EMOTION SUPPRESSION AND ITS IMPACT ON POSITIVE EMOTION

EXPERIENCE.

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Declaration

No portion of the work referred to in this thesis has been submitted in support of an

application for another degree or qualification of this or any other University or

institute of learning.

This thesis is 31,852 words (including Tables and Figures).

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Abstract

This thesis aimed to examine the impact of emotion suppression of negative material on subsequent reactivity to positive material with a group of MDD participants and healthy controls. A mixed design laboratory based experiment was used, where in the first condition participants firstly "just viewed" a sad film clip, and in the second condition they suppressed their emotions to a different sad film clip. Before and after each of the film clips, positive self referent and non self referent material was presented. Based on findings from Dunn et al. (2009), Liverant et al. (2008), and Kashdan and Breen (2008) it was suggested that the suppression of negative emotional experience would down-regulate negative affect, but with the consequence of reducing reactivity to subsequently presented material, including positive.

The underlying rationale was that alterations in emotion regulation, and specifically, emotion suppression, may be a contributory factor in the processing disturbances, which occur in MDD, particularly anhedonia. These ideas overlap with current clinical thinking, where interventions such as Acceptance and Commitment Therapy (ACT), Dialectical Behaviour Therapy (DBT) and Mindfulness Based Cognitive Behavioural Therapy (MCBT) have begun to target both emotion regulation difficulties, and explore the role of acceptance of emotional experience, as opposed to emotion suppression.

The results showed that there were no changes in reactivity to positive non-self referent material as a function of emotion regulation type. However, the results from the positive self referent material, showed that emotion suppression to negative material influenced subsequent reactivity to it. For the control group, the results replicated the findings from the Dunn et al. (2009) study. Namely, a consequence of emotion suppression was the dampening of positive reactivity to positive self referent

material following suppression of emotions to a negative film clip. However, for the MDD group, the opposite pattern was obtained, participants had a greater reduction in positive reactivity following the view condition, compared to the suppress condition. This effect occurred despite higher suppression effort reported following the suppress condition.

With regard to emotion reactivity more generally, across both conditions, there was significantly higher ratings of sadness to the positive memories in the MDD group compared to the control group, there were also significantly lower ratings of happiness to the positive images in the MDD group relative to the control group. With regard to the negative videos, there was no evidence of elevated sadness from the MDD in response to the negative videos; however the MDD group did report significantly lower happiness ratings following the sad videos. These findings offered support for both the positive attenuation view, and partially for the ECI hypothesis.

A number of interpretations of the data have been offered, with regard to the differences between the control and MDD group on the effects of suppression. In particular, the idea of "ego depletion" as a result of the suppress condition, with subsequent implications for reactivity related to self control. Executive function processes were implicated as generic processing factors, which are implicated both in emotion regulation and in self control and self regulation.

The clinical implications from these results focused on the role of flexibility and of habitual suppression in emotional experience. Finally, future research areas were suggested, including examining the role of executive function load in a precise way, and looking at the time course of emotional reactivity following specific types of regulation.

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1   Introduction

Major Depressive Disorder (MDD) is the most common of the affective disorders, which in a proportion of sufferers, becomes a chronic illness. Disturbances in emotional reactivity are a core feature of MDD resulting in increased negative affect, and reduced reactivity to positive stimuli, known as anhedonia. The aim of the current thesis is to explore the role of suppressing emotions on emotional reactivity to positive material in MDD. The theoretical rationale is that alterations in emotion regulation, specifically chronic and habitual use of emotion suppression, may be a contributory factor to anhedonia in MDD. These ideas overlap with current clinical thinking, where interventions such as Acceptance and Commitment Therapy (ACT), Dialectical Behaviour Therapy (DBT) and Mindfulness Based Cognitive Behavioural Therapy (MCBT) have begun to target both emotion regulation difficulties and explore the role of acceptance of emotional experience, as opposed to emotion suppression.

This chapter will first outline the affective clusters that are central to this thesis: depression, positive affect and anhedonia. Following this, theories of emotional reactivity in MDD will be outlined, and the evidence cited in support of them reviewed. The next section on emotion regulation provides a brief context to the area, covering types of emotion regulation including emotion suppression. Both clinical and non-clinical studies of emotion suppression are reviewed, followed by those studies which suggest that emotion suppression can be a successful strategy. It will be argued that, contrary to clinical wisdom, suppression can successfully down-regulate emotion experience. Moreover, depressed individuals may be particularly successful at suppression of negative affect, but this might have down stream blunting effects on reactivity to positive material. Clinical interventions that focus on emotion

regulation and/or emotion acceptance will be outlined, drawing out commonalities and differences between these interventions. Outcome studies and other empirical evidence for these interventions will also be briefly reviewed. It will be concluded that given the consequences of emotion suppression outlined in the literature, the pervasive use of emotion suppression in MDD may inadvertently result in suppressing reactions to all emotional material, including positive material, thus exacerbating anhedonic symptoms . Finally, the rationale and aims for the current study will be described, outlining the research questions and hypotheses to be addressed.

1.1   Depression

Major Depressive Disorder (MDD) is a common and recurrent illness (e.g. Kessler, et al., 1994; e.g. van Weel-Baumgarten, Schers, van den Bosch, van den Hoogen, & Zitman, 2000), which has been projected to become the second leading cause of ill-health worldwide by 2020 (Murray & Lopez, 1996). Under the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition (DSM-IV, 1994) criteria, MDD is classified as a mood disorder, with diagnostic criteria requiring five of the following symptoms for at least two weeks duration: sad, depressed mood, most of the day, nearly every day; loss of interest and pleasure in usual activities; difficulties in sleeping (insomnia), not falling asleep initially, not returning to sleep after awakening in the middle of the night, early morning awakenings or a desire to sleep a great deal of the time; shift in activity level, becoming either lethargic or agitated; poor appetite and weight loss, or increased appetite and weight gain; loss of energy; negative self concept, self reproach and self blame, feelings of worthlessness and guilt; complaints or evidence of difficulty in concentrating such as slowed thinking and indecisiveness; recurrent thoughts of death or suicide.

The prevalence of depression has been increasing steadily over the last fifty years (Klerman, 1988) and at the same time the age of onset has lowered. Relapse rates for depression are high, with about 80% of those diagnosed experiencing a subsequent episode, and the average number of episodes being four (Judd, et al., 1998). In approximately 12% of cases depression becomes a chronic disorder that lasts for over two years.

The body of research literature on depression is now immense, with current research having its roots in research and theory pioneered almost 100 years ago. Historically, explanations for depression have ranged from Freud's (1917) assertion that depression is anger turned inwards, to Beck's (1979) negative cognitive triad of schemas around the self, world and future, and Seligman's (1975) learned helplessness theory. Research has examined the role of social (Kendler, Gardner, Neale, & Prescott, 2001), developmental (Powell & Hemsley, 1984), cognitive (Beck, 1979) neurochemical (Anisman & Zacharko, 1990), genetic (Silberg, et al., 1999) and economic (Everson, Maty, Lynch, & Kaplan, 2002) factors, and the interactions between these components (see Beck, 2008). Clearly, given the range and complexity of the research and symptoms seen in MDD, the intention of the current thesis is not to speak to all of these issues. Rather, the aim will be to relate theory and findings to those symptoms in MDD which make reference to alterations in emotional reactivity to positive material.

1.2   Positive Affect

Positive affect, or those states associated with it (e.g. happiness, joy), is notoriously difficult to define. For example, Kashdan, Biswas-Diener and King (2008) point to the difficulty in separating out the hedonic features of happiness, for example high positive affect, from "eudaimonic" happiness, which is defined as

meaning and purpose or taking part in activities that allow for the actualisation of one's skills and talents. From a psychometric perspective, happiness has been measured using the satisfaction with life scale (Diener, Emmons, Larsen & Griffen, 1985) or the Positive Affect Negative Affect Scale (PANAS, Watson, Clark & Tellegen, 1988). These measures show good validity, for example, Diener, Sandvik, Seidlitz, & Diener (1993) found good convergent validity with the satisfaction with life scale and self and peer reports of emotional well being. A more operational definition is provided by Power and Dalgleish (1997) who define happiness in relation to goals: "Happiness is the result of optimal levels of goal fulfillment across different domains." p.385. This definition appears to combine the two aspects of happiness outlined by Kashdan et al. (2008), and may be the most helpful definition given the conceptual conflict associated with attempts to separate out the experience of happiness, with those activities or goals that give rise to it. In this thesis I focus predominantly on experiential aspects of happiness, in particular, subjective experience in response to positive emotional material.

    1.2.1**Positive affect in clinical psychology.** Traditionally, psychological research and therapy has tended to focus on negative emotions and traits, rather than positive ones. As Conway and MacLeod (2002) note, there is now substantial evidence that positive aspects of experience are related to protection and recovery from depression, and that therapeutic approaches which focus on promoting well-being and quality of life are effective (MacLeod & Moore, 2000). More recently, Wood and Tarrier (2010) argue for a "positive clinical psychology" which integrates the knowledge base clinical psychology has in working with negative mood states, in to a continuum approach where positive mood states are equally focused on. They

suggest that research in to positive emotions should be utilised more by clinical psychology in this endeavor.

Although a substantial body of research on positive emotional experiences has accumulated under the heading of the 'positive psychology' movement (e.g. Seligman & Csikszentmihalyi, 2000), much of this research tends towards the descriptive rather than explanatory. For example, research has shown that positive emotion produces self reported improvements in immune system functioning (Mahoney, Burroughts & Lippman, 2002) including lower readmission rates to hospital following cardiovascular surgery (Middleton & Byrd, 1996). With regard to psychological benefits, positive coping strategies (e.g. positive re-appraisal) help to reduce stress levels (Folkman & Moskowitz, 2000) and depressed mood (Davis & Nolen-Hoeksema, 1998). Affleck and Tennen (1996) found that women who positively appraised their hazardous child delivery had greater well being, which in turn increased the developmental well being of their children. There is a need for a clearer understanding of underlying mechanisms of positivity to develop targeted interventions.

With a greater emphasis on explanation, Fredrickson (2001; Kok, Catalino, & Fredrickson, 2008) has proposed the "broaden and build" theory of positive emotions, which suggests that negative emotions heighten sympathetic activity and narrow attention to support specific action tendencies (e.g., attack, escape). In contrast, positive emotions have the potential to reduce the autonomic arousal generated by negative emotions and broaden attention, thinking, and behavioral repertoires.

However, it is worth noting that the positive psychology movement is not without its critics. As much as clinical psychology has been criticized for excessive focus on the negative, an equal charge can be leveled at positive psychology for a

unilateral focus on the positive. Some of the techniques and concepts proposed by the positive psychology movement would arguably not translate well in to clinical practice. For example, Seligman and Csikszentmihalyi (2000, p.5) note that positive psychology "is about positive individual traits: the capacity for love and vocation, courage, interpersonal skill, aesthetic sensibility, perseverance, forgiveness, originality, future mindedness, spirituality, high talent, and wisdom.' It is easy to see how such a focus may be counterproductive with clients presenting with moderate to severe mental health difficulties, who are highly self critical and/or perfectionist. Secondly, such a focus may reinforce the idea that negative mood states are to be avoided and/or suppressed in favour of positive ones, thus perpetuating distress.

Given this, it is likely that the interweaving of techniques that focus on both positive and negative mood states, will require considerable thought. However, in current clinical practice, emphasis on positive mood is often seen as a means of neutralizing the effects of negative emotional states. This is mirrored by the limited repertoire of therapeutic techniques to address the up regulation of positive affect. For example, the use of behavioural activation is not always effective as a means of increasing positive affect, as clients report that they are simply "going through the motions," which may reflect the fact that less attention is paid to the experiential 'being' aspect of positive experience, rather than simply 'doing' (e.g. Kabat Zinn, 1990). Thought records in Cognitive Behavioural Therapy (CBT) aim to uncover 'Negative Automatic Thoughts' as well as the physiological and emotional states associated with them, however, there is typically no 'positive thoughts' identified, rather alternative or balanced thoughts tend to be outlined (e.g. Padesky & Greenberger, 1995).

Nonetheless, some clinical techniques and models are beginning to emerge which place an equal emphasis on both the positive and the negative aspects, for example Mooney and Padesky (2000) make use of "heroes" or admired characters, to characterize a prior experience which holds a contradictory meaning to that associated with current difficulties. In the Gracey, Evans and Malley (2009) Y shaped model of self representation following brain injury, clients are encouraged to develop a stable, updated representation of the self which 'builds on positives' in a space of 'safe uncertainty'. Whilst these ideas offer a promising way to conceptualise a balance between positive and negative affect, it remains an open question of how specific techniques may contribute to the up regulation of positive affect. One aim of the current study is to explore what role suppression may have in the maintenance of blunted affect in MDD, with the implication that techniques that emphasise the acceptance of emotional experience, may be well placed to counteract blunted emotional reactivity.

1.3   Anhedonia

Given that the current study is concerned with blunted reactivity to emotional stimuli in MDD, the symptom of anhedonia with MDD has particular relevance, as the hallmark of this affective state is blunted reactivity.

1.3.1   The historical context of the concept. In the last century greater attention was paid to the concept of anhedonia, the loss of ability to experience pleasure. Its role in the diagnosis of melancholia was considered to be crucial and was subsequently linked to both depression and schizophrenia. In the present century attention to anhedonia has faded, possibly because of the focus upon depressed mood as the more central feature of depressive disorders (Snaith, 1992). Historically, the term anhedonia (Ribot, 1911) refers to an "insensibility relating to pleasure", as

opposed to analgesia, or the absence of pain. Subsequently, Klein (1974) viewed the responsiveness to monoamine oxidase inhibitors of some patients with chronic depression as evidence for an anhedonic component of some kind of "chronic neurotic depression." This idea that endogenous depression may occur in mild chronic forms has roots in the work of Kraepelin's (1921) concept of hypo-melancholia. However, more recently authors have suggested that the definition of anhedonia is "conceptually unstable" (Berrios & Olivares, 1995). It has been argued that anhedonia is not a unitary phenomenon, and that further research is warranted to explore the potential multiplicity of the concept. For example, in the basic science literature, a distinction has been drawn between anticipatory 'wanting' and consummatory 'liking' (Kringlebach & Berridge. 2008).

    1.3.2 The current status of anhedonia. Notwithstanding these conceptual problems, anhedonia is recognized as one of the key symptoms of depression according to both the (DSM-IV, 1994) and the International Statistical Classification of Diseases and Related Health Problems (ICD-10, World Health Organization, 1992). Under these criteria, it is defined as a loss of pleasurable engagement with the environment, disinterest, low motivation, and social withdrawal (Tellegen, Watson, & Clark, 1999). Along with depressed mood, anhedonia is one of two required symptoms for a diagnosis of MDD (American Psychiatric Association, 2000; World Health Organization, 1992). Recent reports estimate that approximately 37% of individuals diagnosed with MDD experience clinically significant anhedonia (Pelizza & Ferrari, 2009). Furthermore, anhedonia is a particularly difficult symptom to treat, as accruing evidence suggests that current first-line pharmacotherapies (e.g., SSRIs) do not adequately address motivational and reward-processing deficits in depression (American Psychological Association, 2000; Dunlop & Nemeroff, 2007; Nutt, et al.,

2007; Tomarken, Dichter, Freid, Addington, & Shelton, 2004). The presence of anhedonic symptoms is also a predictor of poor treatment response generally (Spijker et al., 2001). From a psychological perspective, much of the research effort in to anhedonia has examined the factor structure of the symptom, in relation to other disorders, and within the structure of depression itself. For example, according to the tripartite model (Watson & Clark, 1991), depression is uniquely distinguished by symptoms of anhedonia and low positive affect (PA), the latter being defined as a loss of pleasurable engagement with the environment, disinterest, low motivation, and social withdrawal (Tellegen, et al., 1999). Anxiety, on the other hand, is distinguished by symptoms of heightened physiological arousal such as heart palpitations, shortness of breath, etc. (Clark, Watson, & Mineka, 1994).

Despite anhedonia being a core symptom within depression, little empirical evidence is available regarding the processing mechanisms that underpin the anhedonic experience. Therefore, this thesis draws heavily on those theories that focus on emotional reactivity in depression, given that deficits in emotional reactivity are a core component of anhedonia. It also draws on cognitive and emotional regulation processes thought to contribute to the onset and maintenance of psychopathology, which have empirical and theoretical implications to anhedonia.

1.4   Literature Review

Subsequent sections will focus on theories of emotion reactivity in depression (section 1.5); the positive attenuation hypothesis, the negative attenuation hypothesis and the emotion context insensitivity hypothesis. Following this, theories and findings related to emotion regulation (section 1.6), with a particular emphasis on studies of emotion suppression from non-clinical and clinical domains (section 1.7) will be outlined and reviewed. This is followed by a discussion of clinical interventions (i.e.,

ACT, DBT and mindfulness based CBT), which focus on the role of emotion regulation and acceptance.

Each section will review the theoretical context, as well as the empirical evidence. Emotion regulation is a vast topic, spanning both clinical (e.g. Joorman, 2005; Cole & Michel, 1994) and non-clinical domains (e.g. Gross & Levenson, 1997; Dunn et al., 2009). As emotion suppression is the core aspect manipulated in the current study, it is those findings directly relating to emotion suppression as a regulation strategy, which will be reviewed in the current thesis. Although emotion suppression will be conceptualized within the broader framework of emotion regulation (section 1.6), bodies of empirical literature relating to other types of emotion regulation, for example, distraction (Kalisch, Wiech, Herrmann, & Dolan, 2006), appraisal (Goldin, McRae, Ramel, & Gross, 2008), or rumination (e.g. Rusting & Nolen-Hoeksema, 1998) will not be reviewed for the purposes of the current thesis.

1.4.1 Search strategy. Literature searches were conducted between January 2010 and April 2011. Key terms (i.e., emotion suppression, anhedonia, emotion regulation, depression, experiential avoidance, mood regulation, major mood disorder, clinical depression) were entered separately and combined in to the following databases on OVID: EMBASE (1980 to date), AMED (1985 to date), MEDLINE (1950 to date) and PSYCHINFO (1806 to date). PUBMED (1881 to date) was also searched. In addition, key journals were also searched (specifically, Behaviour, Research and Therapy; Journal of Abnormal Psychology; Emotion; Cognition and Emotion; Psychological Science, Journal of Affective Disorders, Journal of Consulting and Clinical Psychology and Journal of Personality and Social Psychology). Books were also hand searched (1999 to present) and the websites of key academics searched (e.g. James Gross), both using the search terms listed above.

1.5   The Role of Altered Emotional Reactivity and Emotion Dysregulation in Depression.

A considerable body of literature has highlighted the role of altered emotional reactivity in depression. However, there remains no consensus about the precise nature of these deficits. There are currently three alternative explanations which speak to this issue, positive attenuation; negative potentiation; and the Emotion Context Insensitivity hypothesis (ECI, Rottenberg, Gross & Gotlib, 2005), which are not necessarily mutually exclusive. Each of these will be considered in turn.

1.5.1   Positive attenuation. The concept of positive attenuation focuses on anhedonia as the core of depression. It predicts that depressed individuals will demonstrate an attenuated emotional reactivity to positive material. This idea links to the concept of motivation towards appetitive stimuli, which is reflected in the symptoms of depression such as fatigue, apathy, and reduced appetite. Furthermore, some theorists focus their accounts of emotion dysregulation in MDD around this pattern of deficits associated with appetitive behaviour (Depue & Iacono, 1989; Henriques & Davidson, 2000).

There has been some support for this idea from empirical studies. For example, depressed individuals have been shown to respond less to slides depicting pleasant scenes (Allen, Trinder, & Brennan, 1999; Dunn, Dalgleish, Lawrence, Cusack, & Ogilvie, 2004; Sloan, Strauss, Quirk, & Sajatovic, 1997; Sloan, Strauss, & Wisner, 2001) or to an amusing film clip (Rottenberg, Kasch, Gross, & Gotlib, 2002). However, these studies do provide a more complex picture where the rating scales used in them are taken in to account. In both of the Sloan et al (1997, 2001) studies, dimensional ratings of valence and arousal were taken, with valence using the scale

pleasant – unpleasant. These ratings make it difficult to determine whether lower valence ratings are reflecting a reduced rating of pleasantness, an increase in unpleasantness, or a combination of the two. In the Dunn et al (2004) study where both dimensional (valence, arousal) and categorical ratings (happiness, sadness, fear) were taken, lower valence ratings were obtained from the depressed group, and also lower happiness ratings. However, there was also increased sadness ratings to positive material, suggesting that responses to positive material in MDD is not solely comprised of a reduction in positive reactivity. Rottenberg et al (2002) also found elevated sadness. Contradicting these ideas, with an experience sampling methodology (ESM) Peeters, Nicolson, Berkhof, Delespaul and de Vries, (2003) found that MDD individuals showed an increase in positive mood to positive events, relative to controls. More recently Blysma, Taylor-Clift and Rottenberg, (2011) also used an ESM design to explore reactivity to daily events. They found that relative to healthy controls, the MDD group reported greater daily negative affect and lower positive affect and reported events as less pleasant, more unpleasant, and more stressful. However, the MDD group also reported greater reductions in negative affect following positive events. Whilst this appears contradictory to the prevailing literature, it is important to note that the MDD group also had less positive events overall than the control group, and that their positive mood did not persist for as long as the control groups. These caveats partially account for the fact that overall, the MDD group had lower positive affect, and higher negative affect. In other studies, Berenbaum and Oltmanns (1992) found that depressed individuals showed less positive emotion-expressive behavior (using facial expression analysis) in response to pleasant film and drink stimuli. In addition, Henriques and Davidson (2000) reported that depressed individuals were less behaviorally responsive to reward contingencies.

Thus, there is converging evidence that deficits in response to positive and approach related emotion cues are a distinguishing characteristic of depressed individuals, although the picture looks to be more complex than a simple reduction in positive reactivity.

      1.5.2   Negative potentiation. The prototypical high negative mood, characteristic of the depressed person, is the basis for this idea that depressed individuals will exhibit increased emotional reactivity to negative emotional stimuli. Despite the intuitive appeal of this idea, there is limited empirical evidence for it (for reviews see Ahrens & Haaga, 1993; Bylsma, Morris & Rottenberg, 2008 meta-analysis). For example, depressed individuals do not report elevated negative affect in response to negative images (Dunn et al., 2004) or videos (Rottenberg et al., 2002).

      Indeed, studies have found an opposite effect to that predicted by the negative potentiation hypothesis. For example, depressed persons appear to exhibit diminished amygdala response to fearful faces (Thomas et al., 2001) diminished electrodermal and startle reactivity to a loud noise (Allen, et al., 1999), and a diminished pain report to a range of stimuli (reviewed in Dickens, McGowan, & Dale, 2003).

1.5.3   The Emotion Context Insensitivity (ECI) Hypothesis. The ECI hypothesis was proposed by Rottenberg et al. (2005). ECI proposes that depressed individuals exhibit diminished emotional reactivity to positive stimuli (agreeing with positive attenuation) and diminished emotional reactivity to negative stimuli (disagreeing with the negative potentiation idea).

      The ECI hypothesis is based on evolutionary accounts of depression that emphasize the behavioural pattern of disengagement (Keller & Nesse, 2006). For example, according to Nesse and Ellsworth (2009), depressed mood states evolved as an internal signal designed to bias individuals against action. That is, depressed mood

evolved originally as a defensive response to adverse situations in which continued activity might prove to be futile or dangerous (e.g., famine). In these terms, depressed mood states are thought to prompt withdrawal and broad reductions in motivated activity, which encompass reduced reactivity to novel positive or negative emotional stimuli.

In a series of studies, Rottenberg et al. (2005) explored under what conditions the ECI hypothesis would hold. Comparing a group of non-depressed, recovered, and depressed individuals, they presented both self referent and non self referent stimuli. Consistent with the ECI hypothesis, participants in the depressed group rated positive stimuli as less positive than participants in either the non-depressed or recovered group. However, inconsistent with the ECI hypothesis, the depressed group also rated sad both self referent and non self referent stimuli as more sad than either the control or recovered group. Interestingly, there was also an effect of type of stimuli, but only for the depressed group. Here, depressed participants rated self referent negative material as more negative than non-self referent material, but with an opposite pattern for positive material, where non self referent material was rated more positively than self referent material. The authors suggest that this pattern reflects the activation of negative self schemas in MDD. Given that there may be a different pattern emerging in terms of reactivity to self and non self referent material in MDD, both types of material will be used in the current study.

In relation to other research ECI is consistent with other experimental findings. For example, compared with control participants, depressed individuals exhibit less affective modulation of startle during affective picture viewing (Dichter, Tomarken, Shelton, & Sutton, 2004), less differential neural responding to valenced emotion face stimuli (Gotlib, Sivers, Canli, Kasch, & Gabrieli, 2001), less reported

sadness reactivity and lower levels of amusement to sad and amusing films (Rottenberg, Kasch, et al., 2002), and blunted autonomic responding to a variety of stimuli (e.g., Dawson, Schell, & Catania, 1977). As with the evidence cited in favour of the positive attenuation hypothesis, the picture becomes more complex at the level of specific studies. For example, in the Rottenberg et al (2002) study, only ratings of amusement, sadness and fear were taken. Ratings of amusement may not directly map on to positive emotional experience, being more associated with a cognitive level appreciation of humour rather than experiential reactivity (Gavanski, 1986). Furthermore, the results from this study only partially support ECI. Although lowered amusement ratings were obtained from the MDD group, there was no reduced reactivity to sad material shown. Indeed, although not statistically significant, the pattern of results for the sad films was in the opposite direction to that predicted by ECI, with higher ratings of sadness obtained relative to controls.

