Emotion Regulation in Depression, Anxiety and Stress: A focus on Catastrophising

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Declaration of Original Authorship

I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged

Signature: 

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Abstract

Emotion regulation is fundamental to how we all feel, think about and experience our daily lives. So far the majority of studies into emotion regulation have focused on theories relating to strategies such as rumination, suppression and reappraisal. The first study focused on developing a wider understanding of how emotion is regulated through developing emotion regulation profiles of depression, anxiety and stress. The second study developed an emotion regulation questionnaire designed for experimental use. Unlike existing emotion regulation questionnaires it was designed to be atheoretical and considerably broader in scope.

The relationship between catastrophising and other mental health traits was highlighted in the initial study and found to be mostly unexplored by the emotion regulation literature. The final three studies aimed to build on existing understanding of catastrophising. The first of these used a catastrophising induction developed for the study. The results suggested that in laboratory conditions, catastrophising reduces positive mood and increases negative mood compared to a control group. The forth study created and successfully validated the Catastrophising Questionnaire. This found catastrophising to generally fall into two groups, general catastrophising and health and safety catastrophising, where the later tended to be less associated with poor mental health outcomes.

The final study developed a two-week intervention to reduce catastrophising, which was delivered to a community sample through a mobile phone or tablet based application. Where participants were randomly assigned to the control or the experimental group. Participants in the experimental condition were found to catastrophise comparatively less. They also reported less negative mood, more positive mood and improved more on mental health indicators than the control group.

Chapter One: Literature Review

Fear, elation, jealousy, amusement and other emotions are elicited when an individual appraises a situation as being immediately relevant to their goals. Emotions typically involve physiological, experiential and behavioural responses, where an individual may feel, think and act out their emotion. Emotion has been defined by Keltner & Gross (1999) as: "episodic, relatively short-term, biologically based patterns of perception, experience, physiology, action, and communication that occur in response to specific physical and social challenges and opportunities." Emotions are more developed and flexible interpretations than reflexes, which involve automatic responses to stimuli (Scherer, 1984). Additionally, unlike moods, emotions have more specific goals and intentions (Frijda, 1986) as well as operating over a shorter duration (Ekman, 1999).

The episodic nature of emotion arises when the individual attends to and appraises a situation's relevance to a specific and current goal (Ellsworth, & Scherer, 2003). These motivations may be brief or enduring. They may also be deliberate and complex (in terms of the mechanisms involved) as well as unconscious and basic. These emotions may also be typical reactions to situations or relatively unique. However, at their core, it is the individual's goal and the interpreted meaning of the situation that generate the emotion. As both of these aspects change over time, so will the emotion.

Perception and physiology both contribute to the multifaceted nature of emotion. Emotions are expressed through the whole of the body and can lead to the incorrect interchanging of "feeling" and "emotion" as emotions do not only make us feel but drive us to act (Frijda, 1986). These impulses for action include more than situation specific actions such as running or shouting but also changes in facial behaviour and posture. These are associated

with further neuroendocrine responses serving to anticipate and follow emotion, providing metabolic support suitable for the emotion's goals (Lang & Bradley, 2010).

Emotion can also be defined through understanding other discrete affective processes. Stress and emotion both involve full body responses, yet stress in contrast to emotion, only involves specific negative responses (Lazarus, 1993). Additionally, stress and mood can be distinguished from emotions by duration. These emotions are typically generated by specific objects or situations prompting behavioural responses relevant to the situation. Stress and moods are less specific, promoting behaviours on a broader scale such as approach or withdraw (Lang, 1995; Lazarus, 1993). Moods also bias cognition more than they bias action (Siemer, 2001).

1.1 Emotion Regulation

Emotion regulation has occurred when an individual activates a goal (implicitly or explicitly) to influence the emotion generation process. This process can take many different forms and was defined by Thompson (1994) as: "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features to accomplish one's goals." The core of emotion regulation is a goal to modify emotion or its generation before it is fully developed (Gross, Sheppes, & Urry, 2011). This goal can be activated for intrinsic emotions or externally for emotions that others are experiencing, the latter being more studied in children and infants (Gross, 2014). Although, it is worth noting that these methods may co-occur for any individual.

From Thompson's (1994) definition, the second vital aspect when defining emotion regulation are the processes responsible for modifying emotional reactions, which can be both implicit and explicit. These processes are on a continuum from unconscious (effortless/automatic) to conscious (effortful/deliberate) regulation (Gyurak & Etkin, 2014; Masters, 1991). The third key aspect of emotion regulation are its intensive and temporal

features, also referred to as its impact on emotion dynamics (Thompson, 1990). Emotion dynamics are the magnitude, duration and latency of emotion responses. This can be in physiological, behavioural and experiential domains depending on the goals of the emotion regulation. In summary, the key aspects of emotion regulation are the activation of a regulation goal and the use of regulatory processes, which lead to the adaptation of the emotion's trajectory.

