, P., & Robbins, J.A. (2001). Patient gender differences in the diagnosis of depression in primary care. *Journal of Women's Health and Gender-based Medicine, 10*(7), 689 – 698.

Blumberg, S. J. (2000). The white bear suppression inventory: Revisiting its

　　　factor structure. *Personality and Individual Differences, 29*(5), 943 - 950.

　　　doi: 10.1016/S0191-8869(99)00245-7.

Bohon, C., Stice, E., Burton, E., Fudell, M., & Nolen-Hoeksema, S. (2008). A

　　　prospective test of cognitive vulnerability models of depression with

　　　adolescent girls. *Behavior Therapy, 39*, 79 – 90.

Burt, D.B., Zembar, M.J., & Niederehe, G. (1995). Depression and memory

　　　impairment: A meta-analysis of the association, its pattern, and specificity.

　　　Psychological Bulletin, 117, 285 – 305.

Bradley, M.M. & Lang, P.J. (1999). Affective norms for English words (ANEW).

　　　Gainesville, FL. The NIMH Center for the Study of Emotion and Attention,

　　　University of Florida.

Bradley, B.P., Mogg, K., & Lee, S.C. (1997). Attentional biases for negative

　　　information in induced and naturally occurring dysphoria. *Behaviour*

　　　Therapy & Research, 35, 911 – 927.

Brittlebank, A.D., Scott, J., Williams, J.M.G., & Ferrier, L.N. (1993).

　　　Autobiographical memory in depression: State or trait marker? *British*

　　　Journal of Psychiatry, 162, 118 – 121.

Brommelhoff, J.A., Conway, K., Merikangas, K., & Levy, B.R. (2004). Higher

　　　rates of depression in women: Role of gender bias within the family.

　　　Journal of Women's Health, 13(1), 69 – 76.

Buchanan, T. (2003). Internet-based questionnaire assessment: Appropriate use in

　　　clinical contexts. *Cognitive Behaviour Therapy, 32*(3), 100 - 109.

Buchanan, T., & Smith, J. L. (1999). Using the internet for psychological research: Personality testing on the World Wide Web. *British Journal of Psychology, 90*, 125 - 144.

Butcher, J. N., Perry, J. N., & Atlis, M. M. (2000). Validity and utility of computer-based test interpretation. *Psychological Assessment, 12*, 6 - 18.

Campbell, A., Hayes, B., & Buckby, B. (2008). Aboriginal and Torres Strait Islander women's experience when interacting with the Edinburgh Postnatal Depression Scale: A brief note. *Australian Journal of Rural Health, 16*(3), 124 - 131.

Castellanos, F.X., Sonuga-Barke, E.J.S., Scheres, A., Di Martino, A., Hyde, C., & Walters, J.R. (2005). Varieties of Attention-Deficit/Hyperactivity Disorder-related intra-individual variability. *Biological Psychiatry, 57,* 1416 – 1423, doi: 10.1016/j.biopsych.2004.12.005.

Christensen, H., Griffiths, K., Mackinnon, A., and Jacomb, P. (1997). A quantitative review of cognitive deficits in depression and Alzheimer-type dementia. *Journal of the International Neuropsychological Society, 3* 631 – 651.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155 - 159.

Coles, M. E., Cook, L. M., & Blake, T. R. (2007). Assessing obsessive compulsive symptoms and cognitions on the internet: Evidence for the comparability of paper and internet administration. *Behaviour Research & Therapy, 45*, 2232 - 2240.

Conway, M., Csank, P. A. R., Holm, S. L., & Blake, C. K. (2000). On assessing individual differences in rumination on sadness. *Journal of Personality Assessment, 75*(3), 404 - 425.

Cooper, P. J., & Murray, L. (1997). Prediction, detection, and treatment of

    postnatal depression. *Archives of Disease in Childhood, 77*(2), 97 - 101.

Costello, A.B., & Osborne, J. W. (2005). Best practices in exploratory factor

    analysis: Four recommendations for getting the most from your analysis.

    Practical Assessment Research and Evaluation, 10(7), 1 – 9.

Cox, J.L., Chapman, G., Murray, D, & Jones, P. (1996). Validation of the

    Edinburgh postnatal depression scale (EPDS) in non-postnatal women.

    Journal of Affective Disorders, 39(3), 185 – 189.

Cox, B. J., Enns, M. W., & Taylor, S. (2001). The effect of rumination as a

    mediator of elevated anxiety sensitivity in major depression. *Cognitive*

    Therapy & Research, 25(5), 525 - 534.

Cox, J., Holden, J., & Sagovsky, R. (1987). Detection of postnatal depression:

    Development of 10 item Edinburgh Postnatal Depression Scale. *British*

    Journal of Psychiatry, 150, 782 - 786.

Croll, S., & Bryant, R.A. (2000). Autobiographical memory in postnatal

    depression. *Cognitive Therapy and Research, 24*(4), 419 – 426.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests.

    Psychometrika, 16(3), 297 - 334.

Davies, M. I., & Clark, D. M. (1998). Thought suppression produces rebound

    effect with analogue post-traumatic intrusions. *Behaviour Research &*

    Therapy, 36, 571 - 582.

Davis, R. N. (1999). Web-based administration of a personality questionnaire:

    Comparison with traditional methods. *Behavior Research Methods,*

    Instruments & Computers, 31(4), 572 - 577.

DePue, R.A., & Monroe, S.M. (1978). Learned helplessness in the perspective of

the depressive disorders: Conceptual and definitional issues. *Journal of*

Abnormal Psychology, 87(1), 3 – 20.

DeVellis, R. F. (1991). *Scale development*. Newbury Park, NJ: Sage Publications.

DiStefano, C., Zhu, M., & Mindrila, D. (2009). Understanding and using factor

scores: Considerations for the applied researcher. *Practical Assessment,*

Research & Evaluation, 14(20). Available online:

http://pareonline.net/getvn.asp?v=14&n=20.

Dohr, K.B., Rush, A.J., & Bernstein, I.H. (1989). Cognitive biases and

depression. *Journal of Abnormal Psychology, 98,* 263 – 267.

Ehlers, A., Mayou, R. A., & Bryant, B. (1998). Psychological predictors of

chronic posttraumatic stress disorder after motor vehicle accidents.

Journal of Abnormal Psychology, 107(3), 508 - 519.

Embretson, S.E. (1998). The new rules of measurement. *Psychological*

Assessment, 8(4), 341 – 349.

Epstein, J., Klinkenberg, W. D., Wiley, D., & McKinley, L. (2001). Insuring

sample equivalence across internet and paper-and-pencil assessments.

Computers in Human Behaviour, 17, 339 - 346.

Eysenck, M.W. (2000). A cognitive approach to trait anxiety. *European Journal*

of Personality, 14, 463 – 476.

Eysenck, M.W., & Derakshan, N. (2011). New perspectives in attentional control

theory. *Personality and Individual Differences, 50*, 955 – 960, doi:

10.1016/j.paid.2010.08.019.

Field, A. (2005). *Discovering statistics using SPSS* (2nd ed.). London: SAGE

Publications.

Fisher, R. (1921). On the 'probable error' of a coefficient of correlation deduced from a small sample. *Metron, 1*, 3 - 32.

Flynn, M., Kecmanovic, J., & Alloy, L.B. (2010). An examination of integrated cognitive-interpersonal vulnerability to depression: The role of rumination, perceived social support, and interpersonal stress generation. *Cognitive Therapy and Research, 24*, 456 – 466, doi: 10.1007/s10608-010-9300-8.

George, D., & Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.). Boston: Allyn & Bacon.

Giambra, L.M. (1995). A laboratory based method for investigating influences on switching attention to task unrelated imagery and thought. *Consciousness and Cognition, 4*(1), 1 – 21.

Gibb, B.E., & Alloy, L.B. (2006). A prospective test of the hopelessness theory of depression in children. *Journal of Clinical Child and Adolescent Psychology, 35*(2), 264 – 274, doi: 10.1207/s15374424jccp3502_10.

Gibbs, B.R., & Rude, S.S. (2004). Overgeneral autobiographical memory as depression vulnerability. *Cognitive Therapy and Research, 28*(4), 511 – 526.

Gollwitzer, P.M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist, 54*(7), 493 – 503.

Gotlib, I.H., & Joormann, J. (2010). Cognition and depression: Current status and future directions. *Annual Review of Clinical Psychology, 6*, 285 – 312, doi: 10.1146/annurev.clin.psy.121208.131305.

Grazioli, R., & Terry, D.J. (2000). The role of cognitive vulnerability and stress in

the prediction of postpartum depressive symptomatology. *The British*

Journal of Clinical Psychology, 39, 329 – 347.

Grieve, R., & de Groot, H.T. (2011). Does online psychological test administation

facilitate faking? *Computers in Human Behavior, 27*, 2386 – 2391, doi:

10/1016/chb.2011.08.001.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E., & Tatham, R.L. (2006).

Multivariate Data Analysis (6th ed.). Upper Saddle River, NJ: Pearson

Education Inc.