Although there has been little investigation of the clinical significance of ECI, early evidence suggests that insensitivity to changing environment contexts in MDD may predispose to broader psychosocial difficulties. For example, within a sample of depressed persons, those who reported the most similar reactions in sad and neutral contexts (the pattern predicted by ECI) were found to exhibit the highest depression severity, to have been depressed for the longest period of time, and to have the lowest levels of overall psychosocial functioning (Rottenberg, Kasch, et al., 2002). Similarly, ECI has also been shown to predict prospective depression-related impairment: those depressed individuals who displayed the most similar behavioral and heart-rate reactions in amusing and neutral contexts were the least likely to recover 6 months later.

In summary, the literature to date shows a very mixed picture with regard to emotional reactivity changes in depression. In a recent meta analysis of the literature Blysma et al (2008) conclude that studies have shown both a significant reduction in reactivity to both positive and negative material. However, it is worth noting that the effect size for studies showing a reduced reactivity to negative material was small, despite there being more studies investigating it. For positive stimulus reactivity there was a medium effect size (based on Cohen's 1988 conventions).

Broadly speaking it appears that there is the most robust evidence for reduced reactivity to positive material in MDD, with a mixed picture for reduced reactivity to negative material, and some studies showing an increase in reactivity. As the ECI hypothesis is a relatively new idea, there have been less studies carried out which directly tests the predictions made by it. Of those findings that have been adopted post-hoc in support of it, there a some limitations to the design, when directly translating the findings in support of ECI. In addition, ECI tends towards the descriptive rather than the explanatory in that it tells us little about the factors or processes underpinning the emotional reactivity changes in MDD. At a process level, emotion regulation is a likely contributing process, given than part of their function is to dampen as well as amplify emotional experience. With regard to the current study, the methodological inconsistencies in the literature make it difficult to make firm predictions about all emotion reactivity alterations to our stimuli in the MDD group. It does suggest, however, that lowered positive emotional experience to positive stimuli is a robust finding, which may potentially incorporate elevated levels of sadness. The evidence is less clear overall for negative stimuli.

1.6   What is Emotion Regulation?

For the purposes of the current thesis, emotion regulation refers to a heterogeneous set of processes by which emotions are amplified, dampened or maintained (Gross Richards & John, 2006). Emotion regulation may be automatic or controlled, conscious or unconscious, and may be activated at one or more points during the emotional experience. Within the broader construct of affect regulation, emotion regulation can be seen as one of four overlapping processes, which also include coping, mood regulation and psychological defenses. The more problematic strategies are believed to include avoidant, irrational, and emotional coping, perceptions of uncontrollability, and tendencies to inflexibly engage in emotion suppression (Barlow, Allen, & Choate, 2004; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Gross & John, 2003; John & Gross, 2004). Taken as a whole, there is no clear consensus from the literature of which strategies are the most adaptive, which is probably because the effectiveness of regulatory strategies cannot be divorced from contextual considerations.

1.6.1   Emotion regulation strategies. The process model suggests five time points at which emotions are regulated (Gross, 1998). The first time point, situation selection, is where actions are taken which make it more or less likely that one will end up in a situation that gives rise to desirable or undesirable emotions. This links with the ECI account of depression as "withdrawal" from the environment. The second time point is known as situation modification, which refers to attempts to directly modify a situation, with the aim of altering its emotional impact. The third time point is attentional deployment,, involving an attentional shift to regulate the emotional content of a situation, typically either distraction or concentration. In this context, distraction is defined as focusing attention on different aspects of a situation,

which may involve an external focus, or an internal focus, where individuals invoke thoughts or memories that are incongruent with the emotional state. Conversely, concentration draws attention to the emotional features of an emotion, where this is frequently repeated, it has been classified as rumination. Rumination on sad events has been found to result in longer and more severe depressive symptoms (Just & Alloy, 1997; Nolen-Hoeksema & Morrow, 1993). The fourth time point is cognitive change which refers to changing the appraisal of the situation, to alter its emotional significance, either by changing the appraisal of the situation itself, or altering the appraisal of the ability to mange it. It may also refer to the top down process of emotion suppression, involving executive function processes to down regulate emotional reactivity. Finally, the last time point is response modulation which occurs late in emotion generation. This may target the physiological and experiential aspects of emotion, for example through drugs, exercise, relaxation etc. Individuals may also regulate their emotion-expressive behaviour, for example, through regulating their facial expressions. Whilst emotion suppression is the focus of the current study, it is worth noting the broader context of emotion regulation strategies in which it operates.

1.7   Emotion Suppression

Given that the central manipulation in the current study is emotion suppression, in the following section both clinical and non-clinical studies of emotion suppression are outlined and reviewed. These include studies, which examine the effects of suppression as a state construct, and those which look at trait factors (specifically experiential avoidance). There is some debate in the literature, over how emotion suppression should be defined. For Gross (2002) suppression is a form of response modulation which refers to attempts to decrease ongoing emotion-expressive behavior, rather than an internal regulatory process where experienced emotions are

suppressed and detached from. It can be argued that such a distinction between external and internal suppression is artificial, particularly given that bodily feedback mechanisms have been robustly found to influence both thought and emotion (e.g. Lakoff and Johnson, 1999; Wheeler and Petty, 2001 etc). In addition, clinical theory and interventions that speak to the issue of suppression versus acceptance of emotion, use a broad definition of suppression incorporating both aspects (e.g. Kabat-Zinn, 1990). For this reason, for the purposes of the current experiment, emotion suppression is defined as both the internal and external suppression of both experienced emotion, and emotion expressive behaviour. However, where identified by the authors, the specific conceptualization of suppression used in the following literature will be outlined.

1.7.1 **Non – clinical studies**. A range of studies have examined the pros and cons of suppression in non-clinical samples., Gross and Levenson (1997) allocated 180 female students to either a suppress, or neutral condition for watching sad, amusing or neutral films. Participants who were instructed to suppress their responses, defined as their expressive behaviour, to the films, had lower expressive behaviour in all three films, and decreased amusement self reports in sad and amusing films. Gross and Levenson (1997) also took physiological ratings and found that suppression had no effect in the neutral film, but there were clear effects in both the negative and positive emotional films, including increased sympathetic activation of the cardiovascular system. In other words, individuals can successfully minimize expression of negative emotions, but at the cost of becoming more physiologically aroused.

As part of their validation of the Emotion Regulation Questionnaire (ERQ, Gross & John, 2003) the authors looked at the association between a tendency to

suppress emotional responses and measures of well-being. They found that individuals who typically suppress reported more depressive symptoms on three measures of low mood: the Beck Depression Inventory (BDI; Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961), the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), and the Self- Rating Depression Scale (Zung, 1965). High suppression individuals also felt less satisfied with life, had lower self-esteem, and were less optimistic. They also scored lower on each of the Ryff and Keyes (1995) well-being scales, in particular, the link with interpersonal aspects of well-being was strong (r = -.46).

Hofmann, Heering, Sawyer and Asnaani (2009) compared a group of undergraduate students on the effects of suppression, reappraisal or acceptance on anxiety during and following an impromptu speech, their definitions of reappraisal and acceptance follow those used by Gross and colleagues (e.g. Gross, 1999). They found that the suppression group showed a greater increase in heart rate from baseline than the reappraisal and acceptance groups. The suppression group also reported more anxiety than the reappraisal group. However, the difference between the acceptance group and the suppression group in their subjective anxiety was not significant, despite a large sample size (n = 197). The authors conclude that suppression is maladaptive, leading to a paradoxical rebound effect of experienced emotion. However, the groups were significantly different on a trait measure of anxiety, with the acceptance group having higher scores at baseline than either the reappraisal group or the suppression group. As this was not added as a covariate in any of the analyses, it is difficult to tell what impact this had, if any, on the pattern of results obtained.

More recently Szasz, Szentagotai and Hofmann (2011) compared the effects of suppression, acceptance or re-appraisal of a frustrating task, on subsequent anger levels. They tested a group of undergraduate students, and asked them to complete a mental imagery mood induction of a frustrating situation. Participants who rated at least a moderate level of anger in response to this induction, were asked to complete the frustrating task, and either suppress, accept or re-appraise in response to it. They found that suppression was the least effective, and reappraisal the most effective strategy for regulating anger, with participants in the reappraisal condition reporting lower levels of state anger than the other two groups, there was no difference between state anger scores for the suppression and acceptance group. Although these results are potentially interesting, there are some limitations to the design. The authors tested only those participants with a moderate level of anger in response to the mood induction, which was then directly followed by the frustrating task. By using only this subset of participants, it is difficult to tell how the state mood effects impacted on instruction compliance and responses to the task. More importantly, it is notable that there was no difference between the suppression and acceptance group. This, in addition to the lack of a control group, makes it difficult to disentangle whether there was an effect of suppression, or whether re-appraisal was just an actively helpful strategy. More generally, in both the Szasz et al (2011) and Hofmann et al (2009) studies, the Gross (1999) definition of suppression was used. As this is a more circumscribed definition of suppression, it may be that it was not experiential enough to demonstrate an altered pattern of reactivity relative to the reappraisal groups.

Of greater relevance for MDD, Dunn, Billotti, Murphy, and Dalgleish (2009) investigated the effects of using suppression, acceptance and no-regulation responses to a negative film with a group of healthy volunteers. In addition to this, the

consequences of these emotion regulation strategies, on subsequent reactivity to valenced stimuli was measured. They measured both subjective ratings of affect after the negative film, ratings of subsequently presented valenced stimuli, and took psychophysiology recordings. Suppression was found to effectively reduce negative affect, over both short and longer term. This effect was confined to the subjective ratings of affect during the video, there was no difference between groups on the psychophysiology recordings. Of particular relevance for the current thesis, participants in the suppression condition also reported significantly lower valence ratings in response to positive images following the negative film. The authors suggest that the longer-term consequences of emotion suppression may be to globally down regulate emotion experience, for both positive and negative stimuli. However, the use of "valence" as a rating construct is broadly defined, it is therefore difficult to ascertain whether lower valence ratings to positive images were due to a decrease in positive reactivity, and increase in negative emotion, or a combination of the two.

The mixed picture from this literature suggests that the success of suppression as a strategy depends in part on the emotion being suppressed. In both the Szasz et al (2011) and Hofmann et al (2009) studies, suppression was not a successful strategy for dampening either anxiety or anger. However, the Dunn et al (2009) study suggests that it is successful at dampening negative affect. Crucially for the current study, the Dunn et al (2009) data suggests that one consequence of this suppression is a more global dampening of emotion reactivity, an idea which will be specifically tested in the current experiment.

1.7.2 Clinical studies. There have also been a number of studies carried out on clinical populations. Levitt, Brown, Orsillo, and Barlow (2004) looked at the role of emotion suppression in panic disorder. They recruited 60 participants with a diagnosis

of panic disorder, who were randomly allocated in to a suppress, accept or neutral group. In the suppress and accept group, participants listened to a taped narrative of how to either suppress or accept their emotions in response to a "second challenge"; in the neutral group participants listened to a narrative from the national geographic channel. The suppress instructions included both internal and external components of suppression. For the "second challenge" 5.5% CO_2-enriched air was administered for 15 minutes, which gradually brings on symptoms similar to those experienced during a panic attack. Results showed that the acceptance group was significantly less anxious and less avoidant than the suppression or control groups in terms of subjective anxiety and willingness to participate in a second challenge, but not in terms of self-report panic symptoms or physiological measures. The authors found no differences between suppression and control groups on any measures. They conclude that suppression was related to more subjective anxiety during the challenge, and use of acceptance was related to more willingness to participate in a second challenge. This study does suggest that suppression increases anxiety in a panic disorder sample, however, the lack of a control group makes it difficult to make broader generalizations from the study.

In relation to social anxiety, Kashdan and Breen (2008) explore the idea that social anxiety has commonalities with depression, in a "toxic combination" of emotional suppression and avoidance, leading to reduced positive affect. In line with recent research (Kashdan, 2007; Brown, Chorpita and Barlow, 1998; Kashdan and Steger, 2006), Kashdan and Breen (2008) argue that the affective profile of reduced positive experience seen in depression, is consistent with that seen in social anxiety, even when controlling for depressive symptoms and disorders (Kashdan, 2007).

However, the theory behind the use of suppression is different in social anxiety where it is thought to be a coping strategy whereby concealing and suppression emotional responses is used to minimize the possibility of social rejection. This in turn diminishes positive affect, and ability to engage in social activities. In Kashdan and Breen's (2008) study, a total of 145 undergraduate students participated in a short term (three month) prospective study, completing social anxiety, depression, positive affect, emotion suppression and expression questionnaires at both time points. They found a negative correlation between social anxiety and positive emotions over the three month period; they also found that emotion expression was a key moderator, with low socially anxious adults who tend to express emotion, showing the greatest increases in positive emotions over the period. Importantly for models of causation, the authors failed to find an effect of positive emotions, either singly, or in conjunction with emotion suppression or expression, as predictors of change in social anxiety.

With regard to the specificity of the findings, the relationship between positive emotion and social anxiety remained, when controlling for depressive symptoms. These findings suggest that it is emotion expression, which is a key predictor of positive emotion in social anxiety. However, it is not clear whether this relationship is transferable to anhedonia. Certainly, reduced emotion expression is characteristic of the disorder, but concepts like emotional avoidance and emotion suppression are more likely to be explanatory variables than emotion expression as a coping strategy to minimize social rejection.

More transparently related to depression is a study by Campbell-Sills, Barlow, Brown, and Hofmann (2006) who explored the effects of emotion suppression versus acceptance on participants with an anxiety or mood disorder. Participants viewed a

film clip (which was intended to induce anxiety and dysphoria), and were either asked to suppress or accept their emotion responses to it. Both subjective measures and psychophysiological recordings were taken. This study found that participants in the suppress condition displayed more negative affect during the post film recovery period, and also an increased heart rate during the film, relative to the accept group. Interestingly, there were no effects on positive emotion, and actually an increase in negative emotion, which contradicts the ECI hypothesis.

However, there are several limitations to the design. The first is the use of a mixed clinical group, incorporating a range of anxiety disorders, depression presentations and a mixture of the two. This makes it difficult to disentangle which emotion regulation strategies are most associated with each clinical presentation. Secondly, there is no comparison with a no-regulation control condition, making it difficult to ascertain whether suppression was an actively unhelpful strategy, acceptance actively helpful, or a combination of the two. Nonetheless, this study does suggest that there may be a link between suppression and subsequent increases in negative affect and physiological responding, in this particular sample.

However, Liverant, Brown, Barlow, and Roemer (2008) found that suppression actually reduced negative affect over the short term, and that anxiety about the experience of a depressed mood moderated this relationship. Their sample was sixty depressed individuals, who were either instructed to suppress or accept their responses to a sadness inducing film. They measured participants' subjective emotional experience, anxiety about the experience of depressed mood, and use of regulation strategies on analogue scales, prior to, immediately after, and three minutes after, a negative film clip. Participants in the suppress condition reported lower negative affect than the accept group, immediately after the film. Significantly, this

effect only held where participants had low levels of anxiety about experiencing a depressed mood (as measured by the Fear of depressed mood subscale on the Affective Control Scale (ACS) Williams, Chambless & Ahrens, 1997). For participants with moderate to high scores on the subscale, suppression did not reduce levels of negative affect immediately after the film. However, there were no differences between the groups at the recovery period, and negative affect levels were comparable with those recorded prior to the negative film.

Whilst this study specifically looked at anxiety about depressed mood, the differential pattern of results between those participants who did versus did not have anxiety about depressed mood, suggests that the Campbell-Sills et al (2006) study may have incorporated participants with very different pattern of response to emotion suppression. Liverant et al (2008) conclude that acceptance based therapies like ACT may be most beneficial for those individuals who have moderate to high anxiety about the experience of being depressed. Further, that research efforts should look at a more nuanced explanation with regards to which trait factors may moderate the efficacy of different emotion regulation strategies. Although not measured in their design, the authors speculate that broadly speaking, although suppression has short term benefits, for depressed individuals, it may be better to use an acceptance strategy which can increase or normalise emotional responding, thus counteracting emotional hypo-activity (or anhedonia).

Ehring, Fischer, Schnelle, Busterling and Tuschen-Caffier (2008) compared a group of participants who had recovered from depression, with never depressed controls. The groups were compared on two measures of emotion regulation, one which focused on the cognitive aspects of emotion regulation (the Cognitive Emotion Regulation Questionnaire, CERQ, Garnefski, Kraaij, Spinhoven, 2001), and one on

the experiential aspects (the Difficulties in Emotion Regulation Scale, DERS, Gratz & Roemer, 2004). Specifically with regard to acceptance, the authors found a significant difference between the groups on the DERS, but not on the CERQ, suggesting that the experiential acceptance of emotion may be a trait marker for MDD. The recovered group also scored more highly on rumination, and lower on a measure of positive reappraisal. Given the design of the study, it provides evidence of an association between these variables and vulnerability to MDD, rather than causation. The main limitation of this study was the matching criteria - the authors state that the sample was matched, however, this was only for age and gender, no measure of anxiety were taken, which limits the interpretations that can be drawn from these findings.

Overall, these studies appear to provide conflicting data on the effects of suppression. However, the use of a mixed clinical sample in the Campbell-Sills et al. (2006) experiment, and the lack of anxiety measures in the Ehring et al (2008) study makes it difficult to draw any firm conclusions from their results. Both the Liverant et al. (2008) and the Dunn et al. (2009) papers suggest that one of the immediate effects of suppression in both healthy and depressed samples, may be to reduce negative affect. There is also converging evidence for the effects of suppression on positive affect in the Kashdan and Breen (2008) work on social anxiety. The Dunn et al. (2009) paper further suggests that suppression also down regulated responsiveness to positive material, this issue was also raised in the Liverant et al. (2008) paper. To date, no study has examined the effect of suppression on positive affect in a depressed sample.

1.7.3   Experiential avoidance. Since the "success" of a particular emotion regulation strategy appears to be heavily context dependant, more recently researchers

have started to look at those factors which may impact on our ability to successfully implement emotion regulation strategies. Specifically in relation to the use of less helpful emotion regulation strategies, the concept of experiential avoidance (EA) has emerged as a core trait, which may underpin attempts to suppress emotion. EA is defined as excessive negative evaluations of unwanted private thoughts, feelings, and sensations, an unwillingness to experience these private events, and deliberate efforts to control or escape from them (Hayes et al., 2004). Rather than having a specific definition, experiential avoidance is conceptualized as a broad category of behaviors linked by the common function of avoiding or escaping unwanted internal experiences. In this sense, strategic attempts to escape stressful experiences (avoidant coping), to become independent from aversive events and accompanying emotions (detached coping), or to inhibit the expression of emotions (emotion suppression) can be considered component processes of experiential avoidance. Another component is the belief that personal control over threatening events rests outside oneself (uncontrollability). As such, experiential avoidance is maintained primarily through negative reinforcement, and may include a variety of behaviors that serve this function, such as avoidant coping styles; thought and emotion suppression; drug or alcohol use to escape from unwanted moods; and avoidance of feared objects, places, or situations. As with other areas of emotion regulation, it is not the case that *all* EA is detrimental, the *excessive* element of this definition is critical, mild avoidance or suppressed behavior can at times, be viewed as an adaptive strategy.

Thus, it is proposed that experiential avoidance becomes maladaptive when it is applied rigidly and inflexibly such that enormous time, effort, and energy is devoted to managing, controlling, or struggling with unwanted thoughts and feelings.

There is converging evidence that EA positively correlates with various forms of psychopathology, including depression and anxiety (Kashdan et al., 2006; Roemer, Salters, Raffa, & Orsillo, 2005; Tull, Gratz, Salters, & Roemer, 2004), post-traumatic stress (Marx & Sloan, 2005), and substance abuse (Stewart, Zvolensky, & Eifert, 2002). For example, Gratz and Roemer (2004) explored aspects of emotional processing that differentiate women with and without deliberate self harm (DSH). Their sample was female college students with recent, repeated DSH, matched to a group of female students with no history of self-harm on race/ethnicity, and age. Results indicate that self-harming women reported significantly higher levels of experiential avoidance. In a recent study, Fledderus, Bohlmeijer and Pieterse (2010) recruited a total of 93 adults with mild to moderate psychological distress completed measures assessing coping styles, psychopathology (depression, anxiety, and alcohol use), and mental health (emotional, psychological, and social well-being). Results showed that EA mediated the effects of passive coping on both increased anxiety and depression and decreased emotional and psychological well-being. However, it is not clear how a passive coping style is related to EA, which appears more connected to an active attempt to suppress or avoid emotions, interestingly there was no significant correlation between EA and avoidant coping in this study. Furthermore, these studies do not speak to the issue of causation - is EA adopted as a mechanism to cope with high levels of undesirable emotion, or is it a stable trait characteristic which contributes to the onset of emotional difficulties?

With this in mind, it is unclear whether the associations found between EA and other factors cause, or a consequence of, EA. These include impaired memory for social information, and weaker social ties with interaction partners (e.g., Gross & Levenson, 1993,1997; Richards & Gross, 2000). An association has also been found

between EA and emotional well-being, social outcomes, and life satisfaction, which mirror experimental findings (Gross & John, 2003).

1.7.3.2 Experiential avoidance in depression. Other theorists have also converged on the concept of experiential avoidance, specifically in depression. Moore and Garland (2003) propose three interrelated forms of avoidance in depression: behavioural avoidance of certain external circumstances, cognitive avoidance of certain mental ideas or images, and emotional avoidance through the direct suppression of emotional experiences. Of these types of avoidance, emotional avoidance has particular implications for anhedonia. For example, it has been found that chronic emotional avoidance interferes with the pleasures of being fully immersed in any activity, resulting in less frequent positive events and dampened positive emotions (Gross & John, 2003; Steger & Kashdan, 2007). Given the accumulating literature for the role of EA both in emotion regulation generally, and in MDD, the current study takes a measure of EA, to establish whether this trait factor impacts on the ability of participants to comply with the experimental manipulations.

1.7.4 Can emotion suppression be a successful strategy? In contrast to the above findings, it appears that in some circumstances, and typically with healthy individuals, both thoughts and emotions can be suppressed successfully (Dunn et al, 2009). Several studies have shown that individuals identified by either questionnaire or behavioral measures as "repressors" can adapt more successfully than non-repressors, following a sad or traumatic event (Weinberger, Schwartz, & Davidson, 1979). Repressive coping appears to operate primarily through emotion-focused mechanisms, such as emotional dissociation. It is suggested that repressors tend to report relatively little distress in stressful situations but exhibit elevated distress on indirect measures, such as psychophysiology measures (Weinberger et al., 1979).

Emotional dissociation is generally viewed as maladaptive and may be associated with long-term health costs (Bonanno & Singer, 1990). However, these same tendencies also appear to foster adaptation to adversity. For example, repressors have been found to show relatively little grief or distress at any point across five years of bereavement (Bonanno & Kaltman, 2001; Bonanno, Keltner, Holen, & Horowitz, 1995).

In a series of studies Bonanno argued that emotion suppression and avoidance can have positive consequences for future adjustment and coping. For example, Bonanno et al (1995) used a measure called "verbal – autonomic response dissociation", whereby "repressors" are those with a low negative self report, but high autonomic arousal; non-repressors show no discrepancy between their self report and autonomic arousal. To test the idea of adaptive repression, their sample was participants who had recently lost a partner. They measured verbal autonomic response dissociation at six and fourteen month intervals, and correlated it with a measure of grief. The findings were that those who scored highly on repression, had minimal grief symptoms across the 14 months. A tendency was repress was also linked to initially high levels of somatic symptoms, which dropped to a low level by 14 months, this finding remained when controlling for grief severity.

Bonanno, Noll, Putnam, O'Neill, and Trickett (2003) also studied a sample of young women with documented histories of childhood sexual abuse, repressors were less likely to voluntarily disclose their abuse when provided the opportunity to do so, but they also showed better adjustment than other survivors.

In a related vein, the ability to suppress emotion expression has also been linked to good adjustment following the September 11th terrorist attacks. For example, Seery, Silver, Holman, Ence, and Chu (2008) surveyed 2,138 members of a nationally

representative Web-enabled survey panel who were given the opportunity to express their reactions to the terrorist attacks of September 11, 2001, on that day and those following. They used the decision to express their reactions on this online survey as indicative of either a tendency to express or suppress emotional responses. Follow-up surveys assessing mental and physical health outcomes were completed over the next 2 years. They found that participants who chose not to express any initial reaction reported better outcomes over time than did those who expressed an initial reaction. Among those who chose to express their immediate reactions, longer responses predicted worse outcomes over time. This analysis controlled for acute stress response and exposure to the attacks. Although these covariates did not significantly predict outcome, regression analyses revealed that participants who responded to the prompt reported significantly higher extraversion, agreeableness, and openness to experience than did participants who chose not to respond. The pattern of these correlations questions the validity of responding to a survey prompt as a measure of suppression. Nonetheless, the authors conclude that not expressing your feelings following a traumatic event, is indicative of longer term adjustment.