1.2 The Modal Model of Emotion

In an effort to consolidate the foundations of emotion regulation, the modal model contains key features of emotion that have been established across many research approaches (Gross, 1998). The modal model describes the interaction between situation and attention as well as the meaning to an individual that is contributing to emotion generation. These responses may occur in parallel to one another, providing an individual with coordinated and flexible responses to dynamic environments.

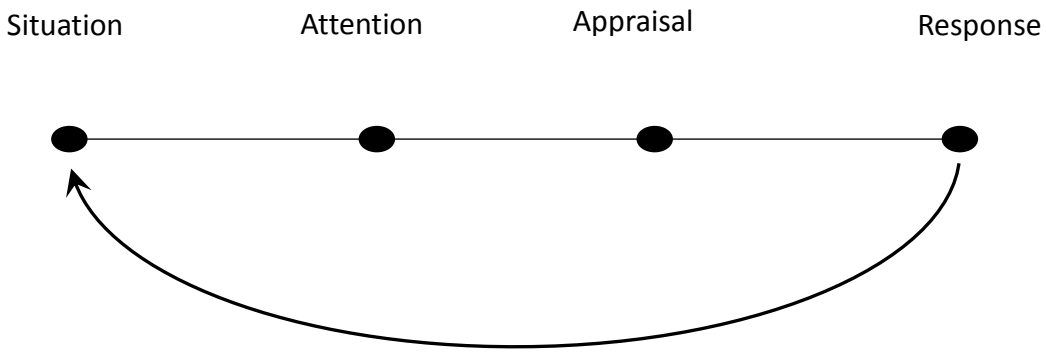

Figure 1.1 The modal model of emotion by James J Gross, 2014, Handbook of Emotion Regulation second edition, p. 5. Copyright 2014 by The Guildford Press.

Figure 1.1 shows the modal model's situation, attention, appraisal and response sequence in its basic form. This pathway begins with relevant situations that can be external or internal. Attention to the situation is then required before a meaningful appraisal can be

developed. An emotional response can only be generated following this sequence of events. These responses can then develop into new situations and interact in parallel with one another. It is these constantly emerging appraisals that influence experiential, behavioural and neurobiological response systems (Gross, 2014).

1.3 Process Model of Emotion Regulation

Whilst emotion regulation strategies have key features in common, they also have differences from one another. In the emotion regulation literature the process model of emotion regulation is most frequently used to plot these differences (Gross, 2002). This model functions as an extension to the modal model of emotion, putting different groups of emotion regulation strategies at different points of a temporal emotion generation scale (see Figure 1.2).