Hall, P. L., & Papageorgiou, C. (2005). Negative thoughts after childbirth:

Development and preliminary validation of a self-report scale. *Depression*

and Anxiety, 22, 121 - 129.

Hankin, B.L., & Abramson, L.Y. (1999). Development of gender differences in

depression: Description and possible explanations. *Annals of Medicine,*

31(6), 372 – 379.

Harvey, A.G., Bryant, R.A., & Dang, S.T. (1998). Autobiographical memory in

acute stress disorder. *Journal of Consulting and Clinical Psychology,*

66(3), 500 – 506.

Hertel, P.T. (1997). On the contribution of deficient cognitive control to memory

impairments in depression. *Cognition & Emotion, 11,* 569 – 584.

Hertel, P.T. (1998). Relation between rumination and impaired memory in

dysphoric moods. *Journal of Abnormal Psychology, 107*(1), 166 – 172.

Hertel, P.T., & Gerstle, M. (2003). Depressive deficits in forgetting.

Psychological Science, 14(6), 573 – 578.

Hertel, P.T., & Rude, S.S. (1991). Depressive deficits in memory: Focusing

    attention improves subsequent recall. *Journal of Experimental*

    Psychology: General, 120(3), 301 – 309.

Hollandare, F., Askerlund, A., Nieminen, A., & Engstrom, I. (2008). Can the

    BDI-II and MADRS-S be transferred to online use without affecting their

    psychometric properties. *E-Journal of Applied Psychology, 4*(2), 63 - 65.

Honey, K. L., Bennett, P., & Morgan, M. (2003). Predicting postnatal depression.

    Journal of Affective Disorders, 76, 201 - 210.

Hu, L, & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance

    structure analysis: Conventional criteria versus new alternatives.

    Structural Equation Modeling: A Multidisciplinary Journal, 6(1), 1 – 55,

    doi: 10.1080/10705519909540118.

Huckert, T., & Krampen, G. (2010). Empirical test of an integrative model

    explaining higher prevalence of subclinical depression in women: A

    normative sex-role orientation approach. *Journal of Applied*

    Biobehavioral Research, 15(3), 144 – 160.

Hunt, M., Auriemma, J., & Cashaw, A.C.A. (2003). Self-report bias and

    underreporting of depression on the BDI-II. *Journal of Personality*

    Assessment, 80(1), 26 – 30.

Ingram, R.E., Cruet, D., Johnson, B., & Wisnicki, K.S. (1988). Self-focused

    attention, gender, gender role, and vulnerability to negative affect. *Journal*

    of Personality and Social Psychology, 55(6), 967 – 978.

Ingram, R.E., Miranda, J., & Segal, Z.V. (1998). *Cognitive vulnerability to*

    depression. New York: Guilford Press.

Ingram, R.E., & Ritter, J. (2000). Vulnerability to depression: Cognitive reactivity

    and parental bonding in high-risk individuals. *Journal of Abnormal*

    Psychology, 109(4), 588 – 596, doi: 10.1037/0021-843X.109.4.588.

Janeck, A. S., & Calamari, J. E. (1999). Thought suppression in obsessive-

    compulsive disorder. *Cognitive Therapy & Research, 23*(5), 497 - 509

Joinson, A. (1999). Social desirability, anonymity, and Internet-based

    questionnaires. *Behavior Research Methods, Instruments & Computers,*

    31(3), 433 - 438.

Joormann, J. (2006). Differential effects of rumination and dysphoria on the

    inhibition of irrelevant emotional material: Evidence from a negative

    priming task. *Cognitive Therapy and Research, 30*(2), 149 – 160, doi:

    10.1007/s10608-006-9035-8.

Just, N., & Alloy, L. B. (1997). The Response Styles Theory of depression: Tests

    and an extension of the theory. *Journal of Abnormal Psychology, 106*(2),

    221 - 229.

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 35*, 401 -

    415.

Kaplan, R.M., & Saccuzzo, D.P. (2005). *Psychological Testing: Principles,*

    Applications, and Issues, 6ᵗʰ ed., Thomson Wadworth: Belmont, CA.

Kelly, A.M.C., Uddin, L.Q., Biswal, B.B., Castellanos, F.X., and Milham, M.P.

    (2008). Competition between functional brain networks mediates

    behavioral variability. *NeuroImage, 39,* 527 – 537, doi:

    10.1016/j.neuroimage.2007.08.2008.

Kendler, K.S., Thornton, L.M., & Prescott, C.A. (2001). Gender differences in the

    rates of exposure to stressful life events and sensitivity to their

depressogenic effects. *The American Journal of Psychiatry, 158*(4), 587 – 593.

Klein, C., Wendling, K., Huettner, P., Ruder, H., & Peper, M. (2006). Intra-subject variability in Attention-Deficit Hyperactivity disorder. *Biological Psychiatry, 60*, 1088 – 1097, doi: 10.1016/j.biopsych.2006.04.003.

Kraut, R., Olson, J., Banaji, M., Bruckman, A., Cohen, J., & Couper, M. (2003). Psychological research online: Opportunities and challenges. *APA - Internet version*.

Kuehner, C., & Weber, I. (1999). Responses to depression in unipolar depressed patients: An investigation of Nolen-Hoeksema's response styles theory. *Psychological Medicine, 29*, 1323 – 1333.

Lam, D., Smith, S., Checkley, S., Rijsdijk, F., & Sham, P. (2003). Effect of neuroticism, response style and information processing on depression severity in a clinically depressed sample. *Psychological Medicine, 33*, 469 - 479. doi: 10.1017/S0033291702007304

Langenecker, S.A., Bieliauskas, L.A., Rapport, L.J., Zubieta, J., Wilde, E.A., & Berent, S. (2005). Face emotion perception and executive functioning deficits in depression. *Journal of Cllinical and Experimental Neuropsychology, 27*, 320 – 333, doi: 10.1080/13803390490490515720.

Lewinsohn, P.M., Hoberman, H.M, & Rosenbaum, M. (1988). A prospective study of risk factors for unipolar depression. *Journal of Abnormal Psychology, 97*(3), 251 – 264.

Lloyd-Williams, M., Dennis, M., & Taylor, F. (2004). A prospective study to compare three depression screening tools in patients who are terminally ill. *General Hospital Psychiatry, 26*(5), 384 - 389.

Lloyd-Williams, M., Shiels, C., Taylor, F., & Dennis, M. (2009). Depression - An

    independent predictor of early death in patients with advanced cancer.

    Journal of Affective Disorders, 113(1-2), 127 - 132.

Lyubomirsky, S., Caldwell, N.D., & Nolen-Hoeksema, S. (1998). Effects of

    ruminative and distracting responses to depressed mood on retrieval of

    autobiographical memories. *Journal of Personality and Social*

    *Psychology, 75*91), 166 – 177.

Mackinger, H.F., Loschin, G.G., & Leibetseder, M.M. (2000). Prediction of

    postnatal affective changes by autobiographical memories. *European*

    Psychologist, 5(1), 52 – 61.

Macleod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional

    disorders. *Journal of Abnormal Psychology, 95*(1), 15 – 20.

Mathews, A., & Macleod, C. (2005). Cognitive vulnerability to emotional

    disorders. *Annual Review of Clinical Psychology, 1,* 167 – 195.

Mathews, A., Ridgeway, V., & Williamson, D.A. (1996). Evidence for attention

    to threatening stimuli in depression. *Behaviour Research & Therapy, 34*,

    695 – 705.

McBride, C., & Bagby, R.M. (2006). Rumination and interpersonal dependency:

    Explaining women's vulnerability to depression. *Canadian Psychology,*

    47(3), 184 – 194.

Miklowitz, D. J., Yousra, A., Geddes, J. R., Goodwin, G. M., & Williams, J. M.

    (2010). Thought suppression in patients with bipolar disorder. *Journal of*

    Abnormal Psychology, 119(2), 355 - 365.

Milgrom, J., & Beatrice, G. (2003). Coping with the stress of motherhood:

    Cognitive and defence style of women with postnatal depression. *Stress*

    and Health, 19, 281 - 287.

Mogg, K., Bradley, B., & Williams, R. (1995). Attentional bias in depression and anxiety: The role of awareness. *British Journal of Clinical Psychology, 34*(1), 17 – 36.

Morrow, J., & Nolen-Hoeksema, S. (1990). Effects of responses to depression on the remidation of depressive affect. *Journal of Personality and Social Psychology, 58*(3), 519 - 527.

Muris, P., Merckelbach, H., & Horselenberg, R. (1996). Individual differences in thought suppression. The White Bear Suppression Inventory: Factor structure, reliability, validity and correlates. *Behaviour Research and Therapy, 34*(5/6), 501 – 513.

Murray, L, Fiori-Cowley, A., Hooper, R., & Cooper, P. (1996). The impact of postnatal depression and associated adversity on early mother-infant interactions and later infant outcome. *Child Development, 67*, 2512 – 2526.

Nickerson, R.S. (2000). Null hypothesis significance testing: A review of an old and continuing controversy. *Psychological Methods, 5*(2), 241 – 301, doi: 10.1037//1082-989X.5.2.241.