Although these studies do suggest that "repression" may be an adaptive process in some circumstances, it is not clear how much conceptual overlap there is with either emotional avoidance, or emotion suppression. Furthermore, methodologically, whilst this is a novel way of conceptualizing "repression", it is not clear how valid the discrepancy between self report and autonomic arousal is. In particular, it is debatable whether "repression" would not extend to the regulation of autonomic arousal, thus reducing the discrepancy between the observed self report and autonomic arousal. For instance Weinberger et al (1979) talk of "emotional dissociation" - in states of dissociation, an autonomic response would not be

expected (Van Der Hart, Nijenhuis, Steele, & Brown, 2004). Nonetheless, this research as a whole does suggest that repression, for some individuals is a long term, successful strategy. Further research is needed to unpick which variables translate in to this long term successful strategy, and which are related to future psychopathology. However, some research has examined what factors impact on the immediate success of suppression as a strategy, as outlined below.

  1.7.5 When emotion suppression becomes problematic. Given that emotion suppression has, at times, been found to be a successful strategy, the question remains, what processes or factors account for this variability? Studies that manipulate cognitive processes as part of an experimental procedure involving suppression, are well placed to examine this issue. Wegner, Erber and Zanakos (1993) asked healthy individuals to either suppress, or not regulate their emotions, whilst recounting a distressing event from their life, using stream of consciousness writing. Results showed that the suppression had worked, with lower reports of negative mood in the suppress condition, relative to controls. A separate group of participants completed the same experiment, but were asked to also remember a nine digit number, thus increasing their cognitive load. Results were reversed – participants in the suppress condition reported relatively more negative affect than controls. Wegner (1994) proposed an "ironic process theory". Under this theory, two complementary processes are used in emotion suppression. The first is an effortful process that carries out the regulation, for example, by searching for mental contents, or altering body state, to counteract the undesired mood and bring them in to awareness. The second is an automatic monitoring process that scans the contents of awareness to evaluate the success of regulation attempts. This latter process needs to activate representations of the to-be-regulated state for comparison, ironically bringing them back to awareness.

Under typical conditions, the operating system is more effective at bringing content in to awareness, than is the monitoring process. However, under conditions in which the effortful operating system is undermined, such as during cognitive load, the automatic monitoring, with it's low activation of the to be regulated material, is sufficient to cause an ironic increase in the to-be-regulated state. In a more recent study Dalgleish, Yeind, Schwiezer and Dunn (2009) used the same stream of consciousness writing task, but without increasing participants cognitive load. Instead they compared a group of high and low scorers on a measure of depressed mood (the depression subscale of the Hospital Anxiety and Depression Scale, HADS, Zigmond & Snaith, 1983). Participants were took part in three conditions, a no instruction, suppress and experience condition, the "experience" condition being where participants were asked to accentuate their emotional experiences. In each condition participants were asked to re-collect a distressing memory. They found that the high HADS scores showed an elevated level of negative emotion in the suppress condition, relative to the control group, who were able to successfully suppress their emotions. The authors conclude that negative affect acts as a kind of chronic mental load, resulting in the failure of suppression.

Other researchers have examined the cognitive consequences of emotion suppression. For example Richards and Gross (2000) examined the effect on incidental learning, of suppressing emotion responses to high and low negative affect pictures (depicting severely wounded men). Participants were told that the aim of the study was to understand how people use biographical and visual information to form impressions about people who have been injured, and that they would be asked to complete a questionnaire about it, following presentation of the images. They were asked to view the pictures, whilst three pieces of fictitious information about each

picture was orally presented alongside it. Following this, they engaged in a cued recall and a cued recognition task, the first asking them to recall the three pieces of information about each picture as it was re-presented, and the second asking them a forced choice recognition test on the pieces of information. They tested undergraduate students, and found that emotion suppression led to lower scores on both the recall and recognition tasks, with both the high and low affect pictures. Interestingly, they also found that emotion suppression did not lower self reported negative affect after viewing the pictures. This may lend support to Wegner et al's (1993) findings that higher cognitive load reduces the efficacy of emotion suppression, given that the instructions stated that the participants would be asked questions about the pictures and information at the end of the experiment.

1.8   Clinical Interventions

Overall, there is considerable debate in the experimental literature over whether intentional emotion suppression, has positive or negative consequences. However, existing clinical approaches in general favour replacing suppression with acceptance. As will be outlined below, clinical interventions like Acceptance and Commitment Therapy (ACT); Dialectical Behaviour Therapy (DBT) and Mindfulness Based Cognitive Therapy (MBCT) all share the idea that it is not emotions per se that are problematic, but maladaptive attempts to control, alter or suppress them. Essentially, the theme of "acceptance" of emotional states, which runs through these therapies, involves relinquishing effortful emotion regulation.

For example, in Acceptance and Commitment Therapy (ACT) it is argued that psychological distress persists due to maladaptive efforts to control negative emotions and other unwanted experiences. Mindfulness based approaches also share the idea that adopting an accepting, observing, non-judgemental approach to emotions is a

more adaptive process than effortful, controlling processes. These approaches have collectively been dubbed the "third wave of cognitive behavioural therapies". However, as Hofman and Asmundson (2008) argue, there is some debate over which therapies actually fall under this "third wave" and what collectively distinguishes them from traditional CBT.

     1.8.1   Dialectical behaviour therapy. Dialectical behavior therapy (DBT, Linehan, 1987) was developed as a treatment for chronically parasuicidal women. Subsequently it evolved in to a treatment for borderline personality disorder (BPD) (Linehan, 1993). The core aspect addressed by the treatment is that of finding an appropriate balance between acceptance and change. The difficulties borderline clients commonly have in tolerating distress, and in accepting themselves and others, led to attempts to help them develop acceptance-oriented skills and change-oriented skills. Some of these treatment strategies draw primarily on standard behavioral and cognitive therapy techniques. Whilst treatment strategies for helping the therapist to convey his or her acceptance of the client draw primarily on client-centered and emotion focused therapies. In addition, treatment strategies which help the client to develop greater acceptance of self, of others, and of life in general draw primarily on Zen principles and practice (Robins, 2003). Mindfulness in DBT is conceptualized as entering in to, participating in, and becoming "one with" experience (Linehan, 1993). DBT has been empirically evaluated in several randomized controlled trials (RCTs) as a treatment for women who meet criteria for BPD, both by Linehan and her colleagues and by others (Chapman, Gratz, & Brown, 2006). Overall, the clinical outcome data support the efficacy of DBT as a treatment for women with BPD.

     Interestingly, DBT has also been trialed for depressed individuals, Lynch Chapman, Rosenthal, Kuo, and Linehan (2006) recruited 34 depressed individuals age

60 and over who were randomly assigned to receive 28weeks of standard medication management, either alone (MED group) or in combination with a DBT group skills class and telephone coaching (MED-DBT group).Assessments at pre-treatment, post-treatment, and 6-month follow-up included both clinician and patient ratings of depressive symptoms. At follow-up, the MED-DBT group had a significantly greater number of patients who were in remission than patients on MED alone. The MED-DBT group also showed significant improvements on self-rated depression scores, adaptive coping, and sociotropy. Of relevance for the current thesis, this study also took measures of avoidance and emotional ambivalence.

On average, the MED-DBT participants showed significant improvements in adaptive coping after stressful events, and these changes were maintained at the 6-month follow-up. Improvements in total coping reflect feeling less overpowered, being more likely to seek social support, being less likely to take frustrations out on others, feeling more independent of stressful circumstances, and working out plans to deal with the stressful event. Given that the symptomatology of depression is different from that of BPD, one question for further research is whether DBT was targeting some of the same underlying processes (e.g. experiential avoidance, inflexibility) for both depressed and BPD clients. It may be that each client group benefited from different aspects of the treatment package.

1.8.2   Acceptance and commitment therapy (ACT*).** The model which underpins Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 2003) has the idea of experiential avoidance at its heart. The authors argue that experiential avoidance of thoughts, feelings and internal sensations leads to the maintenance of psychological distress. Whilst this makes conceptual sense, the link between this premise and the theory underpinning ACT is less transparent. The theoretical basis of ACT is rooted

in Relational Frame Theory (RFT; Hayes, Barnes-Holmes, & Roche, 2001).

According to RFT, cognition is "the learned and contextually controlled ability to arbitrarily relate events mutually and in combination, and to change the functions of specific events based on their relations to others" (Hayes, Luoma, Bond, Masuda, & Lillis, 2006, p. 5). A key assumption of RFT is that such "cognitions achieve their potency not only by their form or frequency, but by the context in which they occur. Problematic contexts include those in which private events need to be controlled, explained, believed, or disbelieved, rather than being experienced" (Hayes et al., 2003; Hayes, et al., 2006, p. 45).

Although RFT is put forward as a comprehensive theory of cognition, it is arguable that it more accurately represents a collection of learning and reasoning principles, including categorization, abstraction and metaphor processing. Whilst it is not couched in these terms, it appears that the thrust of the argument is that problems occur when individuals attempt to process all material at a cognitive rather than an experiential level. This argument has previously been made in relation to traditional CBT, of the distinction between "knowing with the head and feeling with the heart" (Teasdale & Barnard, 1993).

The techniques used in ACT primarily focus on experiential avoidance, including methods that are intended to increase psychological flexibility. The specific processes and techniques to reach this therapeutic goal include acceptance, cognitive defusion, being present, values, and committed action. To increase acceptance clients are encouraged to embrace unwanted thoughts and feelings – such as anxiety, pain, and guilt - as an alternative to experiential avoidance. The goal is to end the struggle with unwanted thoughts and feelings without attempting to change or eliminate them. For cognitive defusion, the purpose is to change undesirable functions of thoughts and

other private events (such as emotions). These strategies are intended to make the client realise that any attempts to control private events are part of the problem, not the solution. For example, in the case of anxiety disorders, the client may learn that it is the unsuccessful attempts to control anxiety that is the problem, not the solution. Instead, clients are encouraged to not act upon the thoughts and feelings, and to ultimately give up control. Various mindfulness exercises attempt to teach clients how to live with their evaluative and critical mind. This links in to the goal of "being present" where therapists encourage clients to be in non-judgmental contact with environmental events as they occur.

Outcome studies for ACT treatment protocols have typically yielded positive results. Bach and Hayes (2002) compared four 45-minute sessions of ACT to treatment as usual (TAU) in a randomized trial helping inpatients cope with positive psychotic symptoms (n=80). Patients in the ACT condition had half the rate of rehospitalisation over a four month follow-up period. ACT was found to result in significantly lower believability ratings of psychotic symptoms (e.g., rating whether the delusions/hallucinations were literally true) at the four month follow up.

Zettle and Hayes (1986) compared an early version of ACT to CBT for depressed clients (N=18) delivered in a 12 week individual protocol. They found that ACT was superior to CBT on depression outcomes at post and at a two-month follow up. In addition, ACT and CBT did not differ significantly on the Automatic Thoughts Questionnaire (Hollon & Kendall, 1980) which measures depressogenic thought frequency, but clients in the ACT group scored lower when they were asked to rate the believability of these same thoughts were they to occur (the "ATQ-B") – a measure of cognitive defusion. Although this finding suggests that ACT has greater efficacy than CBT, it should be noted that it was conducted by the creator of ACT,

thus bias is possible. It is notable that whilst ACT purports to accept *all* emotions,

only negative symptoms have been measured in outcome studies. There is no data on

positive outcomes such as happiness

      1.8.3   Mindfulness. As taught in most clinical interventions, mindfulness is a

collection of meditation practices designed to enhance the ability to remain immersed

non-judgmentally in the present moment (Kabat-Zinn, 2003). Mindfulness

interventions typically begin by teaching the body scan, which involves focusing

attention on the breath and then turning attention to each section of the body. The key

instruction is to attend to bodily sensations (e.g., pain and discomfort) without any

judgment or evaluation of these sensations. Following this, the same principle is used

to observe emotions, cognition, and external events. Beyond the sessions, clients are

encouraged to apply the principles of mindfulness in their daily life, during daily

activities such as eating, driving, and doing the washing up. Although the exact

practices take different forms and have different foci, they share the goal of working

toward a state of non-evaluative self-observance, or "bare attention" (Kabat-Zinn,

1990). Consistent with the positive psychology goal of promoting resilience,

mindfulness includes goals such as enhancing well-being and awareness of the self

and environment, along with disciplining the mind and emotions (Hamilton, Kitzman,

& Guyotte, 2006). Furthermore, it has been suggested that the principles and practice

of mindfulness can be thought of as an intervention that promotes positive psychology

processes such as "flow" (Csikszentmihalyi, 1991), forgiveness (McCullough, 2000),

hope (Snyder, Rand, & Sigmon, 2002), and resilience (Masten 2001). Thus whilst

both ACT and DBT incorporate mindfulness in to their treatment protocols, it is

arguable that mindfulness is the most experiential of these therapies.

      There is considerable empirical evidence for the efficacy of mindfulness based

interventions. Among healthy adults, it has been found to reduce symptoms of stress, anxiety, and depression (Astin, 1997; Roth & Creaser, 1997, 2002; Shapiro, Schwartz, & Bonner, 1998). Several studies have demonstrated the efficacy of mindfulness based programs for patients with fibromyalgia (Goldenberg et al., 1994; Kaplan, Goldenberg, & Galvin-Nadeau, 1993), other chronic pain conditions (Kabat-Zinn, 1982), binge eating disorders (Kristeller & Hallett, 1999), and anxiety disorders (Kabat-Zinn & Chapman-Waldrop, 1988). In addition to a stand-alone treatment, mindfulness has also been combined with cognitive behavioral therapy in order to prevent the recurrence of depressive episodes (Teasdale, Segal, & Williams, 1994; Teasdale et al, 2000). It is likely that the process of mindfulness practice reduces emotion suppression as a consequence of learning to become aware of, and observe emotional states.

1.9   Chapter Summary

A core feature of MDD, and particularly anhedonia, is an alteration in emotional reactivity. It is proposed that emotion regulation processes are one plausible contributory process to this, given that the function of emotion regulation is to elevate as well as dampen emotional experience. The focus of the current thesis is on one such process, emotion suppression, and the impact of suppressing emotions on subsequent reactivity to positive material. Following on from Dunn et al's (2009) and Kashdan and Breen's (2008) research, it is proposed that suppression of emotional responses to negative material, will result in a blunted response to subsequently presented positive material.

Given that this prediction speaks to the literature on emotion reactivity changes in MDD, three conceptualisations for the pattern of emotion reactivity disturbances in MDD were outlined. These emphasised the role of reduced reactivity

to positive material; increased reactivity to negative material, or reduced reactivity to both positive and negative material. Although the evidence was mixed, and at times contradictory, on balance the evidence was most robust for a dampening of reactivity to positive material in MDD. However, Rottenberg et al (2005) did report that the pattern of reactivity in MDD was dependant on whether the material was self referent (e.g. autobiographical memory prompts) of non self referent (e.g. standardised images). Self referent negative material was rated as more negative than non-self referent material, but with an opposite pattern for positive material, where non self referent material was rated more positively than self referent material.

Following this, emotion regulation strategies, as a component process of emotion reactivity, were defined and discussed. Given the focus of the current study, particular attention was paid to empirical investigations of emotion suppression, in both the clinical and non-clinical literature. It appears that in anxious participants, emotion suppression can have a re-bound effect, paradoxically increasing anxious symptoms (e.g. Liverant et al, 2008). In depressed participants, at first glance, suppression appears to be successful, reducing reactivity to negative material. However, the Dunn et al (2009) findings suggest that this suppression has a knock on effect to reactivity to all emotional material, including a reduced reactivity to positive material. This finding dovetails with Kashdan and Breen's (2008) work on social anxiety, where suppression of emotions was associated with lowered positive affect.

These findings were supplemented by research with the idea repressing emotional responses, can be an adaptive strategy. Although this research suffers from conceptual and methodological shortcomings, it does suggest that in healthy participants, repression of emotional responses following a traumatic event can be an indicator for future adjustment. A caveat to these findings is the cognitive

consequences of emotion suppression. Studies have found that emotion suppression can be a successful strategy, but that it depletes cognitive resources, thus reducing capacity for learning and memory (Wegner, 1993; Richards and Gross, 2002). The final aspect covered under emotion regulation, was trait measures of the use of it (specifically experiential avoidance). With regard to EA, studies have consistently found that individuals who score highly on measures of EA have higher levels of psychopathology, including depression.

In the last section, clinical interventions that make use of emotion regulation strategies, particularly suppression and acceptance, were discussed. In common with other areas of clinical work, there was a disjoint between theory and practice. This was reflected in the range of therapeutic techniques adopted by the therapies, and also variation in the conceptualisation of acceptance as a core process in mindfulness practice. Thus, although outcome research from these therapies was discussed, it was difficult to ascertain to what extent emotion regulation processes, and specifically acceptance as an alternative to suppression, was a successful component in these interventions.

Taken as a whole, this body of theory, research and clinical practice points to several gaps in our current understanding of emotion regulation processes in psychopathology, specifically in depression and anhedonia. The aim of the current study is to investigate the role of emotion suppression in reactivity to positive material, comparing a group of participants with MDD to healthy controls. The considerations taken in to account from the above literature, in to the current study, are outlined below.

1.9.1 Research overview. The aim of the current study is to explore whether the use of suppression has immediate short -term consequences of reducing negative

affect, but also has the consequence of reducing responsiveness to subsequently presented positive material even after suppression is relinquished. The present study will test this idea by comparing an MDD group and a control group, on an experimental task, thus examining whether the MDD group have greater use of suppression than controls. In particular, given the theoretical models outlined above, it is possible that individuals with MDD will be more likely to habitually use emotional suppression, and therefore, might show a greater reduction in reactivity than the control group.

The task in the present study will involve viewing negative film clips (whilst either suppressing emotional reactions, or "just viewing") and rating positive material before and after each film clip. Previous paradigms have typically used non self referent positive material (e.g. Dunn, et al., 2009). Whilst this material is well standardized, the research literature on emotional reactivity in depression points to a different pattern of responding for self referent and non self referent material in MDD. For this reason, presentation of both self and non-self referent material will be used as positive material. However, given that the impact of suppression has not been studied in relation to self referent versus non self referent materials, no specific predictions will be made regarding any differences in reactivity to them as a function of MDD.

With regard to existing literature, the current study advances several previous studies. For example, in the Dunn et al (2009) reactivity to positive material was only measured after suppression, and therefore does not provide data on change in reactivity as a within subjects variable. The Campbell-Sills et al (2006) used a mixed sample of anxious and depressed participants, and given that suppression appears to reduce depressed affect, but increase anxiety, this adds a central confound to their

design. Whilst the Liverant et al (2008) study specifically examined MDD participants, they did not look at the consequences of suppression on subsequent reactivity to positive material.

With regard to the effect of emotion suppression on emotion reactivity, the premise underpinning the experimental hypotheses is that suppression will dampen all emotion reactivity (both happiness and sadness) irrespective of the valence of the material presented. This premise is based both on experimental findings on the effects of suppression on negative affect (e.g. Dunn et al, 2009; Liverant et al, 2008) and on correlation studies which show a link between emotion suppression and lowered positive affect (e.g. Gross & John, 2003; Kashdan & Breen, 2008).

The main research questions are: does emotion suppression of negative material effect emotional reactivity and subsequent processing of both self referent and non self referent positive material? Do participants with MDD show a greater reduction in reactivity to positive emotional material following a suppression condition, due to their habitual use of and therefore better intentional use of suppression?

1.9.2   Hypotheses

i. Hypothesis 1: Based on the Dunn et al. (2009) results, it is predicted that all participants will report lower levels of negative and positive affect following the negative video in the suppress condition relative to the view-only condition.

ii. Hypothesis 2: Based on the Dunn et al. (2009) results, it is predicted that all participants will show a reduction in ratings of happiness and sadness to self referent and non-self referent positive material in the suppress-condition relative to the view-only condition.

iii. Hypothesis 3: It is predicted that the MDD group will habitually use suppression when viewing emotional material. It is predicted that this will result in lower ratings of happiness and sadness, to positive self referent and non-self referent material, compared to the control group, across both conditions, with potentially further reductions in the suppression condition.

2   Method

This chapter is divided in to seven sections. Section 2.1 describes the design of the study and provides a flowchart of the experimental procedure. Sections 2.2 to 2.3 describe participant characteristics, inclusion and exclusion criteria, method of recruitment and rationale for sample size. This section also covers ethical issues, recruitment and consent procedures. Section 2.4 provides an account of the measures used pre, post, and during the experiment, followed by the experiment materials in section 2.5. In section 2.6 an outline of the experimental procedure is provided. Finally, an overview of the data analysis principles is included in section 2.7.

2.1   Design

The main aim of this study was to compare the effect of emotion suppression on positive emotional experience between a group of participants with a current diagnosis of MDD and healthy controls.

With this in mind, the hypotheses stated in the introduction were tested using a mixed-factorial design, with Condition as the within-subjects factor (view-only, suppress) and Group (Control, MDD) as the between-subjects factor.

A total of 40 (20 never depressed controls, 20 who met current criteria for MDD) participants took part in the experiment, and all were tested individually. Demographic information and baseline measures of mood were taken during the session, before the experiment commenced.

Prior to the experiment (one week in advance) participants were asked to generate four positive memories (see measures below), for inclusion in the experiment. For the experiment itself, participants took part in both a suppress condition and a view-only condition (see below for a description of the two

conditions), and the order of these tasks was fixed, with the view-only condition

presented first. Participants viewed positive images and recalled positive memories

before and after each video, making it possible to assess the impact of suppression on

positive experience.

Following the experiment, questionnaire measures of trait emotion and

response styles were taken. A neutral washout video was utilized between the two

conditions to return participants to baseline; a positive video was presented at the end

of the experiment to repair mood. The procedure is summarized in Figure 1. The

experiment and associated measures were conducted in a single testing session that

took less than 120 minutes to complete. If participants reported feeling fatigued they

were invited to complete the trait measures (with the exception of the BDI) in their

own time and return them by post within a week, thus reducing the testing session to

105 minutes.

Estimated time

Participants MRC CBSU community volunteer panel, emotion group list. Recruit 20 meeting SCID criteria for MDD, and 20 healthy, never depressed controls

Participants posted or emailed appointment letter, information sheet and autobiographical memory sheet

20 mins — Demographic and Group Allocation Measures

7 mins — Positive stimuli 1 and associated measures

7 mins — Negative Video 1 (View Instructions) and associated measures

7 mins — Positive stimuli 2 and associated measures

Block A

3 mins — Neutral wash out video

7 mins — Positive stimuli 3 and associated measures

7 mins — Negative Video 2 (Suppress Instructions) and associated measures

7 mins — Positive stimuli 4 and associated measures

Block B

1 mins — Positive video

15 mins — Trait Measures (may be completed after the experiment)

5 mins — De-brief

Total 120 mins — Follow up call one week after the experiment

Figure 1. A flow chart of the experiment procedure from baseline to follow up. A description of each of the components in this figure is given in sections 2.4 to 2.6.

2.2   Participants

2.2.1   Sample size. Data for the primary hypotheses (Hypotheses 1 and 2) power calculations were obtained from the Dunn et al. (2009) data set. For Hypothesis 1, a minimum of 24 in total participants were needed to have power of 80% to yield a statistically significant result with a two-tailed test and significance level set at .05 (d = .60, M = 33.35, SD = 25.80; M = 18.25, SD = 23.93). For Hypothesis 2, a minimum of 40 participants in total were needed to have power of 80% to yield a statistically significant result, with a two-tailed test and significance level set at .05 (d = .46, M = 6.9, SD = 1.1; M = 6.4, SD = 1.08).

For Hypothesis 3, power calculation data were taken from the most comparable studies available. This was based on the study by Rottenberg, Gross and Gotlib (2005) where depressed and non-depressed participants were compared on their ratings of positive stimuli (film clips). A minimum of 13 participants in each group were needed to have power of 95% to yield a statistically significant result with a two tailed test and significance level set at .05 (d = 1.51, M = 3.26, SD = 1.53; M = 5.42, SD = 1.33). Thus the aim was to recruit at least 40 participants in total, 20 per group. All power calculations were completed using statistical software, G Power (Faul, Erdfelder, Lang, & Buchner, 2007). To allow for non-attendance, exclusion following screening, and attrition during the study, a total of 45 panel members were recruited of which 40 participated in the study.

Given that all the materials and measures had been used in, and rated for validity, in other studies, a full pilot of them was not carried out. Instead, the procedure was piloted on an individual through opportunity sampling (a member of the CBSU). This was to ensure that the session was not overly fatiguing and that the software was fully functional.

2.2.2   Inclusion and exclusion criteria. For inclusion criteria for the MDD group, the current diagnosis of MDD was taken using the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First et al., 1995). This is a semi-structured interview for making the major DSM-IV Axis I diagnoses. The control group were included if they were in the same age range as the MDD group (18-65 years) and did not have a previous or current diagnosis of depression (as measured by the SCID). Participants were also asked if they had a diagnosis of any other mental health problems, although this was not assessed through the SCID due to time constraints. The age range of 18-65 was chosen to reduce the impact of cognitive decline, and was comparable to previously reported in studies using similar methods (e.g. Dunn et al., 2009).