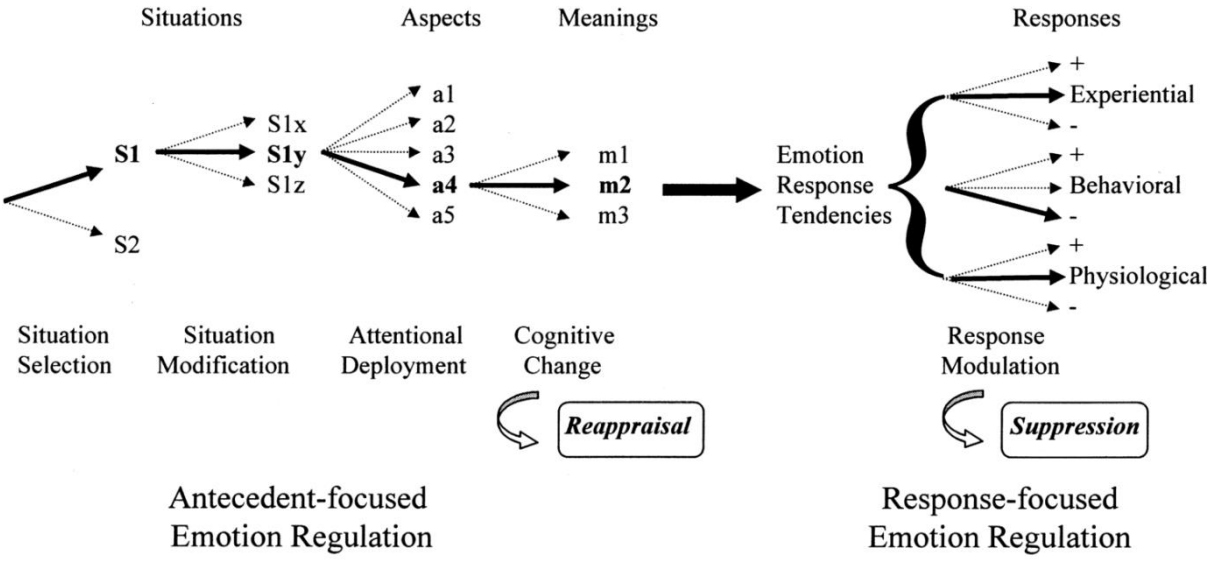

Figure 1.2 A process model of emotion regulation. Reprinted from "Emotion regulation: Affective, cognitive, and social consequences" by James J Gross, 2002, *Psychophysiology*, p. 282. Copyright 2002 by the Society for Psychophysiological Research.

As shown in Figure 1.2, this process can be broadly divided into two phases, antecedent-focused and response-focused strategies. Antecedent strategies refer to strategies before the emotion has been fully generated. Response focused strategies refer to strategies

applied once the emotion has been generated. Within these two phases are the five main time points of emotion regulation strategies. The first of these is situation selection, as shown above as a choice between S1 and S2. In this instance situation S1 is selected. Then another group of emotion regulation strategies may occur to modify the situation's emotional impact, where S1x denotes a situation with no room for change compared with situations with a reasonable potential for change (S1y, S1z). The next process is attentional deployment, which represents the aspect of the situation the individual will focus on. Once a situation has been selected, potentially modified and certain aspects attended to, there remains one other antecedent point that can modify emotion generation. Cognitive change represents which of the possible appraisals (m1, m2 or m3) will be attributed to the situation. It is this final meaning that then gives rise to the emotion response tendencies (experiential, behavioural and physiological). The final point at which emotion regulation can occur is in response modulation, once the emotion has been elicited and may continue to be generated.

To examine the first step in more detail, situation selection is the process of approaching or avoiding places, objects or people in order to modify emotional response. Examples of this could include avoiding a dark alleyway late at night full of intimidating people or finding a specific person that you can vent feelings to. Situations can be complex and situation selection assumes the individual's knowledge of likely events as well as future emotional responses. Situations can be chosen that may have short-term pay offs weighed against longer-term costs, such as an individual with social anxiety avoiding social situations at the risk of isolation.

The second process is Situation modification. This does not always have clear boundaries from situation selection as modifications may create a new situation. Potentially, emotion eliciting situations will not inevitably lead to an emotional response such as the dark alleyway scenario. For example, we can modify the situation above by simply waiting until the

people in question had passed through the alleyway. An individual with social anxiety may choose to communicate with a person by sending an email, rather than meeting someone in person. As stated in Gross & Thompson (2006), efforts to directly modify the situation's emotional impact constitute a powerful form of emotion regulation.

Attentional deployment is a method of emotion regulation that does not alter the environment. Any given situation may have a variety of aspects and attentional deployment is the process involved in selecting what to focus on in order to influence emotion generation. The major attentional strategies highlighted by Gross & Thompson (2006) are placed loosely under the headings of distraction and concentration. Distraction is the focus of attention upon non-emotional aspects of a situation. It can function for both external situations and internal focus such as invoking thoughts or memories that are inconsistent with the current emotional state. Distraction can also include the physical withdrawal of attention, such as closing your eyes or covering your ears. However, concentration draws attention to specific emotional aspects of a situation, which can also have an internal or external focus.

Once a situation has been selected, potentially modified and attention set, there is one last step where the emotion generation may be influenced. Emotion requires a combination of perception and ascribed meaning. Cognitive change is where individuals appraise the situation to modify its emotional significance. This can be achieved by how an individual thinks about the situation or how individuals evaluate their ability to manage the situation. This is also the main point at which catastrophising (also known as magnification), the primary focus of this thesis, can take place. Catastrophising is the appraisal that a certain situation is the worst it can be or more commonly seen in retrospect as making a mountain out of a molehill.

Response modulation, in contrast to the other processes, occurs after the response tendencies have begun. This process can refer to the modulation of physiological, experiential

or behavioural responding. Examples of modulating physiological responses could include exercise, drugs and even food. Another example of response modulation mentioned by Gross (1998), is expressive behaviour or expressive suppression. This has been shown to alter emotion experience, where suppression of emotion such as sadness and disgust has been found to maintain or in some cases heighten the undesired emotion.