Nolan, S. A., Roberts, J. E., & Gotlib, I. H. (1998). Neuroticism and ruminative response style as predictors of change in depressive symptomatology. *Cognitive Therapy & Research, 22*(5), 445 - 455.

Nolen-Hoeksema, S. (1987). Sex differences in unipolar depression: Evidence and theory. *Psychological Bulletin, 101*, 259 - 282.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology, 100*(4), 569 – 582.

Nolen-Hoeksema, S. (1998). The other end of the continuum: The costs of

rumination. *Psychological Inquiry, 9*(3), 216 – 219,

doi: 10.1207/s15327965pli0903_5.

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and

mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology,*

109(3), 504 - 511.

Nolen-Hoeksema, S., & Jackson, B. (2001). Mediators of the gender difference in

rumination. *Psychology of Women Quarterly, 25*, 37 – 47.

Nolen-Hoeksema, S., Larson, J., & Grayson, C. (1999). Explaining the gender

difference in depressive symptoms. *Journal of Personality and Social*

Psychology, 77(5), 1061 – 1072

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and

posttraumatic stress symptoms after a natural disaster: The 1989 Loma

Preita earthquake. *Journal of Personality and Social Psychology, 61*, 115-

121.

Nolen-Hoeksema, S., Morrow, J., & Fredrickson, B. L. (1993). Response styles

and the duration of episodes of depressed mood. *Journal of Abnormal*

Psychology, 102(1), 20 - 28.

Nolen-Hoeksema, S., Parker, L. E., & Larson, J. (1994). Ruminative coping with

depressed mood following loss. *Journal of Personality and Social*

Psychology, 67, 92 - 104.

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking

rumination. *Perspectives on Psychological Science, 3*(5), 400 - 424.

Nyklicek, I., Scherders, M. J., & Pop, V. J. M. (2004). Multiple assessments of

depressive symptoms as an index of depression in population-based

samples. *Psychiatry Research, 128*(2), 111 - 116. doi: 10.1016/j.psychres.2004.05.017

Ode, S., Robinson, M.D., & Hanson, D.M. (2011). Cognitive-emotional dysfunction among noisy minds: Predictions from individual differences in reaction time variability. *Cognition & Emotion, 25*(2), 307 – 327, doi: 10.1080/02699931.2010.494387.

Ogrodniczuk, J. S., & Piper, W. E. (2003). Preventing postnatal depression: A review of research findings. *Harvard Review of Psychiatry, 11*, 291 - 307.

Peterson, C., & Vaidya, R.S. (2001). Explanatory style, expectations, and depressive symptoms. *Personality and Individual Differences, 31*, 1217 – 1223.

Petrie, K. J., Booth, R. J., & Pennebaker, J. W. (1998). The immunology effects of thought suppression. *Journal of Personality and Social Psychology, 75*(5), 1264 - 1272.

Phillips, D., & Segal, B. (1969). Sexual status and psychiatric symptoms. *American Sociological Review, 34,* 58 – 72.

Reilly-Harrington, N.A., Alloy, L.B., Fresco, D.M., & Whitehouse, W.G. (1999). Cognitive styles and life events interact to predict bipolar and unipolar symptomatology. *Journal of Abnormal Psychology, 108*(4), 567 – 578.

Reise, S.P., Ainsworth, A.T., & Haviland, M.G. (2005). Item response theory: Fundamentals, applications, and promise in psychological research. *Current Directions in Psychological Science, 14*(2), 95 – 101.

Rekart, K., Mineka, S., & Zinbarg, R. E. (2006). Autobiographical memory in dysphoric and non-dysphoric college students using a computerised version of the AMT. *Cognition & Emotion, 20*(3/4), 506 - 515.

Roberts, J. E., Gilboa, E., & Gotlib, I. H. (1998). Ruminative response style and vulnerability to episodes of dysphoria: Gender, neuroticism, and episode duration. *Cognitive Therapy & Research, 22*(4), 401 - 423.

Roelofs, J., Muris, P., Huibers, M., Peeters, F., & Arntz, A. (2006). On the measurement of rumination: A psychometric evaluation of the Ruminative Response Scale and the Rumination of Sadness Scale in undergraduates. *Journal of Behaviour Therapy & Experimental Psychiatry, 27*, 299 - 313.

Romens, S.E., Abramson, L.Y., & Alloy, L.B. (2009). High and low cognitive risk for depression: Stability from late adolescence to early adulthood. *Cognitive Therapy and Research, 33*, 480 – 498, doi: 10.1007/s10608-008-9219-5.

Rude, S., Maestas, K.L., & Neff, K. (2007). Paying attention to distress: What's wrong with rumination? *Cognition and Emotion, 21*(4), 843 – 864, doi: 10.1080/02699930601056732.

Sanathara, V.A., Gardner, C.O., Prescott, C.A., & Kendler, K.S. (2003). Interpersonal dependence and major depression: Aetiological inter-relationship and gender differences. *Psychological Medicine, 33*(5), 927 – 931, doi: 10.1017/S0033291703007542.

Santor, D.A., & Ramsay, J.O. (1998). Progress in the technology of measurement: Application of item response models. *Psychological Assessment, 10*(4), 345 – 359.

Scher, C.D., Ingram, R.E., & Segal, Z.V. (2005). Cognitive reactivity and vulnerability: Empirical evaluation of construct activation and cognitive diatheses in unipolar depression. *Clinical Psychology Review, 25*, 487 – 510, doi: 10.1016/j.cpr.2005.01.005.

Schulenberg, S. E., & Yutrzenka, B. A. (2004). Ethical issues in the use of computerized assessment. *Computers in Human Behaviour, 20*, 477 - 490.

Schreiber, J.B., Stage, F.K., King, J., Nora, A., & Barlow, E.A. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research, 99*(6), 323 – 336.

Segal, Z.V., & Shaw, B.F. (1986). Cognition in depression: A reappraisal of Coyne & Gotlib's critique. *Cognitive Therapy and Research, 10*, 671 – 694.

Segal, Z.V., & Gemar, M. (1997). Changes in cognitive organisation for negative self-referent material following cognitive behaviour therapy for depression: A primed Stroop study. *Cognition & Emotion, 11*(5/6), 501 – 516, doi: 10.1080/026999397379863a.

Seibert, P.S., & Ellis, H.C. (1991). Irrelevant thoughts, emotional mood states and cognitive performance. *Memory and Cognition, 5*, 507 – 513.

Shaw, J., Kennedy, S.H., & Joffe, R.T. (1995). Gender differences in mood disorders: A clinical focus. In: Seeman, M.V. (Ed). *Gender and psychopathology*, pp 89 – 112. Washington, DC: American Psychiatric Press.

Smallwood, J., Davies, J.B., Heim, D., Finnigan, F., Sudberry, M., O'Connor, R., & Obonsawin, M. (2004). Subjective experience and the attentional lapse: Task engagement and disengagement during sustained attention. *Consciousness and Cognition, 13*, 657 – 690, doi: 10.1016/j.concog.2004.06.003.

Smallwood, J., Fitzgerald, A., Miles, L.K., & Phillips, L.H. (2009). Shifting moods, wandering minds: Negative moods lead the mind to wander. *Emotion, 9*(2), 271 – 276, doi: 10.1037/a0014855.

Smallwood, J., Obonsawin, M.C., & Reid, H. (2003). The effects of block

duration and task temandes on the experience of task-unrelated-thought.

Imagination, Cognition and Personality, 22, 13 – 31.

Smallwood, J., O'Connor, R.C., Sudbery, M.V., & Obonsawin, M. (2007). Mind-

wandering and dysphoria. *Cognition & Emotion, 21*(4), 816 – 842, doi:

10.1080/02699930600911531.

Smallwood, J., & Schooler, J.W. (2006). The restless mind. *Psychological*

Bulletin, 132(6), 946 – 958, doi: 10.1037/0033-2909.132.6.946.

Spasojevic, J., & Alloy, L.B. (2001). Rumination as a common mechanism

relating depressive risk factors to depression. *Emotion, 1*(1), 25 – 37.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using Multivariate Statistics* (4th ed.).

Needham Heights, MA: Allyn & Bacon.

Taylor, S., Koch, W.J., Woody, S., & McLean, P. (1996). Anxiety sensitivity and

depression: How are they related? *Journal of Abnormal Psychology,*

105(3), 474 – 479.

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination

reconsidered: A psychometric analysis. *Cognitive Therapy & Research,*

27(3), 247-259.

Timbremont, B., & Braet, C. (2005). Selective information-processing in

depressed children and adolescents: Is there a difference in processing of

self-referent and other-referent information? *Behaviour Change, 22*(3),

143 – 155.

Van Minnen, A., Wessel, I., Verhaak, C., & Smeenk, J. (2005). The relationship between autobiographical memory specificity and depressed mood following a stressful life event: A prospective study. *British Journal of Clinical Psychology, 44*, 405 – 415.

Watkins, E., & Teasdale, J.D. (2001). Rumination and overgeneral memory in depression: Effects of self-focus and analytic thinking. *Journal of Abnormal Psychology, 110*(2), 353 – 357.