To reduce the impact of potentially confounding variables, exclusion criteria were applied to both groups. To reduce the impact of general cognitive impairments, participants were selected if they fell within the normal intelligence range (estimated IQ > 70 by using the National Adult Reading Test (NART; Nelson, 1982). For participants with a diagnosis of dyslexia, intelligence level was gauged by their level of educational achievements. Although the study was not restricted to English native speakers, participants needed to have a good standard of English to understand the task instructions and questionnaire measures. For non-native English participants this was gauged by their level of educational achievements in this country.

Other exclusion criteria included: psychosis, substance abuse, current specialist NHS or private treatment for Depression, and marked risk of suicide or self harm. These exclusion criteria were set to avoid the confound of other mental health problems, and to ensure that participants were not undergoing any treatments which might confound the effects of the experiment.

2.2.3   Recruitment procedure. Male and female participants between the ages of 18-65 were recruited from two sources: the Medical Research Council - Cognition and Brain Sciences Unit (CBSU) volunteer panel and a list of currently or previously depressed volunteers held by one of the Emotion Group's Research Associates (see Table 1). Potential participants were identified by the panel manager according to the inclusion and exclusion criteria of this study (see above). The list held by the emotion group contained 116 potential participants who have a history of mental health problems and have previously been recruited via newspaper advertisement to participate in Emotion Group studies. The list contained test scores from common psychometric measures (including the BDI), previous and current diagnoses and treatment, and the type of studies they are willing to participate in. Participants were recruited from this list using their preferred contact method.

Table 1 Number of participants recruited by each method.

	MDD Group	Control Group
Phone	14	6
Email	5	2
SONA (online sign up)	1	12

Note – Data are frequency values

Potential participants were telephoned or e-mailed to inform them of the study and to invite them to consider taking part. Existing panel members were also allowed to sign up using the online recruitment tool used at the CBSU (SONA). This plan for initial contact was consistent with the CBSU panel recruitment procedures. During this initial contact the use of negative material were made clear and available for discussion. To ensure that participants were able to give informed consent, they were

told that they would be shown two sad film clips, and that they may find these distressing. They were told that the clips were taken from two different Hollywood films and that they lasted between 2-3 minutes each. Participants were also informed that they would be asked questions about depression history, and other personal information, such as medication levels. Therefore a limitation of this study was the fact that participants were self selected to a degree, in that only those who felt able to cope with the stressful films and other measures took part in the experiment.

If participants met the study inclusion/exclusion criteria and provided verbal consent to participate, a convenient appointment time was arranged. Participants were informed that a follow up appointment letter, a positive memory handout and a copy of the study information sheet (Appendix A) would be sent before the appointment. The letter advised participants that they could withdraw from the study at any time, with a number to call if they decide to cancel or re-schedule the appointment. This allowed at least 24 hours for participants to consider their involvement in the study prior to taking part. At the start of the experimental session, participants were given another copy of study information sheet to read, had further opportunity to discuss the study with the experimenter, ask questions, and to withdraw if they so wish. Written and informed consent was then obtained, in the presence of the experimenter (Appendix A).

2.3   Ethical Considerations

Ethical approval for this study was awarded by the University of Cambridge Psychology Research Ethics Committee, Council of the School of Biological Sciences (see Appendix B). After consultation with local NHS ethics committees, it was agreed that additional NHS approvals were not necessary as participants were not recruited through NHS services. We also excluded participants currently in both private and

NHS specialist mental health services, including IAPT and counselling services. The emotion group at the CBSU has extensive experience of using negative materials, similar to those used here in particular, the use of the "trauma film paradigm" these experiments have used with both clinical and sub-clinical groups in the laboratory, without adverse effect (Dalgleish, Yiend, Schweizer, & Dunn, 2009; Schartau, Dalgleish, & Dunn, 2009). Similar studies have been carried out in the published literature (e.g. Campbell Sills et al., 2006). In the consent process risks of distress was made clear to participants.

As a precaution, in the event that a participant might experience significant levels of distress either during the tasks or afterwards, the emotion group also has a clinical risk management protocol in place, which was followed for this experiment (see Appendix C). If distress was experienced, participants were encouraged to discuss their concerns with the experimenter and/or the on-site Clinical Psychologist (Dr. Barney Dunn or Dr. Tim Dalgleish) either in person or via telephone. In the unlikely event that an individual experienced distress during or after the study, the session would have been stopped, reasons for distressed would have been discussed, and the participant would be given the opportunity to continue the study at another convenient time or withdraw from the study. None of the participants either reported, or presented with elevated levels of distress during or after the experiment. In addition to self report of distress, other indications of excessive distress were also monitored (e.g. behaviour during the study). Under such circumstances the experimenter would have discussed these situations with the participant to assess the level and impact of distress. Participants were told that they could leave the study at any time and were provided with a contact number for the experimenter to discuss any concerns if they felt worried or distressed about the study. This number was clearly displayed on the

consent form information sheet. One participant called the experimenter prior to the experiment to discuss their concerns regarding generating positive memories, and further information was provided about the requirements for this. All participants were also contacted via telephone or email, one week after the experiment, to ensure they had not suffered any ill effects from the study. None of the participants reported any ill effects from the study.

Participants were informed in the information sheet, that they would be asked to complete symptom and diagnostic questionnaire measures, but will not be given any clinical interpretation of these measures. If participants had any concerns following their responses to these measures, these were discussed with them on an individual basis, and if appropriate, it was suggested that they contact their GP. Two participants in the control group voiced concern following completion of the BDI, further information was given on the types of criteria that are used to diagnose depression, as well as normalising some of the items on the BDI. Neither of these participants had elevated BDI scores (BDI scores of less than three in both cases).

Participants were informed that all data would be kept confidential (following data protection act guidelines), and asked not to write their names on any of the questionnaire measures, or on the positive memory handout. Data were stored via code names with no means of identification safeguard participants confidentiality, and were stored in locked filing cabinets at the CBSU, which only the researchers had access to.

Participants were blind to the purpose of the experimental task, to ensure that findings could be attributed to the experimental manipulation, rather than demand or placebo effects. Participants were however, told that the aim of the study was to explore "Positive information processing biases in depression." Following the study,

participants were fully de-briefed about the purpose of the study, and given the opportunity to ask questions about the protocol. Participants were paid six pounds per hour for their participation, and a contribution towards their travel costs (£2.50 for participants living inside Cambridge, and £3 for travel outside Cambridge).

2.4   Measures

A copy of questionnaire measures (with the exception of the copy righted measures) are in Appendix D. The estimated time taken to complete each component of the study is shown in Figure 1.

2.4.1   Demographic information. The information gathered in this section was used for study inclusion and exclusion checks, for group comparability checks, and also to allocate participants in to a MDD or control group. Firstly, participants age, sex, ethnicity, highest level of educational attainment, and estimated IQ (using the National Adult Reading Test, NART) were recorded for group comparability checks. The NART consists of 50 short words of irregular pronunciation (e.g., placebo, demesne). The NART is widely used with good test-retest reliability ($r = .98$, Crawford, Parker, Stewart, Besson & De Lacey, 1989), good internal consistency (split-half reliability, $r = .93$, Nelson, 1982), and a brief administration time (less than five minutes).

Participants were asked if they had ever had any neurological problems, had treatment for, or suffered from, a mental health problem, a diagnosis of dyslexia, and whether they were currently taking any medication. They were also asked how many units of alcohol they had consumed in the past week, and whether they had taken any street drugs in the last week. Participants were excluded from the study if they reported a diagnosis of psychosis, elevated levels of alcohol consumption (based on current UK guidelines), had taken street drugs in the past week, or were currently

receiving specialist secondary care for depression or other mental health problems, following discussion with NHS ethics committees (see above). None of the control group reported current or past MDD, the MDD group all had current depression symptoms and a subset also reported current or past anxiety (n = 5).

2.4.2   Group allocation measure. The Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First et al., 1995), is a semi-structured interview for making the major DSM-IV Axis I diagnoses. It is used here as a brief screen for the presence of past or current clinical depression; it provides greater validity than non-structured clinical interviews (Kashner, et al., 2003) and increases the clinical applicability of the study. The mood disorders module of the Clinician Version (SCID-CV) was used, which is a streamlined version of the SCID-I-RV (Research Version for Axis I Disorders). Reliability for the SCID is good, ranging between .64 and .93 for major depressive disorder (Skre, Onstad, Torgersen, & Kringlen, 1991; Zanarini, et al., 2000). This took no more than fifteen minutes to complete.

2.4.3   Questionnaire mood disorder screen. Beck Depression Inventory - 2nd Edition (BDI-II) (Beck et al., 1996). This was used as an additional mood screen, as a convergent validity check for the use of the SCID as a group allocation measure. The BDI is a widely used 21-item questionnaire, which requires participants to indicate which statements best represent how they have been feeling over the past week. Internal consistency for the BDI ranges from α = .73 to .92 with a mean of α = .86. (Beck, Steer, & Garbin, 1988).

2.4.4   Manipulation checks. To measure self-reported compliance with the emotion regulation instructions, participants were asked how much they suppressed emotion experience during each of the two negative videos, on a scale of 0 = Not at all to 100 = Very Much. These scales were identical to the scales used in a previous study

(Quarmby, ClinPsyD thesis) and based on those used in the Dunn et al (2009) study. They were taken after each of the negative videos.

2.4.5 Material ratings.

Participants were asked how much happiness and sadness they were feeling after each of the images, videos and memory prompts on VAS scales, where zero is not at all, and 100 is very much. The specific instructions given to participants were: *Please rate how much of the following emotions you are feeling RIGHT NOW where 0 = not at all, and 100 = very much.* For memory stimuli, participants were additionally asked to rate how specific their memories were (on nine point scales). Given that over-general memory is known to be associated with MDD (e.g. Brewin, Reynolds & Tata, 1999), this measure was taken to check that the specificity of the memories did not differ across groups. Categorical ratings were chosen over dimensional ratings (e.g. of valence) as the current study is specifically interested in positive emotion experience. In dimensional ratings of affect (e.g. unpleasant – pleasant for valence) a low valence rating is potentially a composite of either increased ratings of unpleasantness, decreased pleasantness, or a combination of the two. In addition, Dunn et al (2004) found increased ratings of sadness but not fear in an MDD sample when viewing IAPS pictures, suggesting that sadness and happiness should be measured specifically, rather than a composite measure of either pleasantness or unpleasantness.

2.4.6 Post experiment measures. The post experiment measures took approximately 30 minutes to complete. These were trait mood or response style questionnaires that were selected as they measure concepts that are central to the current study (for example, anhedonia, positive affect, emotion suppression) or are

commonly co-morbid with depression (i.e. anxiety). These measures allow for a clearer conceptualization of differences between the two groups.

2.4.6.1 The Mood and Anxiety Symptom Questionnaire short Form (MASQ-S) (Watson & Clark, 1991).

This is a 62-item self report questionnaire that is more sensitive than the BDI to the anhedonic components of depression, which are central to the current study. Participants are asked to judge to what extent they have felt the way described in each question for the past week, ranging from one (not at all) to five (extremely). The MASQ-S comprises three factors: the general distress (GD) subscale; the anxious arousal (AA) subscale and the anhedonic depression (AD) subscale. The reliability and validity of the MASQ-S has been well documented (see Clark & Watson, 1991).

2.4.6.2 The Spielberger Trait Anxiety Inventory. (STAI, Spielberger, 1983).

This was used to measure trait anxiety. The STAI Trait scale (Y1) consists of 20 anxiety related items which participants rate for "how you generally feel" on a 4 point scale- almost never, sometimes, often or almost always. These widely used measures are reported to have satisfactory reliability and validity. Alpha coefficients are reported as ranging from .86 to .95 and test re-test reliability estimates from .65 to .75 (Speilberger et al., 1983).

2.4.6.3 Emotion Regulation Questionnaire (ERQ). (Gross & John, 2003).

This was used as a trait measure of emotion suppression. The ERQ is a 10-item measure of two aspects of emotion regulation: reappraisal (6 items) and expression suppression (4 items). The authors report good internal consistency for both the reappraisal subscale ($\alpha = .84$) and the suppression subscale ($\alpha = .82$).

2.4.6.4 Acceptance and Action Questionnaire. (AAQ) (Hayes, et al., 2004).

This was used to measure experiential avoidance, a central component to the

theoretical background of this study. The AAQ (short form) is a 9-item self-report measure. Participants rate each statement on analogue scales ranging from 1 (never true) to 7 (always true), with higher scores reflecting an increasing degree of experiential avoidance. Hayes et al. (2004) report adequate internal consistency of the AAQ ($\alpha = .70$) and good convergent and divergent validity.

2.5 **Experiment Materials**

2.5.1 **Negative films.** For this experiment two "sad" videos were used, which had been well validated in previous studies. The order of video presentation was randomised across the experiment to remove any confound of specific videos being used in particular tasks. Videos were selected on the basis of rating data reported by previous studies (Gross & Levenson 1995; Hagemann, Naumann, Maier, Becker, Lurken, & Bartussek, 1999).

The first film clip was taken from "The Champ" (MGM, 1979) and is called "Crying boy". Based on rating data from 52 undergraduates, Gross and Levenson (1995) report a mean sadness rating of 5.71 (on a 0-8 visual analogue rating scale where zero was "you did not even feel the slightest bit of the emotion" and eight was "the most you have ever felt in your life") with a hit rate of 94.2%; the hit rate being calculated as the number of participants who indicated that they had felt the target emotion at least one point more than all the other rated emotions. This clip has also been reliably shown to induce sadness in other studies (e.g. Hagemann, et al., 1999). The clip is 2:51 minutes long and shows a boxer who is laying on a table in a locker room; a young boy moves to the table and the man dies; the boy starts to cry and moves to some other men who stand around and look at the boy with consternation; the boy goes back to the table, still crying.

The second film was taken from the film "Return to me" (Tugend & Hunt, 2000) and was rated by 30 undergraduates. Rottenberg and Gross (2007) report a mean sadness rating of 6.96 (on a 0-8 visual analogue scale where zero was "not at all" and eight was "extremely"). The clip is 3:18 minutes long and shows a happy couple dancing, this then jumps to a hospital scene in which the woman is rushed in to the emergency department and subsequently dies. The man is then seen at home crying alone with his dog. Hit rate data is not available for this film.

2.5.2   Positive stimuli. These stimuli comprised both self referent and non self referent positive material. Although previous studies (e.g. Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Dunn, et al., 2009, 2004) have used non self referent images, these lack ecological validity, and the results from them are less easily related to clinical practice and theory. For this reason, brief self referent autobiographical memory stimuli were presented in addition to positive images.

Participants were asked to generate four memories prior to the experiment, by filling in a handout. Participants either posted or emailed this information back to the experimenter, prior to the session, for the information to be checked for suitability. We asked participants to generate the memories prior to the session, to try and reduce the effects of over general memories in depression (e.g. Brewin et al.,1999). spontaneous recall of memories is more likely to be effected by this cognitive bias (Watkins & Teasdale, 2004). A copy of the handout can be found in Appendix A. The handout asks participants to respond to the following questions:

i.   Briefly provide details about the positive event (for example, what it was, when and where it happened, who you were with, any other relevant information)

ii.   Describe any thoughts you can remember thinking during the event

iii. Describe any emotions you can remember feeling during the event

iv. Describe any memories about what you could see/hear/taste/smell or touch during the event

v. Describe any sensations you can remember feeling in your body during the event

vi. Please generate a cue word to remind you of the positive memory

The cue word was presented as a prompt for thinking about the memory in the experiment. Participants were presented with this prompt before and after each of the negative videos, and were asked to think about each memory for two minutes. For the non self referent positive material, participants were shown twenty positive images in total for 6s each , selected from the International Affective Picture Set (IAPS, Lang, Greenwald, Bradley, & Hamm, 1993). The IAPS is a series of emotional and neutral images that have detailed normative ratings and psychophysiological response data (for a review see Bradley & Lang, 2007). A selection of the images is shown in Appendix E. The images have been rated both on how positive they were (M = 7.35, SD = 0.54); and the amount of happiness participants felt when viewing them (M = 5.88, SD = 0.86). Images were rated on a 0-9 visual analogue scale where 0 = not at all and 9 = very much. These images have been previously shown to reliably induce positive emotions across studies (Dunn et al., 2004; Dunn et al., 2009).

2.5.3 Neutral 'wash out' film. This was a neutral film which was designed to "wash out" acute emotional effects. It was administered in between condition one and two, to reduce the impact of the material shown in the view condition, impacting on that shown in the suppress condition. It was designed by Gross (1995) and depicts coloured bars slowly changing shape and orientation, on a black background. It was

chosen as it was rated in a study by Gross et al (1995) as near neutral on all of the emotions (M = 0.77, SD = 0.64), based on a 0-8 visual analogue scale where zero was "you did not even feel the slightest bit of the emotion" and eight was "the most you have ever felt in your life."

2.5.4 Positive 'wash out' film. This was a 58 second positive film taken from Gross et al (1995). It depicts waves rolling along a beach on a sunny day, and has been rated (on the same 0-8 visual analogue scale outlined for the other videos) as inducing feelings of contentment (M = 3.46) and happiness (M = 2.88). It was used to reduce any participant distress at the end of the experiment.

2.6 Procedure

The experiment procedure is summarised in Figure 1. As outlined in Section 2.2.3, participants were recruited either via the CBSU online sign up facility (SONA), from a list provided by the panel administrator, or by a list held by one of the Emotion Group Research Associates. For participants who were recruited via SONA, details of the experiment were posted on the site, which outlined the same information that participants were given over the phone. Two postings were put on SONA, one aiming to recruit for the MDD group, and one for the control group. The information provided to potential participants was identical on each posting. The only difference being that for the control group, the pre-screen was set to exclude participants who self reported a mental health problem. Appointments were made for a mutually convenient time, and participants were given a phone number and email address if they wanted to cancel or re-arrange the appointments. All participants were either telephoned or emailed 48 hours before the experiment to ask if they had any questions or concerns about the experiment, and to ensure that they had received the information sent.

All participants were tested individually and seated in a quiet testing laboratory at the CBSU. At the beginning of the testing session participants were given an additional verbal explanation of the study, along with the information sheet, and were asked to sign a consent form.

On recruitment, participants were allocated a participant code based on the first three letters of their surname, followed by their first initial, and the last two digits of their year of birth. This format is used by all members of the lab to anonymise the data, but also to provide a link to the participant's details, without needing a linked data sheet, should this be necessary.

Following the consent procedure, participants were asked the questions on the demographic information sheet. They were told that if they did not want to answer any of the questions they could indicate this, and the question would be missed. Participants were then asked to read out loud the words on the NART card, complete the BDI, and were finally asked the questions on the mood disorders module of the SCID.

2.6.1   Experiment procedure. Following measures taken above, the experiment program was started. The first screen recorded the participants' code, gender, counterbalance (for the negative video presentation) and inputted the participants positive memory prompts. The instructions for the task were then presented. Participants were asked to follow the on-screen instructions, and were told that the experimenter would be available at the other side of the lab partition should they have any questions, or want to stop the experiment. Figure 1 outlines the structure of the experiment, each component of the experiment is detailed below. All participants completed condition A first, followed by condition B.

2.6.1.1 Positive stimuli and associated measures. Firstly, participants were shown 5 images drawn from the selection of 20 positive images. Participants viewed each image for 6 seconds and following this rated their state mood on the happiness and sadness VAS. There was then a 5 second inter-trial interval before the next image (based on timings used by Bradley, Codispoti, Cuthbert, & Lang, 2001). Participants were instructed to view the pictures as they naturally would and will not be given any particular emotion regulation strategies. They were the told to rate how the image made them feel as honestly as possible. To control for order effects, the images were presented in a random sequence across the four blocks.

Participants were then given one of four cue words as an autobiographical memory prompt for the memories they had previously identified (outlined in the measures section), and asked to think about the memory for two minutes followed by the VAS, for happiness, sadness and specificity. This procedure was identical for the components "Positive stimuli and associated measures" numbers one through to four, as outlined in Figure 1.

2.6.1.2 View only film. One of the two negative videos was shown to the participants (see stimuli section). Participants were asked to watch the film as they normally would. The task instructions were based on the scripts used by Campbell-Sills et al. (2006) and are identical to those used in the Dunn et al. (2009) study (see Appendix F). At the end of the video, participants rated their mood using the video VAS. In addition, ratings of emotion suppression were taken (see 2.4.4 manipulation checks section).

2.6.1.3 Neutral 'wash out' film. Participants were shown the neutral video, as outlined in the materials section. This was followed by a VAS to measure state mood.

2.6.1.4 Suppress film. This task has an identical format to the previous negative video, but with participants asked to suppress their emotional responses to the film. The task instructions were based on the scripts used by Campbell-Sills et al. (2006) and are identical to those used in the Dunn et al. (2009) study (see Appendix F). At the end of the video, participants rated their mood using the video VAS. In addition, compliance measures were taken (see measures section).

2.6.1.4 Positive "wash out" film. This film is as described in the stimuli section, it played for 58 seconds, for all participants, at the end of the experiment.

2.6.2 Trait measures. These comprise the BDI, MASQ-S, ERQ, AAQ and STAI, as described in the measures section. Participants were given the option to complete these measures at home and return them by post. If participants decided to complete these measures outside of the testing session then they were provided with a freepost envelope (provided by the CBSU) and were asked to return the questionnaires within 1 week of the study.

2.6.3 De-brief. Participants were de-briefed at the end of the session, the aims of the experiment were explained and they had the opportunity to talk through any distress as a result of the experiment.

2.6.4 Follow-up telephone call. Participants were telephoned a week after their testing session to discuss whether they have had any unwanted after effects from the experiment. If participants report feeling distressed, this was discussed with them on a case by case basis, with a suggestion being made that they contact their GP, if appropriate. In practice, none of the participants reported feeling distressed following the experiment.

2.7 Analysis Principles

Data were entered in to SPSS 16.0 (SPSS Inc., Chicago, IL) and were visually inspected for missing data, and inaccurate entries. An exploratory data analysis was carried out on the raw data, with tests of normality (Shapiro-Wilk) and homogeneity of variance (Levene's test) conducted. Measures of skew and kurtosis were converted to z scores and considered significantly different from zero if the resulting value was greater than 1.96. To reduce the influence of outliers, skewed data were transformed using a natural log transform (adding a constant of +1, Howell, 2002) for positively skewed data, and inverse log transformation, for negatively skewed data. Box plots were then re-inspected for outliers, to confirm the effectiveness of this procedure. If the transformation was unsuccessful, non parametric analyses were used.

However, for analysis of variance, (ANOVA), violations of the assumptions of the normality, are unlikely to affect the validity of the analysis (Howell, 2002, p.307). For mixed model analysis of variance, if the assumption of homogeneity of covariance was violated (Mauchly sphericity test), the Greenhouse-Geisser epsilon value was used for the F term. For all analyses using ANOVA higher level omnibus analyses were carried out, with interactions broken down, and pairwise comparisons carried out only on significant effects, thus reducing the number of pairwise comparisons. Non-parametric equivalents (Mann Whitney U, Wilcoxon Signed Rank test) were carried out if the data was not normally distributed.

Chi-Square tests were used to explore group differences on categorical data (e.g. sex). Independent samples t tests were used to ensure that the groups are comparable on continuous variables such as age, and estimated IQ (from the NART). For all analyses two tailed tests will be used throughout, with alphas set at 0.05.

3 Results

In this Chapter the findings from exploration of the data to test for the assumptions needed for parametric analysis will be outlined. The group characteristics will be summarized, followed by manipulation checks and finally each hypothesis will be tested.

3.1 Exploratory Data Analysis

Exploratory data analysis was conducted to test whether the data met the requirements for parametric data analysis. As would be expected with valenced materials, with both happiness and sadness affect ratings obtained, the distribution of several of the variables were either positively or negatively skewed. Shapiro Wilk tests confirmed that the majority of variables differed from the normal distribution. Natural log transformations were applied to the relevant variables in the data set, however, the majority of the data remained significantly skewed following this procedure (for an example of this procedure see Appendix G). As outlined in section 2.7 (Analysis Principles) for analysis of variance, (ANOVA), violations of the assumptions of the normality, are unlikely to affect the validity of the analysis (Howell, 1992, p.307), thus ANOVA's were carried out as outlined.

To test whether the variance of the distribution was significantly different between the two groups, Levene's tests were conducted. The results revealed that for the majority of the variables, the assumption of homogeneity of variance was met. In cases where the assumption of homogeneity of variance was violated, the data was corrected using the Greenhouse Geisser epsilon value in the ANOVAs. For pairwise comparisons, non-parametric equivalents were used where the data was non-normal.

3.2   Group Characteristics

Table 2 summarizes each of the groups on the demographic measures. There was no significant difference between the groups on gender distribution, $\chi^2 = .11, df = 1$, $p = .74$, NART estimated IQ, $t(38) = 0.06$, $p = .95$, ethnicity $\chi^2 = 2.00$; $df = 2$, $p = .35$, or education level, $\chi^2 = 1.95$, $df = 4$, $p = .20$. There was a non-significant trend for participants in the MDD group to be older than those in the Control group, $Z = 1.92$, $p = .06$ (Mann Whitney U test). Significantly more of the MDD group were taking anti-depressant medication than the control group, $\chi^2 = 10.10$, $df = 1$, $p = .001$.

Table 2 Descriptive statistics for demographic characteristics of each group.