1.4 Problems in Definition

One of the major issues with the rapidly expanding field of emotion regulation is that it can be used as a blanket term for a large range of behaviours that may not directly be considered emotion regulation. Many of these may have very small emotion regulation components that are better understood as consequences or side effects. Berking & Wupperman (2012) use an example of expressive suppression often used by Gross (e.g. Gross, 1998; Gross, 2002; Gross, 2014) in defining the superiority of antecedent strategies (such as reappraisal) over response strategies (such as expressive suppression). Berking & Wupperman (2012) argue that individuals can suppress their expressions, often not to regulate themselves but to avoid the negative evaluation of others. Additionally, given that emotions will still exist internally when not expressed, they propose that expressive suppression should not be considered an emotion regulation strategy under a stricter definition. However, there is not yet any meaningful consensus on this in the literature, but conceptually, if expressive suppression is not primarily an emotion regulation strategy its use in comparison with reappraisal in a wide array of literature could be brought into question.

An issue brought up by Gross et al. (2011) is how separable are emotion and emotion regulation. Many situations can simultaneously give rise to both emotion and emotion regulation (Campos, Frankel, & Camras, 2004). This has been found in brain systems where emotion centres are also engaged by emotion regulation (Ochsner et al., 2009). These problems have led some to conclude that no difference can be made (e.g. Kappas, 2011;

Thompson, 2011). Kappas (2011) proposed that emotions are also regulatory mechanisms and that considering one without the other is nonsensical. Thus, stating that emotion and emotion regulation research should be conducted under the backdrop of auto-regulation and habituation, not neutral baselines. Gross (2014) attempts to explain this problem through the example that someone angry at people polluting the environment may snap at their children. As a result of this, they become upset with themselves and curb their anger. This is an instance of emotions being a driving force for emotion regulation. Another example is feeling pride for being angry at people throwing rubbish from their cars. From Gross' perspective this is still emotion regulation as it contains aspects intrinsic to emotion regulation, a valuation of the emotion as good or bad and a relevant goal. This goal could be to feel angry at people polluting the environment or to curb anger to avoid snapping at your children.

1.5 Measuring Emotion Regulation

Self-report measures of emotion regulation have developed alongside the field and many have been created to suit a variety of needs (e.g. for a review see Aldao, Nolen-Hoeksema, & Schweizer, 2010). These measures are quick and easy to administer and interpret. Self-report scales are good measures of dispositional tendencies towards specific emotion regulation strategies, presumably capturing what participants do in different contexts and situations. Campbell-Sills & Barlow (2007) maintain that this focus is vital in its application in psychopathology. By taking a long-term view of thoughts, emotion regulation and behaviour patterns we can identify episodes where unwanted emotion persists and recurs over time.

However, despite these advantages these measures are confined by self-awareness (Robinson & Clore, 2002). As well as requiring awareness and meta-cognition, these self-report scales can be influenced by cognitive biases, mood and demand characteristics. Furthermore, Cole, Martin, & Dennis (2004) suggested that these measures may confound emotion experience with its regulation. Two examples of this are the overlap in the

Rumination Scale (Treynor, Gonzalez, & Nolen-hoeksema, 2003) with depressive symptomatology and some measures of eating disorders have emotion items (found in Aldao et al., 2010). This item overlap may result in inflating the relationships between emotion regulation and psychopathology.

Many of these measures have been developed from prior theories such as the Emotion Regulation Questionnaire (ERQ; Gross, 1998) from the process model of emotion regulation and the Rumination Scale (Treynor et al., 2003) from response styles theory. Some were created through a mixture of theory and surrounding literature such as the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2001) drawn from cognitive literature and coping theories. Other questionnaires have been developed for therapeutic interventions, such as the Emotion Regulation Skills Questionnaire (ERSQ;Berking & Znoj, 2008). Some have also been designed using clinical experience, such as the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). While these are varied and valid approaches to measuring emotion regulation, there are none known to the author developed purely to measure emotion regulation without theoretical context, with the close exceptions of scales like the DERS designed to better understand psychopathological associations. This is not a criticism of existing scales but a new approach that has not been explored and may reduce potential overlaps between emotion and emotion regulation measures. An example of this could be, developing an emotion regulation strategy questionnaire through a variety of relevant contexts, such as in Chapter Five.

While the limitations of self-report measures require the careful construction and interpretation of emotion regulation scales, they are still useful, if used appropriately. Self-report measures are simply one tool that can be used to assess strategies alongside experimental, neural or therapeutic methodologies. While some strategies have been tested

in this manner, such as rumination and depression, many more remain untested (Aldao et al., 2010).