Watkins, E., Teasdale, J.D., & Williams, R.M. (2000). Decentering and distraction reduce overgeneral autobiographical memory in depression. *Psychological Medicine, 30*(4), 911 – 920.

Webster, J., Hall, L., Somville, T., Schneider, P., Turnbull, R., & Smith, P. (2006). Prospective testing of the Brisbane Postnatal Depression Index. *Birth, 33*(1), 56 - 63.

Wegner, D. M. (1994). Ironic processes of mental control. *Psychological Review, 101*(1), 34 - 52

Wegner, D. M., Schneider, D. J., Carter, S. R., & White, T. L. (1987). Paradoxical effects of thought suppression. *Journal of Personality and Social Psychology, 53*(1), 5 - 13.

Wegner, D. M., & Zanakos, S. (1994). Chronic thought suppression. *Journal of Personality and Social Psychology, 62*(4), 615 - 640.

Wenzlaff, R. M., & Bates, D. E. (1998). Unmasking a cognitive vulnerability to depression: How lapses in mental control reveal depressive thinking. *Journal of Personality and Social Psychology, 75*, 1559 - 1771.

Wenzlaff, R. M., & Luxton, D. D. (2003). The role of thought suppression in depressive rumination. *Cognitive Therapy & Research, 27*(3), 293 - 308.

Wenzlaff, R.M., Rude, S.S., Taylor, C.J., Stultz, C.H., & Sweatt, R.A. (2001). Beneath the veil of thought suppression: Attentional bias and depression risk. *Cognition & Emotion, 15*(4), 435 – 452, doi: 10.1080/0269993004200169.

Wenzlaff, R. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology, 51*, 59 - 91.

Whisman, M.A., & Kwon, P. (1992). Parental representations, cognitive distortions, and mild depression. *Cognitive Therapy and Research, 16,* 557 – 568.

Whitmer, A., & Gotlib, I. H. (2011). Brooding and reflection reconsidered: A factor analytic examination of rumination in currently depressed, formerly depressed, and never depressed individuals. *Cognitive Therapy & Research, 35*, 99-107.

Williams, J.M.G., Barnhofer, T., Crane, C., Hermans, D., Raes, F., Watkins, E., & Dalgleish, T. (2007). Autobiographical memory specificity and emotional disorder. *Psychological Bulletin, 133*(1), 122 – 148, doi: 10.1037/0033-2909.133.1.122.

Williams, J. M. G., & Broadbent, K. (1986). Autobiographical memory in suicide attempters. *Journal of Abnormal Psychology, 95*, 144 - 149.

Williams, J.M.G., Teasdale, J.D., Segal, Z.V., & Soulsby, J. (2000). Mindfulness-based cognitive therapy reduces overgeneral autobiographical memory in formerly depressed patients. *Journal of Abnormal Psychology, 109*, 150 – 155.

Wood, N., Brewin, C.R., & McLeod, H.J. (2006). Autobiographical memory

    deficits in schizophrenia. *Cognition & Emotion, 20*(3/4), 536 – 547, doi:

    10/1080/02699930500342472.

World Health Organisation. (2003). *Investing in mental health.* Retrieved from

    http://www.who.int/mental_health/en/investing_in_mnh_final.pdf.

Zelkowitz, P., & Milet, T. H. (1996). Postpartum psychiatric disorders: Their

    relationship to psychological adjustment and marital satisfaction in the

    spouses. *Journal of Abnormal Psychology, 105*, 281 - 285.

Appendix A. Demographics questionnaire

Instructions:

Please complete each of the following questions. All responses are strictly confidential.

1	What is your date of birth?

2	What is your occupation?

3   What is the highest level of education that you have obtained?
☐   Secondary school up to Year 10

☐   Secondary school up to Year 12

☐   TAFE/community college qualification

☐   University degree

☐   Postgraduate degree

4   Are you currently employed?
☐   Yes

☐   No

Employment status:

☐   Fulltime

☐   Part-time

☐   Casual

5   Spousal relationship status
☐   Married

☐   Living together/defacto

☐   Separated/divorced

☐   Single

6(a)   Have you ever been diagnosed with depression?

☐   Yes

☐   No

If NO, please go to qn 7.

If YES, please answer qns 6(b), (c), (d) and (e) :

6(b)   Were you prescribed medication for that condition?

☐   Yes

☐   No

6(c)   If so, are you currently taking that medication?

☐   Yes

☐   No

6(d)   If you were not prescribed medication, what treatment (if any) did you receive for your depression?

6(e)   Would you describe yourself as <u>currently</u> suffering from depression?

☐   Yes

☐   No

7(a)   Have you ever been diagnosed with a psychological disorder other than depression?

☐   Yes

☐   No

If YES, please answer qns 7(b), (c) and (d)

7(b)   Please provide the name of the condition with which you have been diagnosed.

7(c)   Have you been prescribed any medication for that condition?

☐   Yes

☐   No

7(d)   If so, are you currently taking that medication?

☐   Yes

☐   No

Appendix B. Ruminative Responses Scale

Instructions:

People think and do many different things when they feel sad, blue or depressed. For each of the following statements, please indicate if you never, sometimes, often, or 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.

1.   Think about how alone you feel.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

2.   Think "I won't be able to do my job if I don't snap out of this".

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

3.   Think about your feelings of fatigue and achiness.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

4.   Think about how hard it is to concentrate.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

5.   Think "What am I doing to deserve this?"

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

6.   Think about how passive and unmotivated you feel.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

7.   Analyse recent events to try to understand why you are depressed.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

8.   Think about how you don't seem to feel anything anymore.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

9.   Think "Why can't I get going?"

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

10.   Think "Why do I always react this way?"

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

11.   Go away by yourself and think about why you feel this way.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

12.   Write down what you are thinking and analyse it.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

13.   Think about a recent situation, wishing it had gone better.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

14.   Think "I won't be able to concentrate if I keep feeling this way".

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

15.   Think "Why do I have problems other people don't have?"

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

16.   Think "Why can't I handle things better?"

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

17.   Think about how sad you feel.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

18.   Think about all your shortcomings, failings, faults, mistakes.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

19.   Think about how you don't feel up to doing anything.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

20.   Analyse your personality to try to understand why you are depressed.

☐1   ☐2   ☐3   ☐4

Almost never   Sometimes   Often   Always

21.   Go someplace alone to think about your feelings.

　　　　☐1　　　　　　☐2　　　　　　☐3　　　　　　☐4

　　Almost never　　　Sometimes　　　Often　　　　Always

22.   Think about how angry you are with yourself.

　　　　☐1　　　　　　☐2　　　　　　☐3　　　　　　☐4

　　Almost never　　　Sometimes　　　Often　　　　Always

Appendix C. Autobiographical Memory Task

Instructions:

The focus of this activity is events that have happened in your life. You will be shown a series of words. For each word, think of an event that happened to you that the word reminds you of. The event could have happened recently (yesterday, last week), or a long time ago. It might be an important event, or a trivial event.

The memory you recall should be a specific event. So in response to the word 'fun' it would not be okay to say, "I always enjoy going on trips", because that does not mention a specific event. It would be okay to say, "I had fun when I went to Dreamworld", because that refers to a specific event. It is also important to try to recall a different memory or event for each cue word.

Cue words:

Happy

Sorry

Safe

Angry

Interested

Clumsy

Successful

Hurt

Surprised

Lonely

Proud

Sad

Excited

Rejected

Cheerful

Failure

Pleased

Hopeless

Lively

Guilty

Appendix D. White Bear Suppression Inventory

Instructions:

Please indicate the extent to which you agree or disagree with each of the following statements by clicking on the box corresponding to the response that most applies to you.

1. There are things I prefer not to think about.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

2. Sometimes I wonder why I have the thoughts I do.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

3. I have thoughts I cannot stop.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

4. There are images that come to mind that I cannot erase.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

5. My thoughts frequently return to one idea.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

6.   I wish I could stop thinking of certain things.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

7.   Sometimes my mind races so fast I wish I could stop it.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

8.   I always try to put problems out of mind.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

9.   There are thoughts that keep jumping into my head.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

10.   Sometimes I stay busy just to keep thoughts from intruding on my mind.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

11.   There are things that I try not to think about.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

12.   Sometimes I really wish I could stop thinking

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

13.   I often do things to distract myself from my thoughts.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

14.   I have thoughts that I try to avoid.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

15.   There are many thoughts that I have that I don't tell anyone.

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1☐	2☐	3☐	4☐	5☐

Appendix E. Self-referent Information Processing Task

Self-referent information processing task

Task 1.

Instructions:

In this task, you will see a number of adjectives that can be used to describe a person. For each adjective, please decide whether it describes you or not. If you feel that the adjective <u>does</u> describe you, tick the "ME" box. If you feel that the adjective does <u>not</u> describe you, tick the "NOT ME" box. When making these decisions, think about the way you usually view yourself.