	Control (N=20)	MDD (N=20)
Age (years)	40 (17.24)	53 (11.84)
Sex		
Male	7	8
Female	13	12
Ethnicity		
White British	19	19
White Irish	0	1
Asian	1	0
Education		
GCSE's	4	5
A Levels	7	3
Diploma	1	6
Undergraduate	4	2
Postgraduate	4	2
NART score	13.85 (7.55)	13.70 (8.65)
Psychotropic Medication	0	16

Note – Data are mean (standard deviation) or frequency values

NART = National Adult Reading Test.

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Table 3 shows the means and standard deviations on the various mood measures for the two groups. As expected, the depressed group scored higher on symptom measures of depression (p <.001 on both the MASQ and the BDI). Importantly for the current study, the MDD group also scored higher on the anhedonia subscale of the MASQ (p <.001). Consistent with the common co-morbidity between anxiety and depression, participants in the MDD group also scored more highly on the STAI (p <.001).

Table 3 Trait mood measures, including their subscales, in the MDD and control sample. Statistical comparison is independent samples t-test.

	MDD	Control	Statistical Comparison
BDI	20 (9.92)	3.5 (3.05)	t(38) = 7.11, p <.001
MASQ-S AA	32.35 (9.48)	20.65 (4.84)	t(38) = 4.91 , p <.001
MASQ-S AD	74.80 (14.75)	51.95 (11.81)	t(38) = 5.41 p <.001
MASQ-S GD	60.70 (16.87)	38.35 (11.22)	t(38) = 4.93 , p <.001
MASQ-S total	167.81 (32.81)	110.95 (24.84)	t(38) = 6.18, p <.001
STAI anxiety	18.45 (3.97)	11.65 (3.36)	t(38) = 5.85, p <.001

Note –

Data are mean (standard deviation) values. BDI = Beck Depression Inventory; STAI = Speilberger Trait Anxiety Inventory (Trait version); MASQ-S = The Mood and Anxiety Symptom Questionnaire Short Form; AD = anhedonia; GD = general distress; AA = anxious arousal.

3.3   Response to Video

3.3.1 Instruction compliance. To examine if participants followed task instructions and if this varied as a function of group, a repeated measures ANOVA was run on the self reported suppression ratings. Video (View, Suppress) was entered as a within-subjects factor and Group (Control, MDD) was entered as a between subjects factor. As intended, ratings of suppression effort were higher following the suppress video than the view video, $F(1,38) = 32.51$, $p <.001$. The MDD group also had higher self reported suppression levels across both videos $F(1,38) = 4.18$, $p = .05$ (see Figure 2). However there was no interaction between Video and Group $F(1,38) = 1.96$, $p = .17$. This shows that participants did comply with the task instructions, but that there was a higher overall level of suppression effort used by the MDD group.

Figure 2: Self reported ratings of suppression effort following each of the videos for each group separately.
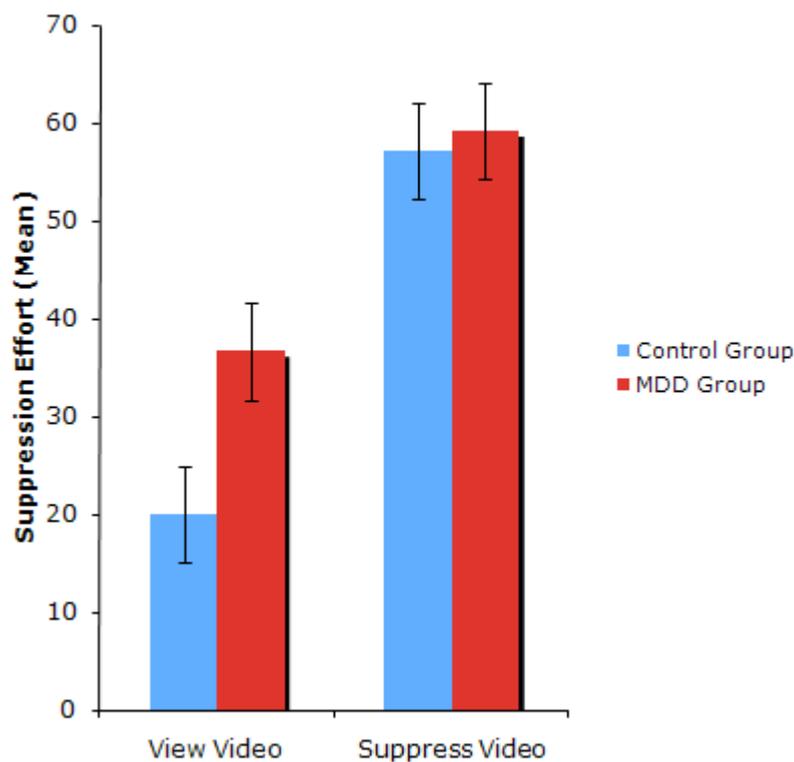
Note - Data are mean (standard error of the mean) values.

3.3.2 Video validity. Next, how the depressed and control participants rated

the videos in terms of happiness and sadness experience was examined (see Figures 3

and 4).

Indicating the videos successfully induced negative affect, ratings following

the videos indicated elevated levels of sadness, and lowered ratings of happiness,

relative to the washout video. A one way ANOVA with Time (Video A, Video B,

Washout) indicated that sadness ratings changed significantly over Time $F(2,76) =$

61.40, $p <.001$. All pairwise comparisons were statistically significant (smallest $t =$

4.54, largest $p <.001$). For happiness ratings, as Figure 3 shows, ratings changed

significantly over Time $F(1.71, 65.04) = 14.00$, with a significant increase in

happiness ratings in the washout condition relative to both the view and suppress

videos (smallest $t = 3.36$, largest $p = .002$). There was no significant difference

between the view and suppress videos however $t(39) = 1.52$, $p = .14$. As Figures 3 and

4 show, the negative videos worked as intended, with elevated sadness levels and

reduced happiness ratings relative to the washout task. Differences between the

sadness ratings on the view and suppress videos are arguably a result of the

experimental manipulation.

3.3.3 Counterbalance analysis. When additionally entering counterbalance

order as a factor in the analyses, this did not significantly interact with condition or

group for either sadness or happiness ratings, greatest $F = 3.15$, smallest $p = .08$. This

indicates counterbalancing is not confounding the results, and for the sake of brevity

is not reported further here.

3.3.4 Washout video. Finally, the efficacy of the washout video in removing

acute emotional effects was analysed by comparing ratings prior to both the view and

suppress conditions. There was no significant difference between either the picture or

memory happiness or sadness ratings compared prior to each of the videos, greatest F = 3.03, smallest p = .09. indicating the washout had served its purpose.

3.3.5 Trait emotion regulation data. As Table 4 shows, the groups differed in trait emotion regulation tendencies, as indexed by the re-appraisal subscale of the ERQ, and also in a trait measure of experiential avoidance (AAQ).

Table 4 Trait mood measures of emotion regulation, including their subscales, in the MDD and control sample. Statistical comparison is independent samples t-test.

	MDD	Control	Statistical Comparison
AAQ	42.20 (6.58)	31.63 (6.01)	t(38) = 5.23, p <.001
ERQ Reappraisal	24.65 (7.58)	29.60 (7.84)	t(38) = 2.09, p = .05
ERQ Suppression	14.80 (5.17)	14.15 (5.89)	t(38) = 0.37, p = .71

Note - Data are mean (standard deviation) values AAQ = Acceptance and Action Questionnaire; ERQ = Emotion Regulation Questionnaire

However, these trait regulation styles did not impact on self reported suppression levels. There were no significant correlations between any of the trait measures of emotion regulation, and self reported suppression in the experiment (largest r = .17, smallest p = .31).

3.3.6 Post video happiness and sadness ratings. 2 (Video: View, Suppress) x 2 (Group: MDD, Control) mixed ANOVAs were carried out on the ratings of happiness and sadness after each video separately. For happiness, ratings, failing to support hypothesis one, there was no main effect of Video, F(1,38) = 2.27, p = .14. There was a non-significant trend for participants in the MDD group to report lower levels of happiness F(1,38) = 3.87, p = .06, across both videos (Figure 3). There was

no significant Video by Group interaction, $F(1,38) = .225$, $p = .64$. This suggests that suppression does not globally reduce state mood ratings.

Figure 3 Happiness ratings following the videos. Data are mean (standard error of the mean) values.
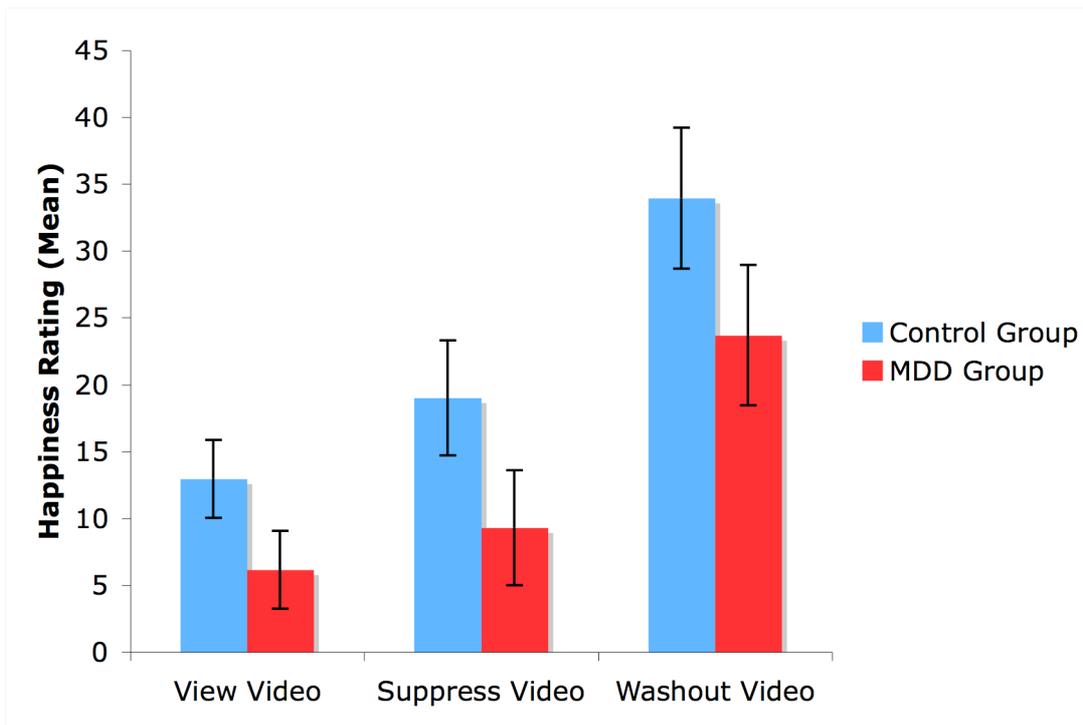
Supporting Hypothesis 1, for sadness ratings there was a main effect of Video $F(1, 38) = 22.67$, $p < .001$, whereby ratings of sadness were higher following the view video than the suppress video (see Figure 4). There was also a significant interaction between Video and Group $F(1,38) = 4.98$, $p = .03$. This interaction was decomposed using a series of t-tests comparing the two groups on sadness ratings after each of the videos. For the view video, there was no significant difference between the two groups sadness ratings $t(38) = 0.74$, $p = .46$. However, for the suppress video, there was a significant difference between the groups whereby the MDD group reported higher ratings of sadness than controls $t(38) = 2.25$, $p = .03$. This contradicts

Hypothesis 1 where it was predicted that both groups would show a comparable reduction in negative affect following the suppress condition. There was no main effect of Group $F(1,38) = 0.68$, $p = .41$

Figure 4 Sadness ratings to each of the videos. Data are mean (standard error of the mean) values.
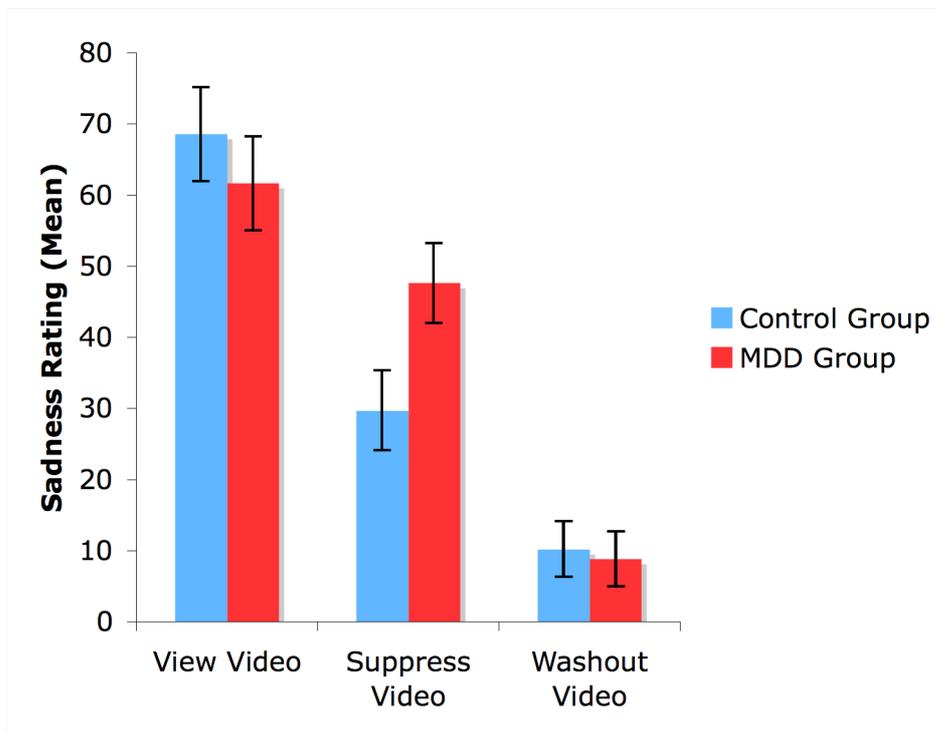
3.4 Reactivity to Positive Material

3.4.1 Analysis strategy. To examine hypotheses two and three analyses were carried out on changes in response to the positive material before and after each video. A repeated measures ANOVA was run for sadness and happiness ratings to each stimuli type (pictures, memories) separately, with Time (Pre, Post) and Video (View, Suppress) as within subjects factor and Group (Control, MDD) as the between-subjects factor. Hypothesis Two is tested by examing the Time by Video interaction. In particular, it is predicted that participants will show a reduction in "post" positive ratings relative to "pre" ratings, in the suppress video condition

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compared to the control condition. Hypothesis Three is tested by the Time by Video by Group interaction. In particular, it is predicted that participants in the MDD group will show a greater reduction than the control group in reactivity from the "post" ratings, relative to the "pre" ratings, in the suppress video relative to the view condition. Again, this prediction is made for both the pictures and memories.

3.4.2.1 Ratings of picture stimuli. For happiness ratings of the pictures, there was a main effect of Video $F(1,38) = 7.35$, $p = .01$, whereby ratings of happiness to the pictures were higher before and after the view video than the suppress video (Figure 5). There was a main effect of Group $F(1, 38) = 4.80$, $p = .04$, whereby ratings of happiness were higher from the control group than the MDD group. There was no main effect of Time, $F(1, 38) = 1.83$, $p = .18$. Failing to support Hypothesis 2, there was no Time by Video interaction, $F(1, 38) = 0.55$, $p = .46$. Inconsistent with Hypothesis Three, there was also no significant three way interaction, $F(1, 38) = 2.74$, $p = .11$. This indicates suppression is not leading to greater blunting of positive affect in response to non self referent positive material, and nor is this more marked in the depressed group. There was no significant interaction between Time by Group $F(1, 38) = 0.55$, $p = .46$ or Video by Group $F(1, 38) = 0.11$, $p = .75$

Figure 5 Happiness ratings to the positive images. Data are mean (standard error of the mean).
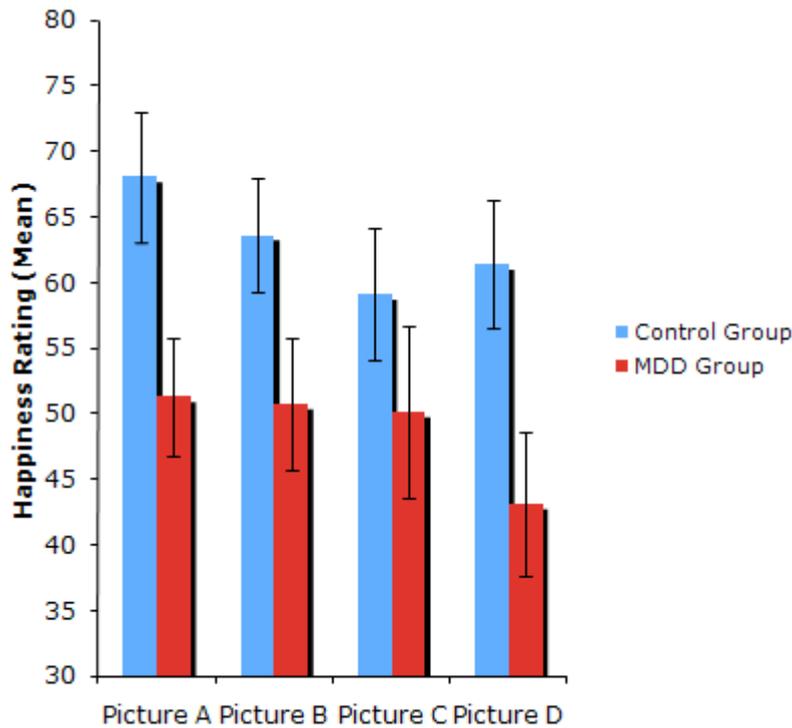
Note

Mean values are based on each participants mean rating of each picture set (A-D) which each comprise five images. Picture A = before view video; B = after view video; C = before suppress video; D = after suppress video

3.4.2.2. Sadness ratings following the positive images. For sadness ratings, there was a main effect of Video $F(1,38) = 7.38$, $p = .01$, whereby ratings of sadness to the images were higher before and after the view video than the suppress video (Figure 6). Figure 6 shows that this main effect is carried by elevated ratings of sandess by the MDD group. There was no main effect of Time, $F(1, 38) = 0.32$, $p = .58$. Failing to support Hypothesis 2, there was no Time by Video interaction, $F(1, 38)$

= 0.13, p = .72. Inconsistent with Hypothesis Three, there was also no significant three way interaction, $F(1, 38) = 0.18$, $p = .67$. This indicates suppression is not leading to greater blunting of negative reactivity in response to non self referent positive material, and nor is this more marked in the depressed group. There was no main effect of Group $F(1, 38) = 0.96$, $p = .33$; or significant interaction between Time and Group $F(1, 38) = 0.32$, $p = .58$ or Video and Group $F(1, 38) = 0.001$, $p = .97$.

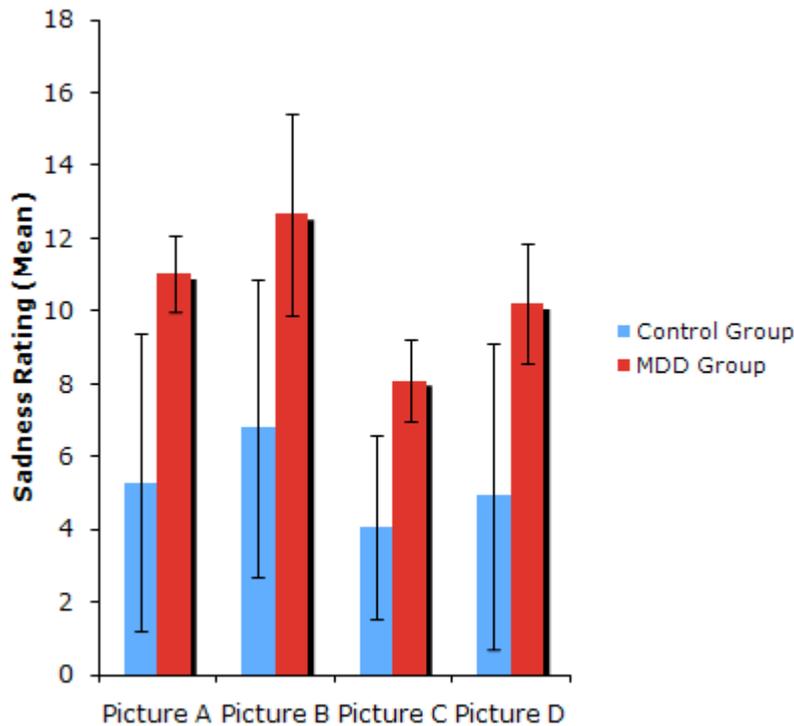Figure 6. Sadness ratings to the positive images. Data are mean (standard error of the mean).

Note

Mean values are based on each participants mean rating of each picture set (A-D) which each comprise five images. Picture A = before view video; B = after view video; C = before suppress video; D = after suppress video

3.4.3 Ratings of memory stimuli

3.4.3.1 Memory specificity. One possible confound of these analyses is that the depressed individuals may have differed in how specific the memories that they recalled were (cf the over-general memory effect; Brewin et al., 1999). To examine this possibility, we compared the groups on specificity ratings of the memories. There were no significant differences between the two groups memory specificity ratings for any of the memories (largest t = 0.74, smallest p = .64). This suggests that this factor is not unduly influencing the results.

3.4.3.1 Happiness ratings. For happiness ratings, there was a main effect of Time $F(1,38) = 12.00$, $p = .001$, whereby ratings of happiness were higher before each of the videos than after them (Figure 7). Failing to support Hypothesis 2, there was no Time by Video interaction, $F(1, 38) = 0.47$, $p = .50$. However, the Time x Video x Group interaction was statistically significant $F(1,38) = 4.34$, $p = .04$. In order to understand this interaction, a difference rating was computed whereby ratings to the memories before the videos, where subtracted from those after the videos (see Figure 8). These changes scores were analysed using a 2(Video: view, suppress) x 2 (Group: MDD, Control) mixed ANOVA. There was no main effect of Video $F(1,38) = .47$, $p = .49$, and no main effect of Group $F(1,38) = .06$, $p = .81$, but there was a significant interaction between Video x Group $F(1,38) = 4.34$, $p = .04$ (Figure 8). However, pairwise comparisons indicated no significant difference between the groups in the decrease in ratings from before to after the view Video $t(38) = 1.24$, $p = .22$, or with the decrease in ratings in the suppress video $t(38) = .13$, $p = .13$. Although not confirmed by the pairwise comparisons, the data in Figure 8 indicates a different pattern of reactivity between the groups. In the MDD group there was greater

decrease in reactivity to the view video, relative to the suppress video, in the control

group, the pattern was reversed. While not significant at a pairwise level, this is in the

opposite direction to predictions, as the depressed group are showing less marked

carry over effects of suppression. There was no main effect of Group $F(1, 38) = 0.50$,

$p = .49$; Video $F(1, 38) = 0.35$, $p = .56$; or significant interaction between Time by

Group $F(1, 38) = 0.06$, $p = .81$ or Video by Group $F(1, 38) = 2.18$, $p = .15$.

Figure 7 Happiness ratings to the positive memories. Data are mean (standard error of
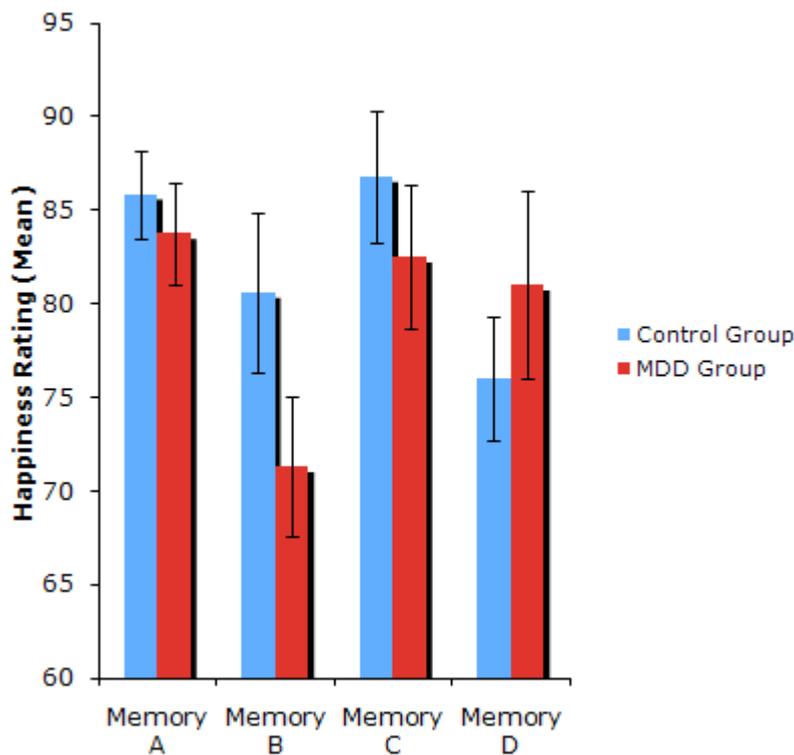
the mean).