Many of these studies have used observational methods by instructing individuals to use a specific strategy in response to a mood induction and measuring expression, emotions, brain activity, thoughts or physiology (such as Gross, 1998 or Nolen-Hoeksema et al., 2008). These studies are valuable in contributing to the understanding of the short-term effects of emotion regulation. However, instructed emotion regulation tasks have a limited application to psychopathology. They do not question whether the tendency to use specific strategies is related to clinical diagnoses. Often, by necessity, these tasks are confined to several strategies at a time and vary in design making comparisons difficult (Aldao et al., 2010).

Self-report measures of emotion regulation remain the dominant methodology in the field and despite their limitations they provide useful insight into emotion regulation and its links with psychopathology. However, both observational and self-report methods often fail to capture the importance of contextually appropriate emotion regulation and its flexible (instead of habitual) application. This could be improved in future research through more use of experience sampling in the field of emotion regulation, whether through mobile applications (such as chapter six), diaries or another ecologically valid and longitudinal method.

1.6 Emotion Regulation: Experimental Design

The majority of research to date contrasts one or more specific emotion regulation strategies, often with a no-regulation control condition (Gross, 2015). The examination of 'purified' emotion regulation strategies is important for practical and theoretical reasons and has yielded many insights on the unique and overarching components and consequences of specific forms of emotion regulation. This broadly quantitative and laboratory based approach is likely to continue to provide valuable insights across a broader range of strategies.

Additionally, with the development of new experimental paradigms and new laboratory contexts, it is likely that this approach will also continue to provide a deeper understanding of known emotion regulation strategies.

However, as the literature gains a deeper understanding of these strategies in laboratory conditions other questions will and are already beginning to develop that are beyond the scope of these 'purified' experimental designs. One such question developed across a number of Gross' papers (Carthy, Horesh, Apter, Edge, & Gross, 2010; Samson, Hardan, Podell, Phillips, & Gross, 2015; Werner, Goldin, Ball, Heimberg, & Gross, 2011) is how a wide variety of emotion regulation strategies may combine. Gross and others found that community and clinical samples reported simultaneously using a number of different forms of emotion regulation. Little to no research has been progressed to understand what blend of strategies are the most effective for certain contexts.

But there is research and development on interventions that blend various emotion regulation strategies. Mindfulness interventions provide one example not directly linked to the emotion regulation literature, which blend several components including increased attentional deployment, cognitive reappraisal and decreasing suppression (Farb, Anderson, Irving, & Segal, 2014). Other examples explored later in this chapter include interventions developed from the emotion regulation literature, such as Emotion Regulation Therapy (Mennin, Fresco, Heimberg, & Ciesla, 2012) and Affect Regulation Training (Berking, Orth, Wupperman, Meier, & Caspar, 2008). Each of these interventions provides a blend of emotion regulation strategies deemed to be effective and adaptive and their success on clients provides valuable insight on how these strategies interact. This marks intervention based designs as the next most common experimental design for furthering the understanding of emotion regulation. For this design methodology to provide the most valuable information for the emotion regulation literature, it would be necessary to create more small and modular emotion regulation based

interventions to test how these strategies best blend together. Beyond furthering understanding, this could lay the foundations to considerably better designed therapies that can focus on particularly effective blends of strategies.

1.7 Emotion Regulation in Psychopathology

Gross suggests the use of antecedent strategies from the Process Model of Emotion Regulation, which this is moderated by the specific context to determine how adaptive emotion regulation strategies are (Gross, 1998). Gross & Jazaieri (2014) add that emotion dysregulation can either be due to failing to engage emotion regulation when it would be adaptive and emotion misregulation when a strategy is engaged, which is poorly suited to the situation.

An alternate approach in the field of psychopathology to define adaptability is assessing their relationships with other symptoms (e.g. depression). In particular, the "distress disorders" (David Watson, 2005), depression and anxiety, are widely viewed as the product of emotion regulation difficulties (Aldao et al., 2010). Also, theorists suggest that individuals unable to effectively manage their emotions, in tandem with daily life, will experience more severe and longer periods of distress. This puts these individuals at risk of developing clinical depression, anxiety or stress (such as Mennin, Holaway, Fresco, Moore, & Heimberg, 2007; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Similar associations have been found in other disorders such as alcohol abuse (Sher & Grekin, 2007) and models of eating disorders (Polivy & Herman, 2002). This suggests that individuals with ineffectively regulated emotions can turn to food or alcohol in an attempt to down regulate or avoid them. It is worth noting that emotion dysregulation may not be confined to failure to use appropriate strategies. For example, Gruber, Harvey, & Gross (2012) found that individuals suffering from bipolar disorder apply more 'adaptive' (e.g. reappraisal) emotion regulation strategies as well as more 'maladaptive' strategies (e.g. suppression) than healthy controls. They also report more conscious effortful

regulation despite reporting less success. To what extent this is due to failing to apply adaptive emotion regulation strategies regarding context or the intensity of the experience for bipolar patients, is not yet established. This suggests that defining emotion regulation strategies as adaptive or maladaptive requires a cluster of contextual cues and the individual's circumstances as well as just understanding the relationships between strategies and clinical criteria.