Adjective	ME	NOT ME
Confident		
Lethargic		
Thoughtful		
Dependable		
Hostile		
Competent		
Resourceful		
Intelligent		
Capable		
Motivated		
Active		
Dynamic		
Energetic		
Worthy		
Important		
Valuable		
Winner		

Adjective	ME	NOT ME
Failure		
Stupid		
Ineffective		
Unskilled		
Lazy		
Indifferent		
Passive		
Apathetic		
Bad		
Nobody		
Useless		
Unlovable		
Polite		
Courteous		
Civil		
Tactful		
Predictable		
Reliable		
Consistent		
Steady		
Offensive		
Nosy		
Thoughtless		
Boastful		
Erratic		

Adjective	ME	NOT ME
Irrational		
Frivolous		
Fickle		
Intelligent		
Passive		
Energetic		
Important		
Erratic		
Offensive		
Capable		
Lazy		
Motivated		
Competent		
Indifferent		
Frivolous		
Consistent		
Nosy		
Valuable		
Active		
Failure		
Worthy		
Thoughtless		
Predictable		
Bad		
Fickle		

Adjective	ME	NOT ME
Resourceful		
Unskilled		
Dynamic		
Stupid		
Civil		
Irrational		
Nobody		
Reliable		
Useless		
Courteous		
Ineffective		
Polite		
Apathetic		
Unlovable		
Boastful		
Winner		
Energetic		
Steady		
Tactful		

Task 2

Behavioural descriptions

Instructions:

In this activity, you will again see adjectives that can be used to describe a person. Select each adjective that you feel describes you. For each of the words you choose as being descriptive of you, list the reasons you feel this adjective is self-descriptive. Give specific examples from your past to indicate why you feel a particular trait is self-descriptive. Use as many examples of as many kinds of behaviours as come to you mind. Do not worry how other people might interpret a particular behaviour; use your own frame of reference.

For example, if the word "athletic" was selected, examples of this might include winning a swimming race, achieving As in physical education classes at school etc.

Competent

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```
┌──────────────────────────────────────────────────────────┐
│                                                          │
│                                                          │
│                                                          │
│                                                          │
└──────────────────────────────────────────────────────────┘
```

Motivated

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```
┌──────────────────────────────────────────────────────────┐
│                                                          │
│                                                          │
│                                                          │
└──────────────────────────────────────────────────────────┘
```

Worthy

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```


```

Ineffective

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```


```

Indifferent

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```


```

Unlovable

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```



```

Courteous

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```



```

Reliable

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```



```

Offensive

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```



```

Erratic

☐   ME

☐   NOT ME

If you selected "ME", please provide examples:

```



```

Task 3

Behavioural predictions

Instructions:

During this next activity, you will be reading sentences that describe a number of behaviours and reactions that might be true of you. For each sentence, indicate how likely or how probable it is that you would behave or react in the way described. You may assign each sentence any number from 0 to 100. A 0 means that this could not be true of you, that is, it is extremely unlikely that you would act or feel this way. A 100 means that this could very well be true of you, that is, it is extremely likely that you would act or feel this way. Use numbers in between 0 and 100 if it is somewhat likely that you would act or feel this way. The higher the number you choose, the more likely it is that you would act or feel the way described.

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

Extremely unlikely that I would act or feel this way

Extremely likely that I would act or feel this way

1.	Your actions make it difficult for people to respect you.	
2.	You work hard to impress a new romantic interest.	
3.	You seek out new activities that you think you might enjoy.	
4.	You tactfully refuse an invitation in order not to hurt the other person's feelings.	
5.	You give an in-class presentation and communicate your ideas clearly.	
6.	Rejection makes you feel worthless.	
7.	You rarely become angry without provocation.	
8.	You give up in the face of major obstacles.	
9.	You are impatient and push and shove to get ahead in a long line.	
10.	People really value your friendship.	
11.	You constantly change your mind after making decisions.	
12.	You become flustered when attempting to answer difficult questions on a job interview.	
13.	You feel that you make important contributions to your job.	
14.	You perform well under pressure at school or on the job.	
15.	Activities that you used to enjoy don't hold the same appeal.	

16.	You have difficulties conveying your ideas clearly during an in-class presentation.	
17.	You persist in pursuing a goal despite major obstacles.	
18.	You give up your seat to an older woman on a crowded bus.	
19.	You go for a job interview and handle the difficult questions with ease.	
20.	You feel that your presence on the job has made little impact.	
21.	You fail to respond to an invitation and just don't show up.	
22.	You have difficulty getting going in the morning and facing the day's activities.	
23.	You find yourself easily embarrassed in difficult social situations.	
24.	You usually stand by important decisions.	
25.	You have many desirable qualities which are attractive to other people.	

Task 4:

Free recall test

Instructions:

The next part is a memory task. Please recall as many as possible of the adjectives that were presented during the first part of this task. That is, I want you to remember as many of the words as you can regardless of whether you judged them to be "ME" or "NOT ME" words. Please write the adjectives in any order that you wish in the box below. You have 5 minutes in which to complete this task.

Appendix F. Edinburgh Depression Scale

Instructions: Please identify the answer which comes closest to how you have felt IN THE PAST 7 DAYS, not just how you feel today.

Here is an example, already completed:

I have felt happy:

☐   Yes, all the time.

☒   Yes, most of the time.

☐   No, not very often.

☐   No, not at all.

This would mean "I have felt happy most of the time" during the past week. Please complete the other questions in the same way.

In the past 7 days:

1.   I have been able to laugh and see the funny side of things:

☐   As much as I always could.

☐   Not quite so much now.

☐   Definitely not so much now.

☐   Not at all.

2.   I have looked forward with enjoyment to things:

☐   As much as I ever did.

☐   Rather less than I used to.

☐   Definitely less than I used to.

☐   Hardly at all.

*3.   I have blamed myself unnecessarily when things went wrong:

☐   Yes, most of the time.

☐   Yes, some of the time.

☐   Not very often.

☐   No, never.

 4.   I have been anxious or worried for no good reason:

☐   No, not at all.

☐   Hardly ever.

☐   Yes, sometimes.

☐   Yes, very often.

*5.   I have felt scared or panicky for no very good reason:

☐   Yes, quite a lot.

☐   Yes, sometimes.

☐   No, not much.

☐   No, not at all.

*6.   Things have been getting on top of me:

☐   Yes, most of the time I haven't been able to cope at all.

☐   Yes, sometimes I haven't been coping as well as usual.

☐   No, most of the time I have coped quite well.

☐   No, I have been coping as well as ever.

*7.   I have been so unhappy that I have had difficulty sleeping:

☐   Yes, most of the time.

☐   Yes, sometimes.

☐   Not very often.

☐   No, not at all.

*8.   I have felt sad or miserable.

☐   Yes, most of the time.

☐   Yes, quite often.

☐   Not very often.

☐   No, not at all.

*9.   I have been so unhappy that I have been crying.

☐   Yes, most of the time.

☐   Yes, quite often.

☐   Only occasionally.

☐   No, never.

*10.   The thought of harming myself has occurred to me:

☐   Yes, quite often.

☐   Sometimes.

☐   Hardly ever.

☐   Never.

Appendix G. Ethics approval

Human Research Ethics Committee

<u>Committee Approval Form</u>

Principal Investigator/Supervisor: Dr Anne Tolan   Brisbane Campus

Co-Investigators: Dr Peter Rendel   Brisbane Campus

Student Researcher: Ms Kate Witteveen   Brisbane Campus

Ethics approval has been granted for the following project:

Cognitive risk factors for depression applied to the prediction of postnatal depression. (Cognition and emotional wellbeing during and after pregnancy)

for the period: 25 February 2010 to 31 December 2012

Human Research Ethics Committee (HREC) Register Number: Q2010 02

The following <u>standard</u> conditions as stipulated in the *National Statement on Ethical Conduct in Research Involving Humans* (2007) apply:

(i)   that Principal Investigators / Supervisors provide, on the form supplied by the Human Research Ethics Committee, annual reports on matters such as:

- security of records
- compliance with approved consent procedures and documentation
- compliance with special conditions, and

(ii)   that researchers report to the HREC immediately any matter that might affect the ethical acceptability of the protocol, such as:

- proposed changes to the protocol
- unforeseen circumstances or events
- adverse effects on participants

The HREC will conduct an audit each year of all projects deemed to be of more than low risk. There will also be random audits of a sample of projects considered to be of negligible risk and low risk on all campuses each year.

Within one month of the conclusion of the project, researchers are required to complete a *Final Report Form* and submit it to the local Research Services Officer.

If the project continues for more than one year, researchers are required to complete an *Annual Progress Report Form* and submit it to the local Research Services Officer within one month of the anniversary date of the ethics approval.

Signed: *K. Pashley.*   .....   Date: 25 February 2010

(Research Services Officer, McAuley Campus)

Appendix H. Participant information letter and consent form – online

modality

INFORMATION LETTER TO PARTICIPANTS

TITLE OF PROJECT: Cognition and emotional wellbeing during and after pregnancy

NAME OF SUPERVISORS: Dr Anne Tolan and Dr Peter Rendell

NAME OF STUDENT RESEARCHER: Ms Kate Witteveen

COURSE: Doctor of Philosophy

Dear Participant,

You are invited to participate in the initial stage of some research investigating the impact of cognitive processes and emotions during pregnancy on emotional wellbeing after the birth of a baby. It is being undertaken as a project for a Doctor of Philosophy (PhD). This project is investigating whether various cognitive processes, including information processing, attention, interpretive style and memory, impact on one's ability to adapt to the life changing event of having a baby.

In the initial stage of this project (in which you are invited to participate), a comparison of testing formats for a series of cognitive tests and questionnaires is being undertaken. Specifically, online administration and the more traditional face-to-face administration are being compared. The main component of this study will then involve pregnant women undertaking the testing in the online administration format.

There are no foreseeable risks to participants involved in this study. Completion of the tests will take approximately 60 minutes, either in a face-to-face testing session or an online testing session.

Participants between the ages of 18 and 40 are required for this stage of the study. Participants will be allocated to either the online testing group or the traditional testing group. Participants in both groups will complete a series of tests, as follows:

- **Demographic questionnaire** – this questionnaire consists of general questions relating to participants' age, occupation, education, psychological health and previous pregnancies (if any). Participants are not required to provide any identifying information, and responses are strictly confidential.
- **Ruminative Response Scale** – this questionnaire asks participants to respond on a 4-point scale from "almost never" to "always" in relation to some of the things they tend to think about when you are feeling down.
- **Autobiographical Memory Test** – this activity requires participants to describe a memory of an event they personally experienced that they are reminded of by a particular cue word e.g. "excitement".
- **Imbedded Word Task** – this activity is similar to a "find-a-word". Participants are given four minutes to find as many words as possible in a hidden word grid.
- **White Bear Suppression Inventory** – this questionnaire requires participants to respond to statements about managing their thoughts on a 5-point scale from "strongly disagree" to "strongly agree".

- **Dot probe task** – this task requires participants to respond as quickly as possible when a dot appears on the computer screen in place of a word.
- **Self-referent information processing task** – this task consists of four parts and requires participants to identify words they believe describe some of their characteristics and provide examples of situations in which they displayed those characteristics. Participants will also perform a memory test as part of this task.
- **Edinburgh Postnatal Depression Scale** – this questionnaire relates to mood and overall sense of wellbeing in the previous seven days. It will be completed during both testing sessions.

The potential benefits for participants are that you may gain a greater understanding of your own cognitive processes and the impact on your emotional wellbeing. In addition, you will be contributing to worthwhile research which may be published to further attempt to explain factors that affect emotional wellbeing after pregnancy.

It is emphasised that participation in this study is for the purposes of data collection and this study will not attempt to provide a diagnosis or treatment of an emotional disorder. If you have concerns about these matters, you are encouraged to see your general practitioner or obstetric healthcare provider. Other useful resources include:

- Salvos Care Line – Ph: 1300 363622
- Lifeline – Ph: 13 11 14
- An online resource: www.depressionservices.org.au

Participation in this research project is voluntary. You can withdraw from the study at any stage without giving a reason. Your academic progress will not be affected in any way if you choose not to participate in this research. Confidentiality will be maintained throughout the study and in any report of the study. All participants will be given a code and names will not be retained with the data. Individual participants will not be able to be identified in any reports of the study, as only the aggregated data will be reported.

If you have any questions about the project, before or after participating, please contact the Staff Supervisor, Dr Anne Tolan on 07 3623 7256 in the School of Psychology, McAuley Campus at the Australian Catholic University, 1100 Nudgee Road, Banyo Qld 4014. Before commencing, you will have the opportunity to ask any questions about the project. Additional information about the results of the research will be made available on the project website.