Note - Memory A = before view video; B = after view video; C = before suppress

video; D = after suppress video

Figure 8. Change in happiness ratings to the positive memories. Data are mean (standard error of the mean).
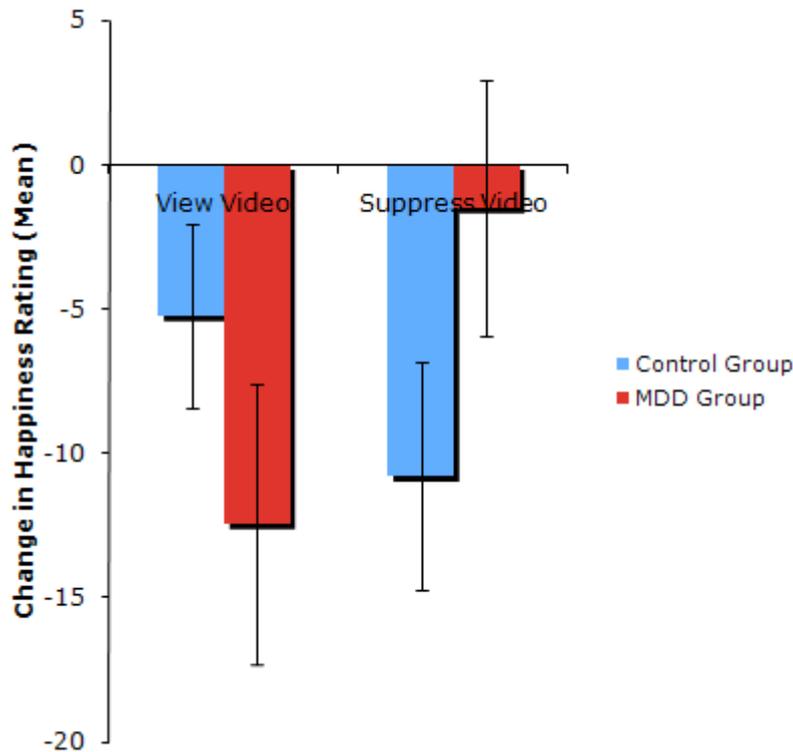
Note - Data are mean values of change in reactivity ratings to the memories before the videos, were subtracted from those after the videos.

3.4.3.2 Sadness ratings. For sadness ratings, there was a main effect of Group $F(1,38) = 7.56$, $p < .01$, whereby ratings of sadness were higher for the MDD group than the controls (Figure 9). Failing to support Hypothesis 2, there was no Time by Video interaction, $F(1, 38) = 0.26$, $p = .62$. Inconsistent with Hypothesis Three, there was also no significant three way interaction, $F(1, 38) = 0.007$, $p = .94$. This indicates suppression is not leading to greater blunting of negative reactivity in response to positive self referent material, and nor is this more marked in the depressed group. There was no main effect of Time $F(1, 38) = 0.01$, $p = .94$; Video $F(1, 38) = 0.63$, $p =$

.43; or significant interaction between Time by Group $F(1, 38) = 0.28$, $p = .60$ or Video by Group $F(1, 38) = 2.67$, $p = .11$.

Figure 9 Sadness ratings to the positive memories. Data are mean (standard error of the mean).
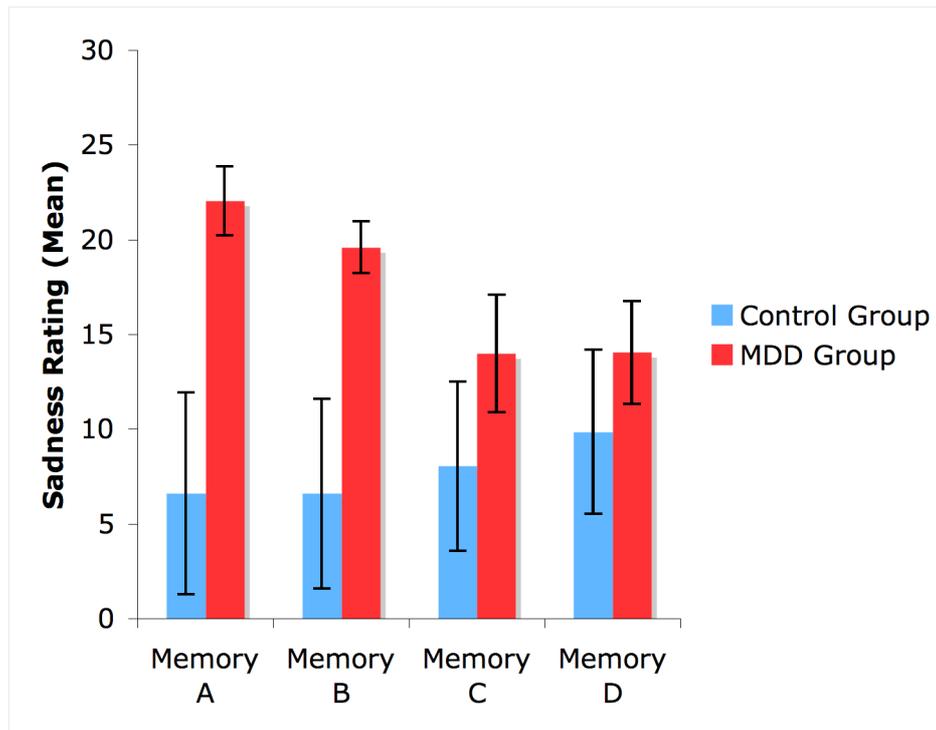
Note - Memory A = before view video; B = after view video; C = before suppress video; D = after suppress video

3.5 Summary of Results

3.5.1 Hypothesis 1. Hypothesis 1 was partially supported. Across both groups, ratings of sadness were lower following the suppress video than the view video. The happiness ratings did not support hypothesis 1 with no difference in ratings of happiness after the view and suppress videos.

3.5.2 Hypothesis 2. Across ratings of happiness and sadness, to both self referent and non-self referent material, Hypothesis 2 was not supported. In particular,

there was no overall greater reduction happiness or sadness in the suppress condition, relative to the view condition.

3.5.3 Hypothesis 3.

The premise that participants in the MDD group would use suppression when viewing material was supported, in that self reported ratings of suppression were significantly higher in the MDD group than the control, across both negative videos. There was no three way interaction to either the sadness and happiness ratings of the images, meaning that the MDD group did not show a greater change in reactivity from view to suppress compared to the control group. However, there was a significant three way interaction between Time x Video x Group for the happiness ratings following the positive memory cue words. The pattern of results was as predicted by Hypothesis 2 for the control group, with there being a greater drop in happiness ratings to the memories following the suppress condition, relative to the control condition. However, the pattern of results (though non-significant) was in the opposite direction for the MDD group, where there was a greater drop in happiness ratings to the memory prompt after the view video, than the suppress video.

4   Discussion

A core feature of MDD, and particularly anhedonia, is an alteration in emotional reactivity. It is proposed that emotion regulation processes are one plausible contributory process to this, given that the function of emotion regulation is to elevate as well as dampen emotional experience. The focus of the current thesis was to explore the effects of one such process, emotion suppression, and the impact of it on subsequent reactivity to positive material in depressed and non-depressed individuals. While a role of emotion suppression in anhedonia has been examined in social phobia (Kashdan & Breen, 2008), as far I am aware this possibility has not yet been examined in depression.

The theoretical rationale was that depressed individuals will have developed extensive suppression skills, both using it spontaneously and in an intentional fashion, to down-regulate negative emotion experience. However, this may spill over to also blunt positive experience (cf Dunn et al., 2009).

These ideas overlap with current clinical thinking, where interventions such as Acceptance and Commitment Therapy (ACT), Dialectical Behaviour Therapy (DBT) and Mindfulness Based Cognitive Behavioural Therapy (MCBT) have begun to target both emotion regulation difficulties, and explore the role of acceptance of emotional experience, as opposed to emotional avoidance.

The present study tested this idea by comparing an MDD group and a control group, on an experimental task, where participants were asked to either suppress or "just view" a negative film. Prior to and following this, positive material was presented, thus examining whether the MDD group and control group differ in their use of, and the consequences of, suppression. It is proposed that individuals with

MDD will be more likely to spontaneously engage in emotional suppression, and therefore, might show a greater reduction in reactivity than the control group in the view video.

This chapter will discuss the findings reported in the results section, in relation to each of the experimental hypotheses. Following this, the strengths and limitations of the study will be outlined in relation to both the methodology and data analysis strategy. This provides a context for the subsequent section, which discusses the theoretical implications of the findings. Finally, the clinical implications of the results will be discussed, followed by suggestions for future research.

4.1   Summary of Findings

This study compared a group of participants who met the criteria for MDD diagnosis, to healthy controls. Twenty participants were recruited to each group, and completed an experimental paradigm investigating the role of emotion suppression on reactivity to positive emotional material. The two groups were comparable on age, sex, and IQ, thus controlling for some factors which may confound the results of the experiment. The group comparisons, manipulation checks and the findings of each hypothesis will be summarized in turn.

4.1.1. Group characteristics. Both groups were measured on a range of trait mood measures and emotion response styles. Some of these measures provide convergent validity for the use of the SCID as the group allocation measure. The MDD group scored higher on levels of depression and low affect, as measured by the BDI, the anhedonic depression subscale of the MASQ. The difference between the two groups on the anhedonic subscale of the MASQ was important, as the implications for anhedonia was one of the key tenets of the current study, and it is not a universal symptom in MDD, with estimates that around one third of individuals

with MDD exhibit clinically significant anhedonia symptoms (Pelizza & Ferrari, 2009). Consistent with findings of experiential avoidance in MDD (e.g. Cribb, Moulds & Carter, 2006) the MDD group scored more highly on the AAQ, indicating higher levels of experiential avoidance, however, there was no difference between the groups on the ERQ measure of emotion suppression, which was used as part of the prediction for the experimental hypotheses. Given that results showed that participants in the MDD group had higher levels of self reported suppression across the two videos, this issue bears closer scrutiny. It is possible that the discrepancy is a result of different conceptualizations of emotion suppression. The ERQ was developed by Gross and John (2003), who conceptualise emotion suppression as the suppression on emotional *expression*, without reference to the suppression of the internal experience of emotion. In contrast, in the current thesis, it has been argued that such a distinction is artificial, and that the internal suppression is inseperable, (and effected by) the external expression of it (e.g. Strack, Martin & Stepper, 1988). This premise was reflected in the current study, where participants were asked to suppress both their experience of emotion, and the expression of it. Given this, the lack of a significant difference between the two groups on this subscale, whilst there being a difference on self report ratings, may reflect a conceptual discrepancy between the two constructs. An alternative explanation is that our rating scales measured the state use of suppression in response to a film clip, whilst the ERQ measures the habitual (i.e. trait) tendency to suppression emotion expression. It may, therefore, be that there are self report biases in either the MDD group or the controls, over their awareness or memory of their use of emotional expression suppression over time.

4.1.2 Materials checks. Materials checks confirmed the validity of the negative videos as inducing sad mood, and of the washout video as removing acute emotional effects. In addition, compliance ratings indicated that self reported suppression effort was higher in the suppress condition relative to the view condition, and that the order of presenting the videos did not impact on results. Taken as a whole, the data supports the validity of the experimental manipulation, and of the videos used.

4.1.3. Hypothesis testing. The study findings will be summarised in relation to each hypothesis in turn.

4.1.3.1 Hypothesis 1. Based on the Dunn et al. (2009) results, it was predicted that all participants would report lower levels of negative affect and lower levels of positive affect in response to the negative video in the suppress condition relative to the view-only condition. This hypothesis was partially supported. Across both groups, ratings of sadness were lower following the suppress video than the view-only video, suggesting that suppression was a successful strategy in the immediate down-regulation of negative affect. This replicates the Dunn et al. (2009) finding with a MDD group, and supports some theorizing in the literature that suppression can be adaptive (e.g. Bonnano et al., 2004). The happiness ratings did not support Hypothesis 1 with no difference in ratings of happiness after the view-only and suppress videos, suggesting that although suppression reduced negative affect, this does not extend to a more global reduction in affect, including happiness.

4.1.3.2 Hypothesis 2. Based on the Dunn et al. (2009) results, it was predicted that all participants would show a reduction in ratings of happiness and sadness to positive (self and non-self referent) material in the suppress-condition relative to the view-only condition. This hypothesis was not supported across ratings of happiness

and sadness, to both self referent and non-self referent material. In particular, there was no overall greater reduction in happiness or sadness in the suppress condition, relative to the view condition. This suggests that taken across both groups, although suppression appears to have reduced negative affect immediately following the negative film, it does not have any further consequences for subjective reactivity to positive material. However, as the results pertaining to Hypothesis 3 will illustrate, this does not suggest that there were no down stream consequences of suppression, but rather, they were not uniform across both groups.

4.1.3.4 Hypothesis 3. Consistent with theories of experiential avoidance, it was predicted that the MDD group would habitually use suppression when viewing emotional material. This was predicted to result in lower ratings of happiness and sadness in response to self and non-self referent material, compared the control group, across both conditions, with potentially further reductions in the suppression condition. This hypothesis received mixed support, and indeed some results went in the opposite direction to predictions.

The premise that participants in the MDD group would habitually use suppression when viewing material was partially supported, in that self reported ratings of suppression were significantly higher in the MDD group than the control group, across both negative videos. However, the effects of this greater suppression usage were not as expected. There were no three way interactions to the sadness and happiness ratings of the images, meaning that the MDD group did not show a greater change in reactivity from view-only to suppress compared to the control group. There was, however, a significant three way interaction between Time x Video x Group for the happiness ratings following the positive memory cue words. The pattern of results was as predicted by Hypothesis 2 for the control group, with there being a greater

drop in happiness ratings to the memories following the suppress condition, relative to the control condition. However, the pattern of results was in the opposite direction for the MDD group, where there was a greater drop in happiness ratings to the memory prompt after the view-only video, than the suppress video. While these comparisons were not statistically significant at the pairwise level, it nevertheless suggests that intentional use of suppression results in a paradoxical rebound (or at least a smaller reduction) in happiness in depressed individuals.

4.2   Interpretation and Theoretical Implications

4.2.1 Overview. As indicated above, the results provided partial support for Hypothesis 1, no support for Hypothesis 2, and mixed evidence for Hypothesis 3. In this section, the findings will be considered in relation to theories of emotion regulation and reactivity, drawing on previous research.

4.2.2 Hypothesis 1: Comparing the effect on reactivity to the negative videos across groups. The ratings of state mood following the negative videos replicates the findings of Dunn et al. (2009) that suppression would successfully reduce negative affect immediately following the video. This effect was significant across both groups, showing that suppression is an effective short term strategy in reducing negative affect. However, the MDD did group report higher levels of negative affect following the suppress condition, relative to controls. This does not appear to be a simple effect of increased reactivity to negative material in the MDD group, as their ratings of sadness were comparable to the control group following the view-only condition, rather, the MDD groups attempts at intended suppression were less successful at reducing negative affect.

There are several possible explanations for the reduced efficacy of suppression for the MDD group. These explanations include: i) the habitual use of suppression in

the MDD group; ii) the effect of instructions on cognitive load; or iii) beliefs about emotion regulation strategies. With regard to the first point, the data from the compliance ratings suggests a habitual use of suppression in MDD, which is consistent with other findings in the literature (e.g. Gross & John, 2003; Aldao, Nolen-Hoeksema, Schweizer, 2010). Participants in the MDD rated themselves as having used a significantly greater amount of suppression effort across both films relative to controls, with an additional, non significant, increase in the suppress condition. Given that the suppress video was always presented after the view-only video, it is possible that in the MDD group, participant fatigue from suppressing in the first condition, limited the success of the strategy in the second condition, relative to controls.

With regard to the second point, it is arguable that the instruction set increased cognitive load. In the view condition, participants were instructed to view the video "as you normally would", whilst in the suppress condition they were specifically asked to suppress their emotions. The requirement to keep this instruction set in mind whilst watching the video would increase demand on working memory. For example, Chandler and Sweller (1991) note that attempts to integrate several separate sources of information generates a high cognitive load. In the suppress condition, participants needed to attend to the video, remember the instruction set, and monitor their own emotional responses with reference to the relative success of their suppression. It has previously been noted that increasing cognitive load can reduce the efficacy of emotion regulation strategies, particularly in participants with high levels of negative affect (e.g. Dalgleish et al., 2009), thus making the strategy less effective than for the control group.

A further possibility is that the two groups differed in their beliefs around suppression, and how successful their attempts to suppress *should* have been. The two groups differed on experiential avoidance as measured by the AAQ, with the MDD scoring more highly, indicative of a lower tolerance and acceptance of emotional states. MDD is also characterized by negative self concept, blame, and often, perfectionist attitudes (e.g. Hewitt & Flett, 1991; Abramson & Sackheim, 1977). It is possible that in the MDD group there was a discrepancy between participants expectation of how successful suppression should be, with how successful it actually was. Such a discrepancy could lead to increased levels of self blame, and thus higher levels of negative affect, relative to controls. Of course, these explanations are not mutually exclusive, and it may be that a combination of them best accounts for the pattern of results obtained here.

Taken together, the findings give the picture that across both groups suppression reduces immediate negative affect, with the MDD group habitually using suppression more than the control group.

4.2.3 Hypotheses 2 and 3: Effect of suppression on subsequent reactivity. Across both groups, suppression did not impact on subsequent reactivity to positive non-self referent material. However, the results from the positive self referent material show that emotion suppression to negative material influences subsequent reactivity to this positive material, but differentially across groups. The implications of these findings are slightly different depending on whether comparisons are made between the groups, or within the groups, over time. Each of these interpretations will be considered in turn.

4.2.3.1 Effect of suppression on subsequent reactivity: Comparison across groups. The current data provides a more complex picture of the pattern of emotion

regulation styles, and their impact on subsequent reactivity, than previously demonstrated (e.g. Liverant et al., 2008; Kashdan & Breen, 2008).

In the view-only condition, the MDD group reported significantly higher levels of suppression effort compared to the control group. This use of suppression in the MDD group resulted in comparable ratings of sad mood following the negative video, and reduced reactivity to the positive memory prompt, relative to controls. In the suppression condition, instructed suppression in the MDD group elevated state mood ratings of sadness to the negative video and increased reactivity to subsequently presented self referent positive stimuli, relative to controls. This finding was unexpected, and suggests that for the MDD group, instructed suppression is having a different effect on reactivity than habitual suppression. In Section 4.3.2, alternative explanations for the reduced efficacy of instructed suppression in the MDD group were suggested, including fatigue, cognitive load, and beliefs about suppression. These explanations alone do not account for the pattern of subsequent reactivity observed between the two groups, rather they offer explanations as to why suppression was less successful in the MDD group. However, one tentative explanation for the pattern of reactivity is based on the idea of self resources.

Research on "self resources" has its roots the social psychology literature where it has been operationalised in effortful behaviours such as effortful action, restraining impulses, and other acts of self-control (e.g. Vohs & Heatherton, 2000; Baumeister, Bratslavsky, Muraven, & Tice, 1998). In this account, self resources are viewed as a kind of limited resource, similar to strength or energy, whereby one act of effortful action will have a detrimental impact on subsequent self control. Importantly, it is not simply a case of difficult or strenuous tasks depleting self resources, it is those tasks where *self* control is needed. In these tasks, as self

resources are used up, it is thought to lead to a state of "ego depletion" where self control is reduced (Baumeister, Bratslavsky, Muraven, & Tice, 1998).

Thus it can be argued that the suppression condition differed from the view-only condition, not merely in terms of cognitive load, but also in the amount of self control, and therefore self resources, that were needed. In the view condtion, participants were just asked to view the video "as you normally would" which should require less self control than an instruction to "suppress your emotions." Of relevance for the current thesis, in a state of ego depletion the self is less able to regulate itself or exert volition (Muraven & Baumeister, 2000). Thus the normal mechanisms of self control are diminished. It is, therefore, plausible that the depletion of self resources following the suppression condition, made it harder for participants to self regulate in response to subsequently presented material, and therefore maintain self control. Given that a state of self control will be different for the MDD and control group, this reduction in self control would lead to two different patterns of reactivity. For the control participants, this led to a reduction in reactivity to the positive memories, and an increase in reactivity for the MDD participants. That is, a reduction in self control alters the normally occurring patterns of reactivity for these two groups.

Although these connections are speculative, it has previously been shown in healthy volunteers that effortful emotion regulation can impair self resources, impacting on subsequent self control. For example, Muraven et al. (1998, Experiment 1) found that self-control was impaired regardless of whether the participants had tried to amplify or to suppress their emotion, as compared with participants who did not try to alter their emotional state. Thus, only participants who tried to override their natural emotional state exhibited subsequent decrements in self-control. Similar findings come from DePaulo, Blank, Swaim, and Hairfield (1992) who found that

efforts to appear emotionally expressive and efforts to appear emotionally suppressed showed similar effects, including less success in a subsequent task, again suggesting that altering one's emotional state involves a similar exertion regardless of whether one is trying up-regulate or down regulate.

With regard to the current task, it is important to note that the ideas of cognitive load and self resources have separable effects. Although there are problems with the specificity of definitions in this literature, I suggest that cognitive load impacts on the *efficacy* of emotion suppression for the MDD group, whilst the fact that an effortful behaviour is carried out depletes self resources for both groups. This is an important distinction as the ego depletion model predicts that self-control strength is needed only by behaviors that require self-control, as opposed to any difficult or effortful task (Muraven et al., 1998, Experiment 3). A further issue to note is that this account would not predict differential depletion of self resources between groups. In a review of the literature, Muraven and Baumeister (2000) note that converging findings suggest that mood, self beliefs, or arousal do not contribute to the effects of depleting self resources (although see Job, Dweck & Walton, 2010 for a more recent critique). In addition, one issue of note is that these findings were obtained with healthy controls, therefore, differential effects in a clinical sample cannot be discounted.

4.2.3.2.The effects of suppression within groups. Given that there was a qualitatively different pattern of reactivity between groups, and the MDD group used significantly greater suppression in the view-only condition relative to controls, it is also helpful to compare the effects of suppression over time, in each group separately.

For the control group, the pattern of results was as predicted by Hypothesis 3

for the control group, with there being a greater, though non-significant, drop in happiness ratings to the memories following the suppress condition, relative to the control condition. This was coupled with lower ratings of sadness following the negative video in the suppress condition, relative to the view only condition.

However, for the MDD group there was a greater reduction in positive reactivity in the view-only condition, compared to the suppress condition. In addition, there was an increase in state mood ratings of sadness in the view-only condition compared to the suppress condition. Thus, it is clear that emotion suppression in MDD does not affect subsequent emotional reactivity as hypothesised. Rather than instructed suppression resulting in a global dampening of reactivity, it appears that it reduces immediate sad affect, resulting in no reduction of subsequently felt positive affect. In contrast, the view-only condition leads to higher ratings of sad mood but a greater drop in positive reactivity than in the suppression condition.

4.2.3.3. Interpretation of the different patterns of reactivity over time. The interpretation of the data within groups also fits well with the ego depletion idea. In the view-only condition, no effortful behavoiur was needed, resulting in a habitual level of suppression effort used in the MDD group, and little suppression used by the control group. The pattern from the MDD group in this condition fits with the idea that suppression reduces reactivity to subsequently presented positive material. In terms of self regulation, it suggests that the state of self control for the MDD group is suppression to negative material, followed by dampened reactivity to positive material. This fits both with the ECI hypothesis on reactivity in MDD, and with the clinical ideas that psychopathology is characterized by an avoidance or attempt to alter unwanted emotional states. For the control group, there were low ratings of suppression in the view-only condition suggesting that the state of self control for the

control group is lower suppression to negative material, followed by higher reactivity to positive material.

4.2.4 Process mechanisms. With regard to the cognitive load and self resources explanations of the results, there is likely to be some overlap in terms of the generic processing mechanisms involved. It is worth considering these, particularly in relation how they may be altered in MDD. In terms of the generic processing mechanisms involved, executive function processes are a likely candidate given that they are involved in emotion regulation processes (Zelazo & Cunningham, 2007; Carlson & Wang, 2007). Deficits in executive function processing have been implicated in MDD (e.g. Shannon & Green, 1999; Watkins & Brown, 2002; for a review see Fossati, Ergis, & Allilaire, 2002), and high negative affect has been conceptualized as increasing demand on executive functions, resulting in reduced efficacy of emotion regulation (Dalgleish et al., 2009). Furthermore, in relation to the ego depletion idea, the processes associated with these ideas are subsumed under a "self executive", part of which appears to directly relate to executive function, involving both externally-oriented acts of choice, active initiative, and volition, and internally oriented processes of self regulation (Baumeister, 2002). Although these connections are speculative, in terms of the current study findings for the suppress condition, it may be that the control group had more executive function capacity available for suppression of emotional experience, which subsequently resulted in a global dampening of emotional reactivity. In contrast, the MDD group had less executive function capacity available to suppress their emotional experience, resulting in no subsequent reductions in positive reactivity. Although the self resources model does not predict any differences between individuals as a function of mood, it is difficult to reconcile this idea with more chronic mood states, as seen in MDD. I

would suggest that executive function processes may interact with both cognitive load and self resources accounts in important ways.

4.2.5 Flexibility. Of further relevance for the implications for emotion regulation, was the finding that the MDD group had higher ratings of suppression effort, irrespective of instruction set. This speaks to current theorising on the factors which may contribute to maladaptive as opposed to adaptive emotion regulation strategies. The data suggests that participants in the MDD group tended to inflexibly engage in emotion suppression across both conditions.