Difficulties in emotion regulation have been associated with almost all mental disorders included in the Diagnostic and Statistical Manual for Mental Disorders (DSM-5; APA 2013). For example, depression is one of the most prevalent disorders and considered to be the greatest health burden in the developed world (Mathers, Fat, & Boerma, 2008). Depressed individuals frequently report difficulties in identifying emotions (Rude & McCarthy, 2003), acceptance (Campbell-Sills, Barlow, Brown, & Hofmann, 2006), self-compassion (Gilbert, 2011) and modifying their emotions (Catanzaro & Mearns, 1999). Furthermore, depression has been associated with a greater use of catastrophising, rumination (repetitive thinking) and suppression (Garnefski, Kommer, et al., 2002). These positively associated strategies are thought to be generally ineffective methods to regulate negative emotions or in developing adaptive responses (Berking & Wupperman, 2012). In Joormann and Stanton's (2016) review they identify that depression is typically characterised by an increased use of rumination and less use of reappraisal. But rumination use appears to be a stable feature of depression risk, where reduced use of reappraisal is often only observed in individuals currently experiencing depression. The literature for both suppression, catastrophising and other strategies is much less clear cut and this could be a focus for future studies.

These findings suggest that emotion dysregulation has a negative impact on mental health. However, these results are largely cross-sectional and do not clarify if these deficits are the cause or effect of these disorders. Longitudinal research suggests that the use of generally

adaptive emotion regulation strategies can predict mental health and reduce the risk of depression (Kassel, Bornovalova, & Mehta, 2007). Other studies have also found that typically maladaptive strategies predict depressive symptoms (Aldao & Nolen-Hoeksema, 2012; Kraaij & Garnefski, 2012) suggesting that emotion dysregulation is a precursor to mental disorders.

Another methodology considering the causality between emotion regulation and mental health are lab studies that manipulate emotion regulation strategies and assess the interactions with depressive symptoms. These studies have shown that maladaptive responses to negative mood inductions impair recovery for those vulnerable to depression (Aldao et al., 2010). Also, individuals suffering from depression are more likely to use maladaptive strategies than healthy controls (Ehring, Tuschen-Caffier, Schnülle, Fischer, & Gross, 2010). In addition to this, there is evidence that depressed individuals engage in fewer adaptive strategies (Joormann & Stanton, 2016). This includes reappraisal (Gotlib & Joormann, 2010), acceptance (Ehring et al., 2010) and adaptive distraction (Lyubomirsky & Nolen-Hoeksema, 1993).

There is a plethora of research into emotion regulation deficits across anxiety disorders (Aldao & Nolen-Hoeksema, 2012; Berking & Wupperman, 2012). Berking, Orth, Wupperman, Meier and Caspar (2008) investigated a non-clinical sample and found that emotion regulation deficits reliably predicted subsequent anxiety over a two-week period. Additionally, Kassel et al. (2007) found that a participant's self-belief in their ability to cope with negative moods predicted reduced anxiety symptom severity over an 8-week period. Another non-clinical sample was able to predict anxiety symptom severity based on unsuccessful emotion regulation 7 months earlier (McLaughlin, Hatzenbuehler, Mennin, & Nolen-Hoeksema, 2011). This also suggests that emotion regulation strategy choices are relatively stable over time and can be an indication of vulnerability to mental health issues.

Research into generalised anxiety disorder has found deficits in emotional clarity, understanding of emotions, acceptance and emotion management (McLaughlin, Mennin, &

Farach, 2007; Turk, Heimberg, Luterek, Mennin, & Fresco, 2005). However, a study by Novick-Kline, Turk, Mennin, Hoyt, & Gallagher (2005) demonstrated that individuals with generalised anxiety disorder have significantly greater emotional awareness. To explain this effect, the researchers proposed that individuals with generalised anxiety disorder experience emotions with greater intensity and therefore are more likely to self-report being more aware of their emotions. Similarly, a study by Mennin, Heimberg, Turk, & Fresco (2005) found differences in how emotion regulation strategies influence the development of avoidance and worry. These included an impaired ability for individuals with generalised anxiety disorder to soothe themselves when experiencing negative emotions. Furthermore, individuals with anxiety demonstrated a greater endorsement of catastrophic beliefs regarding the consequences of emotions than a control group.