This study has been approved by the Human Research Ethics Committee at the Australian Catholic University. In the event that you have any complaint or concern about the way you have been treated during the study, or you have a query that the Student Researcher and Staff Supervisor have not been able to satisfy, you may write to:

Chair, Human Research Ethics Committee
C/- Research Services
Australian Catholic University
Brisbane Campus
PO Box 456
BANYO QLD 4014   Tel: 07 3623 7100

Any complaint will be treated in confidence and will be fully investigated. The participant will be informed of the outcome.

If you are willing to participate, please sign the attached informed consent form. Please return one copy to the researcher and you may retain the other copy for your records. Your participation in this research project will be most appreciated.

Kate Witteveen   Dr Anne Tolan
Student Researcher   Supervisor

Please proceed to the link below to participate in this study:

http://kate.osirissoftware.com.au/#/Home

CONSENT FORM FOR ONLINE TESTING

TITLE OF PROJECT: Cognition and emotional wellbeing during and after pregnancy

NAME OF SUPERVISORS: Dr Anne Tolan and Dr Peter Rendell

NAME OF STUDENT RESEARCHER: Ms Kate Witteveen

COURSE: Doctor of Philosophy

I,... the participant, have read and understood the information provided in the Information Letter to Participants. I agree to participate in this 60 minute research session, realising that I can withdraw at any time. I agree that research data collected for the study may be published or may be provided to other researchers in a form that does not identify me in any way.

Button to be inserted in online format which enables participants to click "I agree"

Appendix I. Participant information letter and consent form –

traditional modality

TITLE OF PROJECT: Cognition and emotional wellbeing during and after pregnancy

NAME OF SUPERVISORS: Dr Anne Tolan and Dr Peter Rendell

NAME OF STUDENT RESEARCHER: Ms Kate Witteveen

COURSE: Doctor of Philosophy

Dear Participant,

You are invited to participate in the initial stage of some research investigating the impact of cognitive processes and emotions during pregnancy on emotional wellbeing after the birth of a baby. It is being undertaken as a project for a Doctor of Philosophy (PhD). This project is investigating whether various cognitive processes, including information processing, attention, interpretive style and memory, impact on one's ability to adapt to the life changing event of having a baby.

In the initial stage of this project (in which you are invited to participate), a comparison of testing formats for a series of cognitive tests and questionnaires is being undertaken. Specifically, online administration and the more traditional face-to-face administration are being compared. The main component of this study will then involve pregnant women undertaking the testing in the online administration format.

There are no foreseeable risks to participants involved in this study. Completion of the tests will take approximately 60 minutes, either in a face-to-face testing session or an online testing session.

Participants between the ages of 18 and 40 are required for this stage of the study. Participants will be allocated to either the online testing group or the traditional testing group. Participants in both groups will complete a series of tests, as follows:

- **Demographic questionnaire** – this questionnaire consists of general questions relating to participants' age, occupation, education, psychological health and previous pregnancies (if any). Participants are not required to provide any identifying information, and responses are strictly confidential.
- **Multiple Stimulus Types Ambiguity Tolerance (M-STAT)** – this questionnaire requires participants to respond to statements about how they feel about situations in which they may feel unsure. Responses are made on a 7-point scale ranging from "strongly disagree" to "strongly agree".
- **Ruminative Response Scale** – this questionnaire asks participants to respond on a 4-point scale from "almost never" to "always" in relation to some of the things they tend to think about when you are feeling down.
- **Autobiographical Memory Test** – this activity requires participants to describe a memory of an event they personally experienced that they are reminded of by a particular cue word e.g. "excitement".
- **Imbedded Word Task** – this activity is similar to a "find-a-word". Participants are given four minutes to find as many words as possible in a hidden word grid.

- **White Bear Suppression Inventory** – this questionnaire requires participants to respond to statements about managing their thoughts on a 5-point scale from "strongly disagree" to "strongly agree".
- **Self-referent information processing task** – this task consists of four parts and requires participants to identify words they believe describe some of their characteristics and provide examples of situations in which they displayed those characteristics. Participants will also perform a memory test as part of this task.
- **Edinburgh Depression Scale** – this questionnaire relates to mood and overall sense of wellbeing in the previous seven days. It will be completed during both testing sessions.

The face-to-face testing component will be undertaken in the research laboratory in the Psychology Department on the McAuley Campus of ACU, at a time that is mutually convenient to the participant and researcher.

The potential benefits for participants are that you may gain a greater understanding of your own cognitive processes and the impact on your emotional wellbeing. In addition, you will be contributing to worthwhile research which may be published to further attempt to explain factors that affect emotional wellbeing after pregnancy.

It is emphasised that participation in this study is for the purposes of data collection and this study will not attempt to provide a diagnosis or treatment of an emotional disorder. If you have concerns about these matters, you are encouraged to see your general practitioner or obstetric healthcare provider. Other useful resources include:

- Salvos Care Line – Ph: 1300 363622
- Lifeline – Ph: 13 11 14
- An online resource: www.depressionservices.org.au

Participation in this research project is voluntary. You can withdraw from the study at any stage without giving a reason. Your academic progress will not be affected in any way if you choose not to participate in this research. Confidentiality will be maintained throughout the study and in any report of the study. All participants will be given a code and names will not be retained with the data. Individual participants will not be able to be identified in any reports of the study, as only the aggregated data will be reported.

If you have any questions about the project, before or after participating, please contact the Staff Supervisor, Dr Anne Tolan on 07 3623 7256 in the School of Psychology, McAuley Campus at the Australian Catholic University, 1100 Nudgee Road, Banyo Qld 4014. Before commencing, you will have the opportunity to ask any questions about the project. Additional information about the results of the research will be made available on the project website.

This study has been approved by the Human Research Ethics Committee at the Australian Catholic University. In the event that you have any complaint or concern about the way you have been treated during the study, or you have a query that the Student Researcher and Staff Supervisor have not been able to satisfy, you may write to:

Chair, Human Research Ethics Committee
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Australian Catholic University
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PO Box 456
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Any complaint will be treated in confidence and will be fully investigated. The participant will be informed of the outcome.

If you are willing to participate, please sign the attached informed consent form. Please return one copy to the researcher and you may retain the other copy for your records. Your participation in this research project will be most appreciated.

Kate Witteveen   Dr Anne Tolan
Student Researcher   Supervisor

CONSENT FORM

Copy for Researcher

TITLE OF PROJECT: Cognition and emotional wellbeing during and after pregnancy

NAME OF SUPERVISORS: Dr Anne Tolan and Dr Peter Rendell

NAME OF STUDENT RESEARCHER: Ms Kate Witteveen

COURSE: Doctor of Philosophy

I,... the participant, have read and understood the information provided in the Information Letter to Participants. I agree to participate in this 60 minute research session, realising that I can withdraw at any time. I agree that research data collected for the study may be published or may be provided to other researchers in a form that does not identify me in any way.

NAME OF PARTICIPANT:..

SIGNATURE:..DATE:.....................

SIGNATURE OF SUPERVISOR:...DATE: ....

SIGNATURE OF STUDENT RESEARCHER:.............................DATE:......................

Appendix J. Scores obtained for each Participant

Variable	Score/s Obtained
Age	Age in years
Occupation	A description of the participant's main occupation.
Educational level	Level of educational attainment: 1 = up to Yr 10; 2 = up to Yr 12; 3 = Diploma/Tafe; 4 = undergraduate degree; 5 = postgraduate degree.
Employment status	1 = fulltime; 2 = part-time; 3 = casual; 4 = maternity leave; 5 = not currently employed.
Relationship status	1 = married; 2 = defacto; 3 = separated; 4 = single
Depression diagnosis	0 = no previous depression diagnosis; 1 = a previous depression diagnosis
Depression medication	If previously diagnosed with depression: 0 = no medication prescribed; 1 = medication prescribed
Medication current	If prescribed medication: 0 = not currently using medication; 1 = currently using medication
Alternative treatment	If diagnosed with depression and not prescribed medication, alternative treatment prescribed.
Depression current	If diagnosed with depression: 0 = currently depressed; 1 = not currently depressed.
Other disorder	0 = no previous diagnosis of a disorder other than depression; 1 = a previous diagnosis of a disorder other than depression

Variable	Score/s Obtained
Other medication current	If prescribed medication: 0 = currently using medication; 1 = not currently using medication
RRS	Each item's score was added together to calculate the total score.
AMT	Responses were rated by three raters and categorised as either specific, extended, categoric, semantic association or omission. Several scores were then calculated, including:

    (a) Total number of correct (specific) responses.

    (b) Total number of incorrect (extended, categoric, semantic association and omission) responses.

    (c) Total number of correct responses to depression relevant stimuli.

    (d) Total number of correct responses to non-depression relevant stimuli.

    (e) Total number of incorrect responses to depression relevant stimuli.

    (f) Total number of incorrect response to non-depression relevant stimuli.

    (g) Total number of correct responses to positive stimuli.

    (h) Total number of correct responses to negative stimuli.

(i) Total number of incorrect responses to positive stimuli.

(j) Total number of incorrect responses to negative stimuli.

(k) Proportion of correct and incorrect responses.

WBSI   Each item's score was added together to calculate the total score.

SRIP   Several scores were calculated, including:

SRIP Task 1.

(a) Proportion of positive depression relevant traits endorsed.

(b) Proportion of negative depression relevant traits endorsed.

(c) Proportion of positive depression irrelevant traits endorsed.

(d) Proportion of negative depression irrelevant traits endorsed.

SRIP Task 2.

(e) Proportion of positive depression relevant traits endorsed.

(f) Number of behavioural examples of positive depression relevant traits provided.

(g) Proportion of negative depression relevant traits endorsed.

(h) Number of behavioural examples of negative depression relevant traits provided.

(i) Proportion of positive depression irrelevant traits endorsed.

(j) Number of behavioural examples of positive depression irrelevant traits provided.

(k) Proportion of negative depression irrelevant traits endorsed.