This tendency has been linked to underlying belief systems both about the self, and about emotion responses, whereby more flexible belief systems result in more adaptive, context dependent regulation strategies, thus increasing positive affect. For example, Tamir, John, Srivastava, and Gross (2007) studied a group of students about to enter college, administering a measure of implicit beliefs regarding emotion. Those students with an flexible as opposed to an fixed view of emotion, reported greater use of emotion regulation to promote self efficacy, and greater use of reappraisal. By the end of their first year, participants with flexible beliefs about emotion reported greater levels of positive emotions, well being and social adjustment, in addition to lower negative emotions, including depression, and lower self reported loneliness. This suggests that beliefs about emotion, particularly the belief that they are dynamic and malleable, are associated with more attempts at, and more successful, emotion regulation.

More recently, Kashdan and Rottenberg (2010) have argued that flexibility is a key determinant of positive mental health, which overlaps with ideas in mindfulness, acceptance, and emotion regulation. The finding that the MDD group was more rigid in their use of emotion suppression clearly relates to these ideas, and

dovetails with prior research on reduced flexibility across a range of domains in MDD (e.g. Moore & Fresco, 2007).

4.3 Emotion Reactivity

4.3.1 Reactivity to positive stimuli. Notwithstanding the effects of emotion regulation strategies, these data also speak to the issue of emotional reactivity in MDD. Partially replicating the findings of Rottenberg et al. (2005), across both conditions, there were significantly higher ratings of sadness to the positive memories in the MDD group compared to the control group. There were also significantly lower ratings of happiness to the positive images in the MDD group relative to the control group. Thus, there is some evidence of blunted reactivity in terms of happiness to non self referent positive material, but elevated sadness reactivity in response to self referent positive material. Interestingly, this was not mirrored by lower ratings of happiness to positive memories, or higher ratings of sadness to the positive images for the MDD group, suggesting that the separate constructs of happiness and sadness are capturing distinct aspects of emotional reactivity in the MDD group.

4.3.1.1. Positive self referent material. This pattern of results from positive self referent material suggests that MDD is characterised not by blunted positive reactivity to positive material, but elevated negative reactivity to it. By using positive autobiographical memories, for the MDD this may have resulted in a discrepancy between how things were, and how they are now, resulting in elevated levels of negative affect (e.g. Joorman, Rathias & Gotlib, 2007; Dunn et al., 2004). It would be interesting to examine whether this pattern is different with self referent material that is a part of current experience, or whether the "depressed self" continuously notes the discrepancies with positive, self referent material.

4.3.1.2 Positive non-self referent images. With regards to the lowered ratings of happiness in response to the positive images, this replicates several other findings that MDD is characterized by reductions in reactivity to positive material (e.g. Dunn et al., 2004; Gruber, Christopher, Keltner & Johnson, 2010). It therefore lends support to patterns of reactivity identified by both the idea of positive attenuation, and aspects of the ECI hypothesis (Rottenberg, 2002).

4.3.2 Reactivity to negative videos. Of further theoretical relevance is the fact that there was no evidence of elevated sadness from the MDD in response to the negative videos, which counteracts the negative potentation idea that MDD is characterised by elevated reactivity to negative stimuli (Beck, 1967). With regard to the MDD groups significantly lower happiness ratings following the sad videos, this may reflect two potential aspects. Firstly, as the films were not designed to induce positive affect, the ratings may represent a more global rating of state mood, rather than a specific reaction to the videos. This would fit with research demonstrating over general cognitive biases in MDD (e.g. Sweeney, Anderson & Bailey, 1986; although see Coyne & Gotlib, 1983 for a critique). Secondly, the MDD group may have interpreted their experience of reactivity as lowered levels of happiness in response to the videos, as well as increased levels of sadness, this point would therefore speak to the phenomenology of depression, rather than reactivity per se.

4.3.3 Immediate effects of suppression on global reactivity. One of the principles underpinning the experimental hypotheses was that is that suppression would dampen all emotion reactivity (both happiness and sadness) irrespective of the valence of the material presented. This premise was based both on experimental findings on the effects of suppression on negative affect (e.g. Dunn et al, 2009; Liverant et al, 2008) and on correlation studies which showed a link between emotion

suppression and lowered positive affect (e.g. Gross & John, 2003; Kashdan & Breen, 2008). However, this idea was not supported with regards to reactivity following the negative videos. Suppression effectively reduced self reported levels of sadness, but had no effect on happiness ratings, across both groups. This suggests that in the immediate term, suppression only reduces felt emotions, rather than a global dampening of all emotion.

4.3.4 Type of material and time course of emotional reactivity. Of further note were the main effects of video on both the happiness and sadness ratings to the positive images. Across both groups, there were higher ratings of both happiness and sadness to the images before and after the view video, than the suppress video. Looking at the pattern of results, these main effects were carried by higher happiness ratings before/after the view condition from the control group, and by higher sadness ratings before/after the view condition from the MDD group. There was no main effect of video on either of the ratings to the positive memories. This suggests that reactivity to non self referent material may become habituated over time, which for the control group equates to lower happiness ratings, and for the MDD group, lower sadness ratings. Despite the common view that self referent material is more likely than non-self referent material to capture attention and processing resources (e.g. Moray, 1959; Shapiro, Caldwell, & Sorensen, 1997), more recently research has shown that this is not always the case, and that the effects of self referent material can habituate quickly (Devue & Bredart, 2008; Harris & Pashler, 2004). However, no such effect was shown for the self referent material in this study, suggesting that it is less susceptible to habituation.

4.4   Strengths and Limitations of the Current Study.

To provide a context for the experimental findings outlined above, the strengths and limitations of the current study will be discussed.

4.4.1 Design. This study employed a between groups design comparing the response of participants with MDD to a group of healthy controls. The use of a laboratory controlled analogue study allowed for the direct comparison between an MDD and control group, on reactivity to positive material when emotion regulation instructions to viewing negative material were manipulated. Although the groups were broadly comparable on age, sex and IQ, the groups inevitably differed on factors, which might have contributed to performance on the task (e.g. background, culture, socioeconomic status). It is conceivable that these factors could have influenced results, however, there were no a priori reasons for expecting them to do so.

By using a two group design, the impact of suppression on those who met criteria for MDD, could be compared to a healthy control sample. However, it would have added to the explanatory power of the study, to include a group of participants who have recovered from MDD. This would have enabled a closer examination of the role of suppression in emotional reactivity, whether it is a stable trait marker which may predispose towards MDD, or whether it is a response to the existence of a negative mood state. This is particularly the case given that anhedonia does not seem to remit in treatment and often remains in recovery (Brown, 2007).

An additional weakness of the study was that the effects of suppression were only measured during the experimental session. It would have been informative to collect data on participants mood state in the week following the experiment, to explore whether emotion suppression has any longer term effects, as well as

increasing the ecological validity of the study. However, given there were no effects immediately post-suppression, it seems unlikely they would emerge downstream. Nonetheless, recent experience sampling approaches (e.g. Bylsma et al., 2011; Peeters et al., 2003) offer a valuable way to increase the "real world" applicability of basic science findings. It will however, be important to establish how the methodologies used in these approaches impacts on the results obtained, and how they relate to traditional laboratory findings.

      4.4.2 Experimental Manipulation. The experimental manipulation in this study was to ask participants to either suppress their emotions or "just view" whilst watching a sad video. This manipulation was consistent with other studies in the literature (e.g. Dunn et al., 2009; Campbell-Sills et al., 2006; Liverant et al., 2008) and therefore allows a comparison between these studies and the current data set. However, experimental manipulations such as these, are difficult to control for on an experiential level. It is difficult to ascertain whether the experimenter's intended process of "suppressing" was the same as that adopted by participants. For example, one participant who was a film student, noted that they "thought about the technical bits of editing the film" to suppress their feelings about it. This anecdotal evidence points to an important distinction between the processes or techniques that may be used to arrive at a state of suppression. With this in mind, it would have been helpful to ask for a broader range of compliance measures, as well as potentially open ended questions about the types of techniques participants used, or how they would describe a state of "suppression." These open questions could have been administered at the end of the experiment, and provided greater insight both in to the process and phenomenology of suppression.

4.4.3 Participants. Although participants were matched on age, sex and IQ, there was a trend effect (p = .06) for participants in the MDD group to be older than the control group. This means that care should be taken to interpret the findings above, in the light of other potentially confounding factors, which correlate with age. Of relevance for the current study, is factors such as cohort beliefs on the expression of emotions (e.g. Gross, Carstensen, Pasupathi, Tsai, Götestam, & Angie, 1997; Malatesta & Kalnok, 1984), whereby older adults are more likely to endorse beliefs around "keeping a stiff upper lip" than those of a younger generation.

With regard to other differences between the groups, the data from the psychometric measures showed that the groups differed significantly on several key variables. Of particular note is the fact that the two groups also differed significantly on a trait measure of anxiety (the STAI). This difference is not surprising given the common comorbidity between anxiety and depression (e.g. Clark & Watson, 1991). In addition, five of the participants in the MDD group reported a current or prior diagnosis of an anxiety disorder. These findings are potentially of relevance given that previous studies have shown that in anxious participants, suppression of anxiety leads to an increase in the experience of it (e.g. Levitt et al, 2003), however, it is not clear whether the same pattern would hold for suppression of sad mood. In addition, suppression has been linked to reductions in positive affect in social anxiety (Kashdan & Breen, 2008), thus, it cannot be stated unequivocally that the results obtained were not driven by symptoms of anxiety rather than depression.

4.4.4 Recruitment. Participants were recruited either via the MRC CBSU volunteer panel, or via the emotion group's list of currently and previously depressed participants. This means that the sample is limited in terms of the self selection bias inherent in this sample, particularly given the potentially distressing nature of the

experiment, it may be that only those participants who felt able to cope with the experimental procedure, volunteered to participate. Furthermore, several of these participants were regularly recruited for studies at the CBSU, including those carried out by the emotion group, meaning that they may not have been completely naïve to the methods used. Of relevance for the clinical implications of this study, is the fact that the participants in the MDD group were recruited from a community sample, specifically excluding those participants who were currently receiving either specialist secondary care, or a talking therapy. These criteria were set to both comply with the ethical approval for the study, and to ensure that participants were not engaging in treatments which could interact with the experimental manipulation (e.g. learning emotion regulation skills). However, this does mean that only those participants who were not currently seeking treatment through NHS specialist services, were recruited. It is impossible to generalize the reasons for this, but it may reflect attitudes towards help seeking, previous experiences with NHS services, limited awareness or acknowledgement of current difficulties. As these factors, particularly the latter one, may impact on habitual tendencies to suppress or avoid emotional experiences, it might be useful to seek to replicate these findings with a group of participants who are currently under the care of specialist NHS services for depression.

4.4.5 Measures

4.4.5.1 Picture ratings. Throughout the experiment, ratings of happiness and sadness were taken, both as measures of state mood, and as measures of reactivity to the positive materials. These ratings were chosen given previous research showing alterations in happiness and sadness reactivity in MDD (e.g. Dunn et al., 2004; Rottenberg et al., 2005). An alternative would have been to take ratings of valence (and potentially arousal). These ratings have most recently been conceptualized as

organized around two basic motivational systems: the appetitive and the defensive systems (e.g. Codispoti, Bradley, & Lang, 2001). According to this view, valence and arousal, capture global and basic elements of emotion; valence indicates which motivational system is activated, and arousal marks the intensity of this activation. With regard to categorical ratings such as happiness and sadness, these are then integrated as a subordinate division of this system that correspond to specific content categories. Thus, although studies examining emotion reactivity in MDD have used either dimensional or categorical ratings of affect, they do vary in terms of how they are organized in conceptualizing emotion. In particular, the use of a dimensional scale of unpleasant-pleasant for valence ratings, may not capture the complexity of emotional experience in MDD (Lambie & Marcel, 2002).

4.4.5.2 Self report ratings. Self report ratings were used exclusively throughout the experiment, and whilst these are a well validated method of obtaining insight in to emotional states and reactivity, they are of course, subject to demand effects. For the compliance measures, only a measure of suppression effort was obtained, in order to further examine the validity of the manipulation, ratings could have been taken of other emotion regulation strategies that participants may have used, for example, distraction or rumination. In addition, baseline measures of mood were not obtained at the beginning of the experiment, this limits the interpretation that can be drawn from the current data set. Comparisons can only be made on changes in reactivity comparing between suppress and view only conditions, rather than in relation to state mood. It would also have been helpful to take an additional measure of affect, for example psychophysiology recordings, which are frequently used in this literature (e.g. Dunn et al 2009). There is also evidence that these measures can be more sensitive, for example, Gehricke and Shapiro (2000) using a depressed sample,

found differences only on the psychophysiology measures, but not on self report, suggesting greater sensitivity in this non-verbal measure of affect. However, this is by no means a consistent finding in the literature, with other studies failing to find an effect (for a review see Davidson, 2003).

4.4.6 Materials. It is also important to comment on the validity of the stimuli used to generate positive and negative emotions. The positive images were taken from a subset of the IAPS images, which have been extensively rated and validated (Lang, Bradley, & Cuthbert, 2008). In particular, all images used in the present study have been shown to reliably rated as pleasant and inducing happiness (e.g. Dunn et al., 2004; Dunn et al., 2009). They were also rated as happy in the current sample.

However, the IAPS images are now quite dated, having first been validated in 1980, it may therefore be that societal and cultural perceptions of happiness and positive affect have shifted in this time. Moreover, viewing static images is very different from interacting with real world positive events, questioning the ecological validity of the images.

The sad films were taken from a selection of films rated by Rottenberg, Ray & Gross (2007) and had both been found to reliably induce feelings of sadness. However, the "crying boy" film clip was to some extent a purer inducer of sad mood, in the ratings obtained by Gross and Levenson (1997), than the film clip from "return to me", which also obtained elevated ratings of surprise. The Crying boy film clip was also older (released in 1979) than the Return to me film (released in 2000), and it is possible that participants responded differently to the film clips depending on their age. Despite these limitations, these films were chosen as they offered a validated means of inducing sad mood that could be controlled in laboratory setting.

Partially overcoming the issue of ecological validity, we also asked participants to recall personally experienced positive memories. The use of autobiographical memory prompts has been well validated in the literature (for a review see Conway & Pleydell-Pearce, 2000) and emotion related prompts have been reliably found to induce the corresponding mood state (e.g. Joorman & Seimer, 2004). Each prompt was presented once, with the order of prompts randomized in the experiment. However, only presenting each prompt once could have resulted in a chance finding, whereby prompts which engendered greater reactivity occurred with greater frequency at fixed points in the experiment. This could have been overcome by presenting each memory prompt at each point during the experiment.

In the current study, participants were asked to complete a series of prompts for each memory prior to the experiment, these prompts were then checked by the experimenter to ensure that they were specific. Given that depression is known to be associated with over general autobiographic memory (e.g. Williams & Scott, 1988) it would have been helpful to complete a qualitative analysis on the handouts, with inter-rater checks. This would have provided more information on the content and type of memories being generated by the participants, as well as any between group differences in them. In addition, the use of reenactments of positive self referent material is susceptible to biases by the participant, for the MDD group especially, it may have interacted with negative self schemas which altered the positivity of it. Compliance ratings would have been helpful after the memory prompts to try and assess whether this was an issue.

One further issue of note was the additional differences between the two types of material, over and above the self referent/non self referent distinction. Images and memory prompts vary on several dimensions, including sensory, perceptual and

amount of generation needed by the participant. Thus using, for example, both self referent and non self referent memory scripts would have overcome these confounds. Despite this, one of the strengths of the study was the use of both the self referent and non self referent material, enabling an examination of both of these aspects.

4.4.7 Procedure. For the experimental procedure, the order of the manipulations was fixed, all participants took part in the view condition, followed by the suppress condition. This design was chosen to remove the possibility from a fully counterbalanced design, that participants who took part in the suppress condition first, might have had subsequently elevated levels of suppression in the view-only condition. However, there are difficulties with the design taken in the current study. Firstly, participant fatigue would have been higher in the second condition relative to the first, which may have dampened emotional reactivity. Secondly, participants had already viewed one block of valenced stimuli before the suppress condition, which may have led to an acclimatization to the stimuli. Thirdly, the positive material was organized so that positive memories were always presented directly pre and post each of the negative films. If the effects of emotion suppression are thought to reduce quickly over time, this may have contributed to the finding that suppression altered reactivity to positive memories, but not to the positive images. In addition, the main effect of video in happiness ratings to the pictures is consistent with the idea of a level of either fatigue or acclimatization effecting reactivity to the stimuli.

4.4.8 Data Analysis. Data analysis followed the mixed design of the study set up in the introduction chapter. This design allowed a direct comparison between an MDD group and a control group on the effects of suppression on reactivity to positive material. Trait measures of mood and emotion response styles were taken to measure differences between the two groups on relevant measures, however, they could also

have been used as covariates in ANCOVA analyses, conceptualizing depression and anhedonia as continuous variables.

4.5   Clinical Implications

The clinical implications drawn from these findings are necessarily tentative, given the limitations inherent in translating a single laboratory study in to clinical practice. Nonetheless, the findings from this thesis do offer potentially interesting insights in to the impact of emotion suppression in MDD. As outlined in the introduction, one of the theoretical strands of this thesis was developed from ideas in the clinical literature that it is not merely the existence of problematic thoughts and emotions that contributes to psychopathology, but how individuals respond to them.

For example, therapies like Acceptance and Commitment Therapy (ACT, Hayes et al., 2004) argue that psychological distress persists due to maladaptive attempts to alter or otherwise suppress unwanted thoughts and emotions. Similarly, both DBT and mindfulness approaches emphasise the importance of "being with" difficult emotional states rather than struggling against them. Certainly, the MDD group reported higher levels of suppression effort throughout both conditions, suggesting that suppression in response to emotional material is a characteristic of MDD.

One of the potentially interesting implications from the "ego depletion" idea, is that effortful self control, actually reduces self resources, and thus the ability to self regulate in the short term. Where beliefs about effortful emotion regulation strategies are maladaptive, this could lead to useful behavioural experiments. For example, where clients hold the belief that strategies like emotion suppression will increase their ability to "stay in control." Based on the ego depletion idea, effortful emotion

regulation would actually reduce self control, and may therefore provide an interesting alternative to that belief.

With regard to the "real world" implications of the findings, it is arguable that the results from the view condition offer a more representative reflection of emotion regulation processes in MDD. In this condition, participants were asked to "view the video as you normally would" for the MDD group this was characterized by higher suppression effort relative to controls, and lowered reactivity to positive self referent material. This pattern of results fits with the rationale behind the "third wave" cognitive therapies, that suppression is maladaptive.

However, this is only a small part of the picture, at a clinical level it would be important to ascertain *why* negative material is avoided, and how this relates to self concept and core beliefs. In addition, one of the main findings from this study runs contrary to current clinical thinking, namely the finding that emotion suppression can be an adaptive strategy in the short term. However, the findings from the current study add to the growing body of literature which suggests that in depressed individuals, and healthy controls, negative affect can be successfully suppressed (e.g. Bonanno et al., 2004; Dunn et al., 2009). Instead, it appears that the habitual level of suppression observed in the MDD group which appears to be problematic. At the level of intervention, such an observation may be helpful for clients who find it difficult to relinquish effortful emotion regulation strategies.

The habitual use of suppression observed in the MDD group also speaks to current research on the positive effect that flexibility has on psychological health (for a review see Kashdan & Rottenberg, 2011). The irony is that this lack of flexibility can, at times, be mirrored in traditional CBT approaches where a maladaptive set of beliefs and self concepts are replaced with a "coping" set. In addition, clinical

psychology as a whole has been criticized for its emphasis on ameliorating negative emotional states, rather than increasing positive ones (e.g Wood & Tarrier, 2010).

More broadly, given the emerging research on the importance of underlying trait factors like flexibility and experiential avoidance in the ability to apply adaptive emotion regulation strategies, it appears that attending to these areas in therapy may be an important ingredient over and above the reduction of distress or the increase of positive emotion. A greater emphasis on flexibility is arguably inherent in mindfulness based approaches where clients are taught to accept emotional experiences and sensations rather than rigidly appraising them as unacceptable (e.g. Kabat-Zinn, 1990).

With regard to emotion reactivity more generally, the data suggests a pattern of elevated sadness to positive self referent material, and lowered happiness ratings to positive non self referent material. Thus, where techniques like behavioural activation (e.g. Hopko, Lejuez, Ruggiero & Eifert, 2003) and positive mental imagery are used (e.g. Holmes, Arntz & Smucker, 2003), it will be important to target these specific aspects of emotion reactivity depending on the type of material used.

Taken as a whole, our findings on emotion reactivity in MDD, do suggest that the up-regulation of positive affect, integrated alongside traditional therapeutic approaches, would be of benefit. With regards to the question over acceptance versus suppression, it may be that this is less about changing immediate reactivity to positive material, but rather, reducing the load on executive functioning, which in turn may allow greater flexibility in emotional reactivity.

4.6 Future Studies and Research Directions

The current study is one of the first to explore experimentally, what effect emotion suppression has on subsequent emotion reactivity to positive material in

MDD. Although a considerable body of research has examined emotion reactivity in depression, very little work has sought to explain the mechanisms, which contribute to it. The current study contributes to this work, and suggests that emotion suppression impacts on subsequent reactivity to positive self referent material, but in different ways across the two groups.

However, there are several questions left unanswered with the current results, particularly in relation to the pattern of data reported from the MDD group. With regard to the view condition, it appears that a habitual level of suppression resulted in comparable ratings of sadness following the video, and reduced ratings of happiness to the positive memories, in relation to the control group. Although it would be helpful to gain an additional rating of suppression (e.g. in facial expression analysis), this result fits with one of the premises of the thesis regarding the habitual use of suppression in MDD resulting in a global dampening in response to all emotional stimuli, including positive. However, the data from the instructed suppression condition does not fit this pattern, despite higher ratings of suppression effort, the MDD had higher ratings of sadness relative to controls, and higher happiness reactivity relative to controls in the subsequent positive memory prompt. To discount the notion of participant fatigue, either a fully counterbalanced within subjects design, or a between subjects design would be needed. It would also be helpful to obtain data on participant's beliefs about emotion regulation (cf Campbell Sills, to add as a covariate in the analysis. Given the emphasis in the clinical literature on interventions which aim to encourage acceptance rather than avoidance of emotional states, adding in an "accept" condition would have been helpful, where participants are encouraged to experience their emotions as fully as possible.

With regard to the possibility that the instructed suppression condition

increased cognitive load, thus reducing the efficacy of it relative to controls, this explanation would fit with reported executive function deficits in MDD. However, further research would be needed to test this idea formally in the context of emotion suppression manipulations.

Given the very tentative ideas proposed in this thesis regarding the impact of effortful emotion suppression on self resources and self control, considerable further research would be needed to examine whether these ideas are accurate. One of the issues with this literature appears to be the use of loose definitions for terms like "self control" and the "self executive" – it would be helpful to clarify these conceptual issues as part of future research. Although the current research tends to favour the idea that mood states or beliefs do not influence self resources, this idea has recently been challenged (Job et al., 2010). Given the common, and at times contradictory beliefs around self efficacy in MDD (e.g. Flett, Besser & Hewitt, 2005), it would be interesting to note how these factors interact with the processes proposed by the ego depletion account.

More broadly, it would be instructive to examine the time course of emotion reactivity effects in MDD. In the current experiment, none of the hypotheses were supported in relation to the positive images, which may point to a limited time window of dampened emotional reactivity following suppression. However, the current design does not address this possibility in a controlled way. Recent research has shown that this pattern may be different between MDD participants and healthy controls, for example Heller et al (2009) demonstrated that depression leads to deficits in sustaining positive affect; with other researchers showing that dysphoria is associated with a reduced time course of positive experience (McMakin et al., 2009).

With regard to emotion reactivity changes, only the effect of suppression on

subsequent positive material was looked at here, further research could examine subsequent reactivity to negative material in an MDD sample, which may provide further insight in to the habitual use of emotion suppression in depression. Given the levels of anxiety reported in the current MDD sample, it would also be informative to replicate this study with a group of participants who do not have this co-morbitdity. In addition, comparisons with a recovered group, would provide information on whether the biases obtained here are stable trait markers or more mood dependant.

4.7   Conclusions

This thesis aimed to examine the impact of emotion suppression of negative material on subsequent reactivity to positive material with a group of MDD participants and healthy controls. Based on findings from Dunn et al. (2009), Liverant et al. (2008), and Kashdan and Breen (2008) it was suggested that the suppression of negative emotional experience would down-regulate negative affect, but with the consequence of reducing reactivity to subsequently presented material, including positive.

The underlying rationale was that alterations in emotion regulation, and specifically, emotion suppression, may be a contributory factor in to the processing disturbances, which occur in MDD, particularly anhedonia. These ideas overlap with current clinical thinking, where interventions such as Acceptance and Commitment Therapy (ACT), Dialectical Behaviour Therapy (DBT) and Mindfulness Based Cognitive Behavioural Therapy (MCBT) have begun to target both emotion regulation difficulties, and explore the role of acceptance of emotional experience, as opposed to emotion suppression.

The results showed that there were no changes in reactivity to positive non-self referent material as a function of emotion regulation type. However, the results

from the positive self referent material, showed that emotion suppression to negative material influenced subsequent reactivity to it. For the control group, the results replicated the findings from the Dunn et al. (2009) study. Namely, a consequence of emotion suppression was the dampening of positive reactivity to positive self referent material following suppression of emotions to a negative film clip. However, for the MDD group, the opposite pattern was obtained, participants had a greater reduction in positive reactivity following the view condition, compared to the suppress condition. This effect occurred despite higher suppression effort reported following the suppress condition.