These findings were also supported by Suveg & Zeman (2004), who investigated the relationship between emotion regulation in children and the development of anxiety disorders. The study concluded that children with anxiety disorders have difficulty dealing with sadness, worries and anger. Furthermore, the researcher suggested that their limited strategies in managing emotions coupled with a lack of confidence in being able to manage those emotions, are potential factors for the development of anxiety disorders.

There is a broad range of evidence that emotion dysregulation is associated with a wide array of mental disorders and that those strategies contribute to the development and maintenance of those disorders. Such as post-traumatic stress disorder, where symptom severity has been associated with a lack of emotional clarity, acceptance, and adaptive emotion regulation strategies (Cloitre, Miranda, Stovall-McClough, & Han, 2005; Ehring & Quack, 2010; Tull, Barrett, McMillan, & Roemer, 2007). In eating disorders there has been found to be greater avoidance, difficulty with acceptance and managing unwanted emotions (Corstorphine, Mountford, Tomlinson, Waller, & Meyer, 2007). More severe eating disorder

symptoms were also associated with greater use of rumination and suppression (Aldao et al., 2010). Borderline personality disorder also has emotion dysregulation as a key aspect (Linehan, 1993). This can include a lack of emotional awareness (Leible & Snell, 2004), greater avoidance (Berking & Neacsiu, 2009), less success in reappraisal (Schulze et al., 2011) and less tolerance of distress (K L Gratz, Rosenthal, Tull, & Lejuez, 2006).

1.8 Factors of Emotion Regulation

There are a range of factors that contribute to emotion dysregulation (Gross & Jazaieri, 2014), also in addition to Gross' modal and process models a number of frameworks for understanding emotion regulation have been proposed (such as: Koole, 2009; Saarni, 1999; Shah, Friedman, & Kruglanski, 2002; Webb, Schweiger Gallo, Miles, Gollwitzer, & Sheeran, 2012). From these theories, the three most influential factors in emotion dysregulation are awareness, goals and strategies.

Awareness of the emotion and the relevant aspects of its context is helpful for engaging adaptive responses. But both Berking, Orth, et al. (2008) and Gross & Jazaieri (2014) observe that more awareness is not always better. One example of hyper-awareness becoming maladaptive is in panic disorder. Panic disorder is the recurrent experience of unexpected panic attacks, which are followed by at least one month of persistent concern and worries about future attacks provoking significant changes in behaviour (American Psychiatric Association, 2013). Panic attacks are often characterised as a 'faulty alarm system' where the individual is hyperaware of physiological changes and appraises them catastrophically. Also, many individuals suffering from eating disorders demonstrate low levels of emotional awareness and consequently find it more difficult to engage deliberate and adaptive emotion regulation strategies (Corcos et al., 2000).

Emotion regulation goals are the outcomes the individual is seeking to achieve regarding the specific emotion. Healthy individuals will typically weigh the short-term and

long-term consequences when weighing up different approaches. Failure to balance these concerns may result in problematic emotion regulation goals (Gross & Jazaieri, 2014). One example of dysfunctional emotion regulation goals are found in manic states of bipolar disorder, where individuals tend to report feeling euphoric and usually disinterested in downregulating their emotional state despite potential consequences (Gruber, Eidelman, Johnson, Smith, & Harvey, 2011). However, it is not clear whether this failure to downregulate is due to failing to conceive of the consequences or a failure to properly weigh up these consequences. But there is some evidence to suggest that the more manic an individual is the less weight they give to the adverse and long term consequences of their goals (Meyer, Johnson, & Winters, 2001).

The third factor in emotion regulation are the emotion regulation strategies applied by the individual to achieve their goal. This can be further separated into two aspects, strategy selection and strategy implementation. There are a range of decisions to weigh up when selecting an appropriate strategy for a specific context. One is the strategy's overall effectiveness, as there is a great deal of evidence suggesting that some strategies are more effective than others (for a meta-analysis see: Webb, Miles, & Sheeran, 2012). Another aspect is the availability of resources to engage the strategy, as it is now well understood that different strategies may require different amounts of resource (such as cognitive demands or external opportunity). Therefore, even if a strategy is very effective it may not be available. For example, Sheppes, Scheibe, Suri, & Gross (2011) found that in a community sample participants would choose to engage cognitive reappraisal in low-intensity emotional tasks and distraction in high intensity tasks. Therefore, if healthy emotion regulation selection requires an awareness of the efficacy of different strategies and an accurate assessment of the resources available, it follows that emotion dysregulation could be due to difficulties in weighing up one or more of these steps (Gross & Jazaieri, 2014).