(l) Number of behavioural examples of negative depression irrelevant traits provided.

SRIP Task 3.

(m) Mean score of positive depression relevant ratings.

(n) Mean score of negative depression relevant ratings.

(o) Mean score of positive depression irrelevant ratings.

(p) Mean score of negative depression irrelevant ratings.

SRIP Task 4.

(q) Number of positive depression relevant words recalled correctly.

(r) Number of negative depression relevant words recalled correctly.

(s) Number of positive depression irrelevant words

recalled correctly.

(t) Number of negative depression irrelevant words

recalled correctly.

EDS   Items 3, 5, 6, 7, 8, 9 and 10 were reverse scored and the

reversed scores added to the original scores for items 1,

2 and 4 to calculate an overall score.

Appendix K. Summary of Data Screening – Study 1Variables of Interest

Variable	% Missing data	Outliers	Skewness	Kurtosis	Action required	Variable to include
RRS Total	0%	Nil	n.s	n.s	Nil	RRS Total
AMT Total specific	0%	Nil	n.s.	n.s.	Nil	AMT Total specific
AMT Total errors	0%	Nil	n.s.	n.s.	Nil	AMT Total errors
AMT depression relevant specific	0%	Nil	n.s	n.s	Nil	AMT depression relevant specific
AMT depression relevant errors	0%	Nil	n.s.	n.s.	Nil	AMT depression relevant errors
WBSI Total	1.7%	Nil	n.s	n.s	Nil	WBSI Total
SRIP 1 pdr_prop	0%	Nil	-3.54	n.s	Transform (reflect and sqrt)	SRIP 1 pdr_prop transformed
SRIP 1 ndr_prop	0%	Yes – case 53	5.66	5.34	Transform (sqrt)	SRIP 1 ndr_prop transformed
SRIP 1 pdi_prop	0%	Yes – case 52	-4.9	5.08	Transform (reflect and sqrt)	SRIP 1 pdi_prop transformed
SRIP1 ndi_prop	0%	Yes – case 34	4.17	n.s.	Transform (sqrt)	SRIP 1 ndi_prop transformed
Variable	% Missing data	Outliers	Skewness	Kurtosis	Action required	Variable to include

SRIP2 pdr egs	0%	Yes – case 20	7.95	13.79	Transform (sqrt)	SRIP2 pdr_egs transformed
SRIP2 ndr egs	0%	Yes – case 20	13.36	37.78	Transform (sqrt)	SRIP2 ndr_egs transformed
SRIP 2 pdi egs	0%	Nil	4.23	n.s	Transform (sqrt)	SRIP2 pdi_egs transformed
SRIP2 ndi egs	0%	Yes – cases 19, 20	8.67	13.29	Transform (sqrt)	SRIP2 ndi_egs transformed
SRIP3 pdr mean	0%	Nil	n.s	n.s	Nil	SRIP3 pdr_mean
SRIP3 ndr mean	0%	Nil	n.s	n.s	Nil	SRIP3 ndr_mean
SRIP3 pdi mean	0%	Nil	n.s	n.s	Nil	SRIP3 pdi_mean
SRIP3 ndi mean	0%	Nil	n.s	n.s	Nil	SRIP3 ndi_mean
SRIP4 pdr prop	0%	Nil	n.s	n.s	Nil	SRIP4 pdr recall
SRIP4 ndr prop	0%	Nil	n.s	n.s	Nil	SRIP4 ndr recall
SRIP4 pdi prop	0%	Nil	n.s	n.s	Nil	SRIP4 pdi recall
SRIP4 ndi prop	0%	Yes – case 42	n.s	n.s	Transform (sqrt)	SRIP4 ndi recall transformed
EDS Total	0%	Nil	n.s	n.s	Nil	EDS Total

Appendix L. Participant information letter and consent form – Study 2 and 3

INFORMATION LETTER TO PARTICIPANTS

TITLE OF PROJECT: Gender differences in cognitive patterns influencing emotional wellbeing

NAME OF SUPERVISORS: Dr Anne Tolan and Dr Peter Rendell

NAME OF STUDENT RESEARCHER: Ms Kate Witteveen

COURSE: Doctor of Philosophy

Dear Participant,

You are invited to participate in some research investigating differences in the impact of cognitive processes on emotional wellbeing. It is being undertaken as a project for a Doctor of Philosophy (PhD). This project is investigating whether various cognitive processes known to impact on emotional wellbeing, including information processing, attention, interpretive style and memory, have differential effects across gender.

There are no foreseeable risks to participants involved in this study. Completion of the tests will take approximately 60 minutes, either in a face-to-face testing session or an online testing session.

Participants over the age of 18 are required for this study. Participants will complete a series of tests, as follows:

- **Demographic questionnaire** – this questionnaire consists of general questions relating to participants' age, occupation, education, psychological health and previous pregnancies (if any). Participants are not required to provide any identifying information, and responses are strictly confidential.
- **Ruminative Response Scale** – this questionnaire asks participants to respond on a 4-point scale from "almost never" to "always" in relation to some of the things they tend to think about when you are feeling down.
- **Autobiographical Memory Test** – this activity requires participants to describe a memory of an event they personally experienced that they are reminded of by a particular cue word e.g. "excitement".
- **White Bear Suppression Inventory** – this questionnaire requires participants to respond to statements about managing their thoughts on a 5-point scale from "strongly disagree" to "strongly agree".
- **Dot probe task** – this task requires participants to respond as quickly as possible when a dot appears on the computer screen in place of a word.
- **Self-referent information processing task** – this task consists of four parts and requires participants to identify words they believe describe some of their characteristics and provide examples of situations in which they displayed those characteristics. Participants will also perform a memory test as part of this task.
- **Edinburgh Depression Scale** – this questionnaire relates to mood and overall sense of wellbeing in the previous seven days. It will be completed during both testing sessions.

The potential benefits for participants are that you may gain a greater understanding of your own cognitive processes and the impact on your emotional wellbeing. In addition, you will be contributing to worthwhile research which may be published to further attempt to explain how cognitive factors that affect emotional wellbeing influence males and females differently.

It is emphasised that participation in this study is for the purposes of data collection and this study will not attempt to provide a diagnosis or treatment of an emotional disorder. If you have concerns about these matters, you are encouraged to see your general practitioner or obstetric healthcare provider. Other useful resources include:

- Salvos Care Line – Ph: 1300 363622
- Lifeline – Ph: 13 11 14
- An online resource: www.depressionservices.org.au

Participation in this research project is voluntary. You can withdraw from the study at any stage without giving a reason. Your academic progress will not be affected in any way if you choose not to participate in this research. Confidentiality will be maintained throughout the study and in any report of the study. All participants will be given a code and names will not be retained with the data. Individual participants will not be able to be identified in any reports of the study, as only the aggregated data will be reported.

If you have any questions about the project, before or after participating, please contact the Staff Supervisor, Dr Anne Tolan on 07 3623 7256 in the School of Psychology, McAuley Campus at the Australian Catholic University, 1100 Nudgee Road, Banyo Qld 4014. Before commencing, you will have the opportunity to ask any questions about the project. Additional information about the results of the research will be made available on the project website.

This study has been approved by the Human Research Ethics Committee at the Australian Catholic University. In the event that you have any complaint or concern about the way you have been treated during the study, or you have a query that the Student Researcher and Staff Supervisor have not been able to satisfy, you may write to:

> Chair, Human Research Ethics Committee
> C/- Research Services
> Australian Catholic University
> Brisbane Campus
> PO Box 456
> BANYO QLD 4014   Tel: 07 3623 7100

Any complaint will be treated in confidence and will be fully investigated. The participant will be informed of the outcome.

If you are willing to participate, please sign the attached informed consent form. Please return one copy to the researcher and you may retain the other copy for your records. Your participation in this research project will be most appreciated.

Kate Witteveen   Dr Anne Tolan
Student Researcher   Supervisor

Please proceed to the link below to participate in this study:

http://kate.osirissoftware.com.au/#/Home

Australian Catholic University
Brisbane Sydney Canberra Ballarat Melbourne

ACU National

CONSENT FORM FOR ONLINE TESTING

TITLE OF PROJECT: Gender differences in cognitive patterns influencing emotional wellbeing

NAME OF SUPERVISORS: Dr Anne Tolan and Dr Peter Rendell

NAME OF STUDENT RESEARCHER: Ms Kate Witteveen

COURSE: Doctor of Philosophy

I,.. the participant, have read and understood the information provided in the Information Letter to Participants. I agree to participate in this 60 minute research session, realising that I can withdraw at any time. I agree that research data collected for the study may be published or may be provided to other researchers in a form that does not identify me in any way.

Button to be inserted in online format which enables participants to click "I agree"

Appendix M. Dot probe task stimuli: Valence, frequency and length

Word pair #	Positive words (Maximum positive valence = 9)	Negative words (Maximum negative valence = 1)
1	**Vacation** Valence: 8.16 Frequency: 47 Length: 8	**Rejected** Valence: 1.5 Frequency: 33 Length: 8
2	**Fun** Valence: 8.37 Frequency: 44 Length: 3	**Sad** Valence: 1.61 Frequency: 35 Length: 3
3	**Comedy** Valence: 8.37 Frequency: 39 Length: 6	**Cancer** Valence: 1.5 Frequency: 25 Length: 6
4	**Lucky** Valence: 8.17 Frequency: 21 Length: 5	**Grief** Valence: 1.69 Frequency: 10 Length: 5
5	**Joke** Valence: 8.1 Frequency: 22 Length: 4	**Hurt** Valence: 1.9 Frequency: 37 Length: 4
6	**Treasure** Valence: 8.27 Frequency: 4 Length: 8	**Mutilate** Valence: 1.82 Frequency: 3 Length: 8
7	**Graduate** Valence: 8.19 Frequency: 30 Length: 8	**Disaster** Valence: 1.73 Frequency: 26 Length: 8
8	**Thrill** Valence: 8.05 Frequency: 5 Length: 6	**Rabies** Valence: 1.77 Frequency: 1 Length: 6
9	**Kiss** Valence: 8.26 Frequency: 17 Length: 4	**Jail** Valence: 1.95 Frequency: 21 Length: 4
10	**Rainbow** Valence: 8.14 Frequency: 4 Length: 7	**Torture** Valence: 1.56 Frequency: 3 Length: 7
11	**Miracle** Valence: 8.6 Frequency: 16 Length: 7	**Suicide** Valence: 1.25 Frequency: 17 Length: 7
12	**Success**	**Failure**

		Valence: 8.29	Valence: 1.7
		Frequency: 93	Frequency: 89
		Length: 7	Length: 7
13	Cash		Sick
		Valence: 8.37	Valence: 1.9
		Frequency: 36	Frequency: 51
		Length: 4	Length: 4
14	Orgasm		Poison
		Valence: 8.32	Valence: 1.98
		Frequency: 7	Frequency: 10
		Length: 6	Length: 6
15	Loyal		Upset
		Valence: 7.55	Valence: 2
		Frequency: 18	Frequency: 14
		Length: 5	Length: 5
16	Dazzle		Trauma
		Valence: 7.29	Valence: 2.1
		Frequency: 1	Frequency: 1
		Length: 6	Length: 6
17	Heart		Alone
		Valence: 7.39	Valence: 2.41
		Frequency: 173	Frequency: 195
		Length: 5	Length: 5
18	Safe		Hate
		Valence: 7.07	Valence: 2.12
		Frequency: 58	Frequency: 42
		Length: 4	Length: 4
19	Grin		Debt
		Valence: 7.4	Valence: 2.22
		Frequency: 13	Frequency: 13
		Length: 4	Length: 4
20	Bouquet		Traitor
		Valence: 7.02	Valence: 2.22
		Frequency:4	Frequency: 2
		Length: 7	Length: 7
21	Easy		Fear
		Valence: 7.1	Valence: 2.76
		Frequency: 125	Frequency: 127
		Length: 4	Length: 4
22	Relaxed		Quarrel
		Valence: 7	Valence:2.93
		Frequency: 14	Frequency: 20
		Length: 7	Length: 7
23	Ecstasy		Despise
		Valence: 7.98	Valence: 2.03
		Frequency: 6	Frequency: 7
		Length: 7	Length: 7
24	Rescue		Horror
		Valence: 7.7	Valence: 2.76
		Frequency: 15	Frequency: 17

		Length: 6		Length: 6
25	**Inspired**		**Criminal**	
		Valence: 7.15		Valence: 2.93
		Frequency: 25		Frequency: 24
		Length: 8		Length: 8
26	**Jewel**		**Vomit**	
		Valence: 7		Valence:2.06
		Frequency: 1		Frequency: 3
		Length: 5		Length: 5
27	**Lively**		**Scared**	
		Valence: 7.2		Valence: 2.78
		Frequency: 26		Frequency: 21
		Length: 6		Length: 6
28	**Hopeful**		**Neglect**	
		Valence: 7.1		Valence: 2.63
		Frequency: 12		Frequency: 12
		Length: 7		Length: 7
29	**Champ**		**Venom**	
		Valence: 7.18		Valence: 2.68
		Frequency: 1		Frequency: 2
		Length: 5		Length: 5
30	**Caress**		**Rotten**	
		Valence: 7.84		Valence: 2.26
		Frequency: 1		Frequency: 2
		Length: 6		Length: 6
31	**Luxury**		**Victim**	
		Valence:7.88		Valence: 2.18
		Frequency: 21		Frequency: 27
		Length: 6		Length: 6
32	**Kindness**		**Sickness**	
		Valence: 7.82		Valence: 2.25
		Frequency: 5		Frequency: 6
		Length: 8		Length: 8