With regard to emotion reactivity more generally, across both conditions, there was significantly higher ratings of sadness to the positive memories in the MDD group compared to the control group, there was also significantly lower ratings of happiness to the positive images in the MDD group relative to the control group. With regard to the negative videos, there was no evidence of elevated sadness from the MDD in response to the negative videos; however the MDD group did report significantly lower happiness ratings following the sad videos. These findings offered support for both the positive attenuation view, and partially for the ECI hypothesis.

A number of interpretations of the data have been offered, with regard to the differences between the control and MDD group on the effects of suppression. In particular, the idea of "ego depletion" as a result of the suppress condition, with subsequent implications for reactivity related to self control. Executive function processes were implicated as generic processing factors, which are implicated both in emotion regulation and in self control and self regulation.

The clinical implications from these results focused on the role of flexibility in, and habitual suppression of emotional experience. It was suggested that

interventions such as mindfulness might fruitfully address these issues. With regard to emotion reactivity in MDD, it was argued that techniques which help to up-regulate positive affect would be a useful complement to traditional CBT approaches, whilst bearing in mind the finding that processing positive self referent material may also elevate levels of sadness.

Finally, future research areas were suggested, including examining the role of executive function load in a precise way, and looking at the time course of emotional reactivity following specific types of regulation.

Taken as a whole, these findings provide an insight in to the consequences of both habitual and effortful suppression in MDD. Given the unexpected pattern of results, it further offers several potential avenues for future research, as well as some implications for clinical practice.

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Appendices

Appendix A: Study information sheet

                      Consent form

                      Positive memory handout

Appendix B: Ethical approval

                      Ethics amendment

Appendix C: Risk Protocol

Appendix D: Trait Questionnaire Measures

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Appendix G: Example box plots

Information Sheet for Volunteers Considering Participating In a Study Entitled:

<u>Exploring Emotional Information Processing in Depression</u>

Please read the information below to decide if you would like to take part in the project:

What is the purpose of the study?
The aim of this study is to investigate the different ways of responding to and processing positive and negative emotional material in individuals with differing levels of depressive symptoms. The eventual goal of this work is to help develop new ways of managing and treating symptoms of depression.

Why have I been asked to take part?
You have been asked to take part so we can explore the interaction between your thinking styles, mood and responses to positive and negative emotional material.

What will I have to do?
If you decide to take part, you will be invited to attend a session at the Cognition and Brain Sciences Unit, 15 Chaucer Road, Cambridge, at a time of your convenience. Each session will ask you to fill in a series of self-report questionnaires about how you think and feel and if you have recently experienced any symptoms of depression or related conditions. You will also complete an experiment measuring your response to emotional material, for example how you feel in response to videos or pictures, and also how you reason about and attend to emotional material. Some of this material will be positive, but some of it will also be negative, so that we can compare how individuals process both positive and negative information. This will be similar to material you might watch or read about in television broadcasts or newspapers and you may find it upsetting. Sometimes you may be instructed to respond to this material in a certain way, so that we can examine how emotion control strategies impact on your experience. As well as measuring your subjective response to emotional material, we will also record your bodily emotional response in terms of how much your heart rate changes, and how much you sweat through the finger tips. The session will take less than two hours. You will also be asked to complete some questionnaire measures of mood, if you would prefer, you can complete these in the week following the experiment, and post these back to us. These questionnaires will ask about how you normally process emotional material, and your typical mood state. We cannot however, provide a clinical interpretation of questionnaire scores to participants.

Are there any risks in taking part?
All of the tasks we will ask you to complete and the equipment we use have been safely used in previous research. Some of the information we will ask you to process is positive. However, some of the material will be negative in content and you may find it upsetting. We do not anticipate any negative effects on mood beyond each testing session as a result of participating, however, it is possible that you may experience a negative mood after the experiment. If you are uncomfortable with any of the procedures you are able to stop participating and withdraw from the experiment at any time. The experimenter will stay with you until you are feeling better, and if needed, will contact the on call clinician.

Are there any benefits to taking part?
There are no immediate benefits to taking part. However, the results from the research will be used to improve our treatment of depression.

Other information
We will reimburse you for your travelling expenses up to £3, and you will receive an honorarium of £6 an hour for your time. You will be paid both for your time in the session at the Cognition and Brain Sciences Unit, and for your time to complete the positive memory

handout beforehand. This study has received ethical approval from the Ethics Committee of the University of Cambridge. The data we collect will be used in the strictest confidence. Data will be stored via code names with no means of identity in order to safeguard your confidentiality. Data will be stored in locked filing cabinets, which only your experimenter will have access to. Results from the study may be presented at conferences and written up in journals. Results will be presented in terms of groups of participants, so individual data will not be identifiable. You are free to decide not to take part in the study and can withdraw from the study at any time. If you do decide not to take part or to withdraw you do not need to explain your reasons to us if you do not want to.

If you have would like any further information about the project please contact Adele Pacini (tel: 01223 355 294 email: a.pacini@uea.ac.uk, address: MRC CBU, 15 Chaucer Road, Cambridge, CB2 2EF). Thank you for reading this information sheet.

CONSENT FORM

Title of Project: Exploring Emotional Information Processing in Depression

Name of Researcher: Dr. Adele Pacini
Please initial box

1. I confirm that I have read and understand the information sheet dated.....................
(version............) for the above study. ☐

2. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

3. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

4. I understand that relevant sections of my data collected during the study, may be looked at by individuals from regulatory authorities, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. ☐

5. I agree to take part in the above study. ☐

………………………   ……………..   …………………
Name of Participant   Date   Signature

……………………   ……………….   …………………..
Name of Person taking consent   Date   Signature

<u>Positive Memory Task</u>

Instructions

During your the experimental session at the Cognition and Brain Sciences Unit we will ask you to try and remember in as much detail as possible some positive memories from your past.

To help you be more prepared for this on the day we would like you to prepare the positive memories before hand using the following guidelines. We strongly suggest that you prepare your memories a couple of days prior to your session at the CBU. We would like you to prepare four different memories.

Please select four times when you think you most strongly experienced positive emotions such as happiness, pride, joy, excitement and/or contentment. For example, it could relate to a personal success, an enjoyable visit with friends or family, a memorable part of a holiday, a wedding day, or the birth of a child. These positive memories should be as vivid and clear as possible, as we will ask you to recall it in as much detail as you are able. We would also like these memories to be as specific as possible, meaning you can identify a particular time and place when they happened. For example, rather than remembering generally being happy on your birthdays, you might instead remember one specific birthday party. If you are unsure whether the memory you have selected is suitable or have any other queries about the experiment, please e-mail or telephone me to discuss it (a.pacini@uea.ac.uk; 01223 355294).

We ask you to write about these memories using the guidelines on the following page.
Your writing about these memories will be anonymised and kept entirely confidentially, so please don't write your name on the piece of paper (you will be given a code name by your experimenter). Your memories will not be used for any purposes other than this study. We will also ask you to identify a cue word to describe each memory. For example, if you are recalling a particularly enjoyable holiday in Cornwall, the cue word could be "Cornwall holiday". This will be used to remind you of the memory during in the experiment. Completing the sheet should take you around twenty minutes. When you attend the testing session at the unit we will pay you an extra half hours honorarium to cover the time this takes you.

Please bring this paper to the experimental session with you or alternatively you can email the document to me at a.pacini@uea.ac.uk
Thank you for you time.

Participant Code: _____

Memory 1
Briefly provide details about the positive event:
(for example, what it was, when and where it happened, who you were with, any other
relevant information):

Describe any thoughts you can remember thinking during the event:

Describe any emotions you can remember feeling during the event:

Describe any memories about what you could see/hear/taste/smell or touch during the
event:

Describe any sensations you can remember feeling in your body during the event:

Please generate a cue word to remind you of the positive
memory:

<u>Memory 2</u>
Briefly provide details about the positive event:
(for example, what it was, when and where it happened, who you were with, any other
relevant information):

Describe any thoughts you can remember thinking during the event:

Describe any emotions you can remember feeling during the event:

Describe any memories about what you could see/hear/taste/smell or touch during the
event:

Describe any sensations you can remember feeling in your body during the event:

Please generate a cue word to remind you of the positive
memory:

<u>Memory 3</u>
Briefly provide details about the positive event:
(for example, what it was, when and where it happened, who you were with, any other
relevant information):

Describe any thoughts you can remember thinking during the event:

Describe any emotions you can remember feeling during the event:

Describe any memories about what you could see/hear/taste/smell or touch during the
event:

Describe any sensations you can remember feeling in your body during the event:

Please generate a cue word to remind you of the positive
memory:

<u>Memory 4</u>
Briefly provide details about the positive event:
(for example, what it was, when and where it happened, who you were with, any other
relevant information):

Describe any thoughts you can remember thinking during the event:

Describe any emotions you can remember feeling during the event:

Describe any memories about what you could see/hear/taste/smell or touch during the
event:

Describe any sensations you can remember feeling in your body during the event:

Please generate a cue word to remind you of the positive
memory:

Karen Douglas
Secretary

Dr B Dunn
MRC Cognition & Brain Sciences Unit
15 Chaucer Road
Cambridge
CB2 2EF

UNIVERSITY OF CAMBRIDGE

CAMBRIDGE
PSYCHOLOGY RESEARCH
ETHICS COMMITTEE

24 February 2010

Application No: 2010.11

Dear Dr Dunn

Exploring Positive Information Processing in Depression

The Cambridge Psychology Research Ethics Committee has given ethical approval to your research project: Exploring Positive Information Processing in Depression, as set out in your application dated 16 December 2010.

The Committee attaches certain standard conditions to all ethical approvals. These are:

(a)   that if the staff conducting the research should change, any new staff should read the application submitted to the Committee for ethical approval and this letter (and any subsequent letter concerning this application for ethical approval);

(b)   that if the procedures used in the research project should change or the project itself should be changed, you should consider whether it is necessary to submit a further application for any modified or additional procedures to be approved;

(c)   that if the employment or departmental affiliation of the staff should change, you should notify us of that fact.

Members of the Committee also ask that you inform them should you encounter any unexpected ethical issues.

If you would let us know that you are able to accept these conditions, I will record that you have been given ethical approval.

Yours sincerely

K S Douglas

cc: Dr T Dalgleish

From: Margaret Benton [mailto:Margaret.Benton@admin.cam.ac.uk]
Sent: 06 August 2010 11:10
To: Barney Dunn
Subject: RE: Ethics application pre.2010.11
Dear Barney

New members of staff noted.

Thanks for letting me know.

Best wishes
Margaret

_____
School of the Biological Sciences
17 Mill Lane
Cambridge
CB2 1RX
Phones: (01223) 766876 Enquiries
        (01223) 766894 Miss Karen Douglas
                    (Secretary of the School)
        (01223) 766899 Dr Fiona Russell
                    (Secretary of the Faculty Board)
Fax: (01223) 332355

_____
From: Barney Dunn [mailto:Barney.Dunn@mrc-cbu.cam.ac.uk]
Sent: 06 August 2010 09:54
To: Margaret Benton
Cc: Maxine Howard; Clem Edwards; Adele Pacini; Adlam Anna-Lynne Dr (MED)
Subject: RE: Ethics application pre.2010.11

Dear Margaret

Re: 'Exploring positive information processing in depression'.

I have some new members of staff on my team, so wondered if I could add the
following people to the above ethics application.

******, voluntary placement student at MRC CBU (BA Hons in Psychology)
Adele Pacini, trainee clinical psychologist at University of East Anglia (BA Hons,
PhD)
*******, undergraduate summer student from Cambridge University (completing
natural sciences degree)

Please contact me if you require any further information.

Many thanks,

Barney Dunn

Standard Operating Procedure for risk management in patient studies

When working with patient populations there is the chance of untoward incidents, defined as events outside the defined research protocol that raise risk or client welfare issues. In individuals with affective or personality disorders these will most typically relate to risk regarding suicidality or self-harm and participants becoming markedly upset during testing. These guidelines outline our standard laboratory practice for dealing with such incidents.

Availability of clinical support
- When testing patients, an on-call clinician should always be available for contact should urgent issues arise (i.e. there appears to be an immediate risk to the health and safety of the participant, researcher or others).
- On the CBU research team, this will typically include Dr Barney Dunn (01223 355294; barney.dunn@mrc-cbu.cam.ac.uk) and Dr Tim Dalgleish (01223 273685, tim.dalgleish@mrc-cbu.cam.ac.uk), both qualified clinical psychologists with experience of treatment and assessment of emotional distress.
- These clinicians will be available on call via e-mail or phone during testing sessions for the researcher to consult and if necessary will schedule an assessment appointment with the client. Alternatively, pre-arranged liaison clinicians at each of the clinical testing sites should be available, agreed in advance with the collaborating clinicians for each individual participant.

Managing distress during testing
- Many of our experiments involve viewing upsetting material or discussing personal information, which may distress vulnerable individuals. Therefore, all participants need to be fully informed of the nature of the study and a distress management protocol needs to be in place.
- It will be made clear from the outset when upsetting emotional material will be presented and that participants may withdraw from any experiments at any point for whatever reason.
- In studies using mood inductions or upsetting material, self report measures of mood will be taken throughout the experiment (e.g. the short PANAS). The experimenter will look at these measures and ask the participants how they are feeling, to help identify people who may have been markedly upset.
- Before any participant leaves, they should be fully debriefed, and it should be ensured that they are not overly distressed.
- If participants are unduly distressed and no longer wish to continue, the session will be terminated and the experimenter will debrief them. Someone from the research team will be available to stay with the participant until such a time that the distress has dissipated, and cognitive-behavioural coping strategies will be used to handle distressing feelings (for example, client validation, use of humour, distraction, reappraisal, deep breathing, positive event scheduling etc).
- Where possible, it should be arranged for the volunteer to have some social contact after testing (for example, a friend or relative picking them up).
- Where appropriate, clients will be given contact numbers for relevant support services (for example, the Samaritans or local crisis service)
- Follow up phone calls and/or emails will be offered 24 hours after the experiment to any participant experiencing undue distress, to check that the reaction has dissipated, and in any particularly severe cases this will involve contacting the on-call clinician for consultation.
- All testers will be informally trained and supervised in use of these strategies by one of the clinicians on the project (typically either Barney Dunn or Tim Dalgleish).

Managing Risk
- Risk is to some extent a daily reality with clients with mood and personality disorders, so a careful balance needs to be struck between adequately containing this risk and inadvertently reinforcing any potentially problematic help-seeking behaviour.
- Risk can take the form of a client disclosing information during the testing session that indicates they are vulnerable, or the nature of the experiment activating risk (e.g. talking about clinical history triggering the urge to self-harm).
- Whenever marked risk issues emerge during the testing session (for example strong suicidal or self harming urges or aggression towards other) the experimenter should always consult one of the on call clinical psychologists in the research team and if necessary a member of the patient's clinical team.

- When working with particularly vulnerable clients, and if agreed with clinical services, testing sessions will be scheduled to tie in with therapy sessions or other clinical contacts, such that the patient has access to their clinician to discuss any issues that the experiment has raised. In these case experimenters should ensure they keep clinical teams informed of their testing schedule well in advance to an arranged point of contact.
- If there are any particular patients requiring more careful monitoring, the experimenter should directly liaise with the clinical team.
- If in doubt, the experimenter should always contact the on-call clinician for advice.

Managing specific events
- In case of minor self-harm (where there is minimal risk of significant physical complications; e.g. superficial scratching to the surface of the arm), the experimenter will contact the on-call clinician. Following assessment, an appropriate course of action will be recommended.
- In case of significant self-harm (where there are likely to be significant physical complications; e.g. deep cuts close to an artery), participants will be assessed at local accident and emergency services. If more urgent care is required, ambulance emergency services (999) will be contacted.
- If a patient discloses intent to self harm, then the nature of the intended injury will be ascertained. If it is deemed that this may lead to medical complication, the client will be encouraged to attend the local A&E. In case of elevated and imminent risk to self that cannot be contained in the research setting, crisis services will be contacted (see contact numbers at end of this document).
- If a patient discloses any marked suicidal intentions (i.e. desire, plan, means and time scale), the experiment will be terminated, and the responsible clinician and the local crisis team will be immediately informed. The participant will need to be seen by one of these contacts urgently.
- In case of violence towards people or property, the Police will be contacted (999).
- In case of a medical emergency or physical injury, the ambulance services will be contacted without delay (999).
- In all of these cases, relevant clinical services involved in the patient's care will be informed.

Reporting
- Every untoward incident should be reported to the study chief investigator by person or by phone as soon as possible, followed by an email. Where untoward incidents are assessed as sufficiently serious, and with the consent of the participant, the clinician in charge of that volunteers routine clinical care will also be informed.
- A serious adverse is an untoward occurrence that results in death, is life-threatening, requires hospitalization or prolongs existing hospitalization, results in persistent or is otherwise considered medically significant by the investigator. Any such events should be reported to the LREC within 15 days where in the opinion of the chief investigator the event was related to the research procedures and an unexpected occurrence.

The AAQ

Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following scale to make your choice.

1----------------2----------------3----------------4----------------5----------------6----------------7
never   very seldom   seldom   sometimes   frequently   almost always   always
true   true   true   true   true   true   true

_____ 1. I am able to take action on a problem even if I am uncertain what is the right thing to do.

_____ 2. When I feel depressed or anxious, I am unable to take care of my responsibilities.

_____ 3. I rarely worry about getting my anxieties, worries, and feelings under control.

_____ 4. I'm not afraid of my feelings.

_____ 5. Anxiety is bad.

_____ 6. If I could magically remove all the painful experiences I've had in my life, I would do so.

_____ 7. I often catch myself daydreaming about things I've done and what I would do differently next time.

_____ 8. When I evaluate something negatively, I usually recognize that this is just a reaction, not an objective fact.

_____ 9. When I compare myself to other people, it seems that most of them are handling their lives better than I do.

The ERQ

Instructions and Items

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

1---------------2----------------3---------------4----------------5---------------6------------7
strongly   neutral   strongly
disagree   agree

1. _____ When I want to feel more *positive* emotion (such as joy or amusement), I *change what I'm thinking about.*
2. _____ I keep my emotions to myself.
3. _____ When I want to feel less *negative* emotion (such as sadness or anger), I *change what I'm thinking about.*
4. _____ When I am feeling *positive* emotions, I am careful not to express them.
5. _____ When I'm faced with a stressful situation, I make myself *think about it* in a way that helps me stay calm.
6. _____ I control my emotions by *not expressing them.*
7. _____ When I want to feel more *positive* emotion, I *change the way I'm thinking* about the situation.
8. _____ I control my emotions by *changing the way I think* about the situation I'm in.
9. _____ When I am feeling *negative* emotions, I make sure not to express them.
10. _____ When I want to feel less *negative* emotion, I *change the way I'm thinking* about the situation.

MASQ-62

Below is a list of feelings, sensations, problems, and experiences that people sometimes have. Read each item and then mark the appropriate choice on the answer sheet. Use the choice that best describes how much you have felt or experienced things <u>this way this past week, including today</u>. Use this scale when answering:

1 ……..……… 2 ………..….. 3 …………….. 4 …………….. 5
Not at all   A little bit   Moderately   Quite a bit   Extremely

_____1. Felt sad

_____2. Startled easily

_____3. Felt cheerful

_____4. Felt afraid

_____5. Felt discouraged

_____6. Hands were shaky

_____7. Felt optimistic

_____8. Had diarrhea

_____9. Felt worthless

_____10. Felt really happy

_____11. Felt nervous

_____12. Felt depressed

_____13. Was short of breath

_____14. Felt uneasy

_____15. Was proud of myself

_____16. Had a lump in my throat

_____17. Felt faint

_____18. Felt unattractive

_____19. Had hot or cold spells

_____20. Had an upset stomach

_____21. Felt like a failure

_____22. Felt like I was having a lot of fun

_____23. Blamed myself for a lot of things.

_____24. Hands were cold and sweaty

_____25. Felt withdrawn from other people

_____26. Felt keyed up, "on edge"

_____27. Felt like I had a lot of energy

_____28. Was trembling or shaking

_____29. Felt inferior to others

_____30. Had trouble swallowing

_____31. Felt like crying

_____32. Was unable to relax

_____33. Felt really slowed down

_____34. Was disappointed in myself

_____35. Felt nauseous

_____36. Felt hopeless

_____37. Felt dizzy or lightheaded

_____38. Felt sluggish or tired

_____39. Felt really "up" or lively

_____40. Had pain in my chest

_____41. Felt really bored

_____42. Felt like I was choking

_____43. Looked forward to things with
          enjoyment

_____44. Muscles twitched or trembled

_____45. Felt pessimistic about the future

_____46. Had a very dry mouth

_____47. Felt like I had a lot of interesting
          things to do

_____48. Was afraid I was going to die

_____49. Felt like I had accomplished a lot

_____50. Felt like it took extra effort to get started

_____51. Felt like nothing was very
          enjoyable

_____52. Heart was racing or pounding

_____53. Felt like I had a lot to look forward to

_____54. Felt numbness or tingling in my body

_____55. Felt tense or "high-strung"

_____56. Felt hopeful about the future

_____57. Felt like there wasn't anything
          interesting or fun to do

_____58. Seemed to move quickly and easily

_____59. Muscles were tense or sore

_____60. Felt really good about myself

_____61. Thought about death or suicide

_____62. Had to urinate frequently

Appendix E: A selection of positive images

Appendix E: A selection of positive images
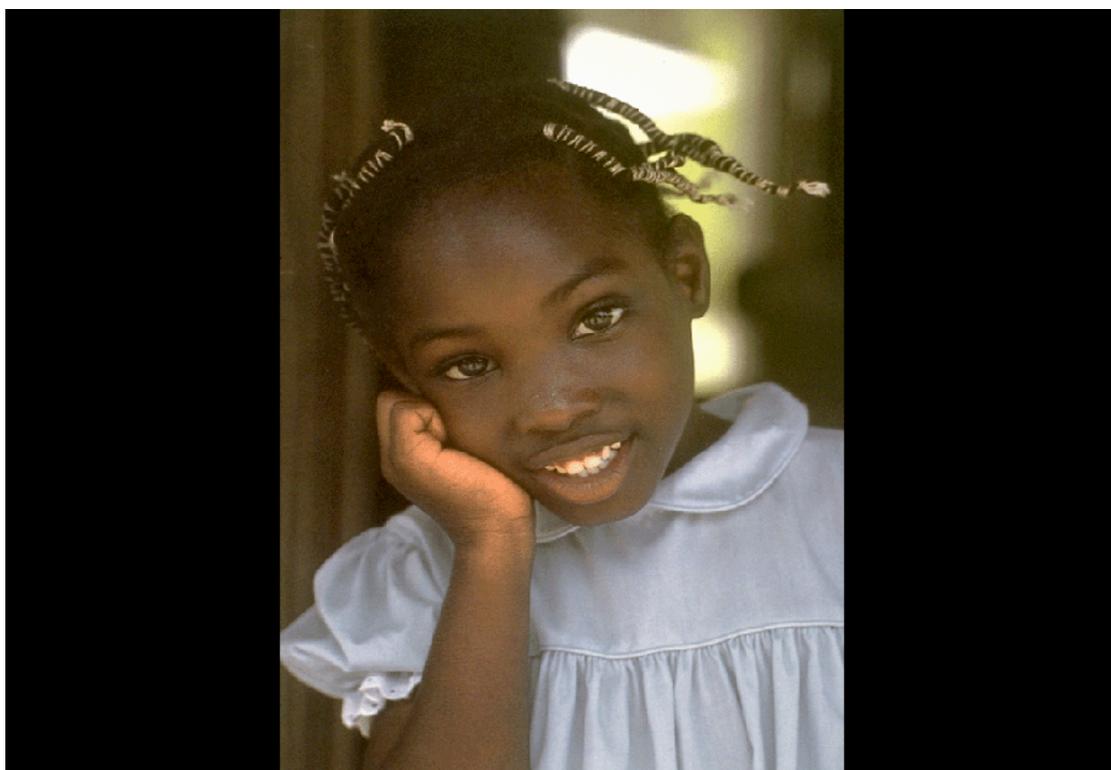
Appendix E: A selection of positive images

Appendix F: Video Viewing Instructions

View Only:

''You will now view the test film. This will show (insert brief content of the film) which you may find upsetting. It is important for the experiment that you watch the film, but if you become so distressed that you wish to stop the film let the experimenter know by saying 'stop' and we will terminate the experiment. Remember to pay attention to the film and do not look away from the screen, as we will ask you questions about it afterwards. After the video we will ask you to rate how you are feeling.''

In the suppress condition, participants will additionally be given the following instructions:

''It is very important for the experiment that when you watch the film you try and suppress any emotional responses to it you are having. What we mean by this is that you should adopt a detached and unemotional attitude as you watch the film. Try to think about what you are seeing objectively in such a way that you don't feel anything at all. Further, if you do have any feelings try not to let these show and keep a 'straight face'. In other words, as you watch the film, try to behave in such a way that a person watching you would not know that you were feeling anything. For example, if the film makes you feel afraid, we would like you to decrease the intensity of fear that you feel and show.''

Appendix G: Example Box Plots.