Once a strategy has been selected as appropriate, an amount of confidence and skill is still required to implement it. If either of these are absent, then the strategy is likely to be ineffective. The two main components of emotion regulation strategy implementation are goal flexibility, where the emotion regulation goal may need to be adjusted as the situation develops, and goal shielding, which refers to prioritising the goal from competing goals. The inattentive/disorganised subtype of ADHD includes being easily distracted, poor concentration, forgetfulness and a lack of attention to detail (American Psychiatric Association, 2013). Given the nature of this issue it follows that an individual with ADHD may have difficulties in implementing emotion regulation strategies due to difficulties in goal shielding (Mullin & Hinshaw, 2007).

1.9 Emotion regulation strategies

Whilst different disorders can display contrasting symptoms, there are several key strategies or deficits that appear across many disorders, such as rumination, suppression and catastrophising. Also, typically adaptive strategies are often marked by their absence, such as reappraisal. Recent research suggests that the grouping of these strategies into maladaptive and adaptive is overly simplistic and that the strategy is not only dependent on the context but also on the flexibility of its use (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; Mennin & Fresco, 2011). Although, it has also been found that despite context, some strategies, such as suppression, involve more cognitive load and physiological arousal, making regulation less effective or more draining (Gross & John, 2003).

1.10 Catastrophising

Catastrophising is one of the main focuses of this thesis. First defined by Ellis (1962) as focusing on how terrible a situation appears to be. This concept was later refined for depression and anxiety by Beck, Rush, Shaw, & Emery (1979), also known as magnification, as

dwelling on the worst perceived possible outcome of a situation. Unlike the other prolifically researched emotion regulation strategies discussed after this section, catastrophising has received most attention within the pain literature and little attention elsewhere. In regard to pain, catastrophising is defined as a negative exaggerated emotional and cognitive schema arising during anticipation or actual pain stimulation (Quartana, Campbell, & Edwards, 2009). In pain literature, catastrophising has been associated with lower self-efficacy (Sullivan et al., 2001), increased pain sensitivity (Edwards, Bingham, Bathon, & Haythornthwaite, 2006), depression (Quartana et al., 2009) and suicide ideation (Edwards, Smith, Kudel, & Haythornwaite, 2006).

Outside of research in pain, there are studies into catastrophising as a key symptom in panic disorder. In panic disorder, catastrophising is defined as misinterpretations of ambiguous mental events and physiological sensations, which maintain the disorder (Fentz et al., 2013). While these various definitions are highly context specific, the common theme is a belief driven magnification of emotion sensation during the appraisal step of the process model of emotion regulation. In this context, catastrophising has been associated with anxious arousal (Casey, Oei, Newcombe, & Kenardy, 2004), lower panic self-efficacy (Fentz et al., 2013), and increased risk of anxiety in panic disordered individuals as well as in healthy controls (Berger, Fraser, Carbone, & Mcgorry, 2006). Additionally, when catastrophising is treated directly, reductions are associated with greater therapeutic gains in Cognitive Behavioural Therapy (CBT; Clark, 1999).

In anxiety and depression, there is much less research directly into catastrophising, despite being the origin of the modern definition. In CBT, catastrophising is tackled very broadly as one of many maladaptive strategies to be questioned and replaced with more helpful reappraisals (Beck et al., 1979). In this area much research on catastrophising, outside of the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven,

2001), occurred in the early 2000's as a cognitive error, rather than as an emotion regulation strategy. Studies have associated catastrophising with depression and anxiety (Garnefski, Kommer, et al., 2002; Garnefski & Kraaij, 2006). One study by Martin & Dahlen (2005) uses a multiple regression on cross-sectional data and found catastrophising to be a significant predictor of depression, anxiety and trait anger but not stress. However, there are no studies known to the author that test catastrophising as a predictor of depression, anxiety and stress over time in adults.

In children, catastrophising has been shown to be predictive of depression over a six week period (Abela, 2001). This has also been replicated in adolescents over a 10 week period (Abela & Sarin, 2002). Similar relationships between catastrophising and anxiety have been found in children, where catastrophising was the strongest predictor of a range of measures of anxiety (Weems, Berman, Silverman, & Saavedra, 2001). Catastrophising was also found to be more prevalent in younger children (less than 12 years). Further research has also shown catastrophising to be associated with sleep disturbances (Hiller, Lovato, Gradisar, Oliver, & Slater, 2014).

1.11 Rumination

Another common transdiagnostic response to negative affect is rumination, which is defined by constantly recurring thoughts, often with no new progress. In depression, this frequently means repetitive negativity, self-deprecating statements as well as pessimistic beliefs about the future (Joormann & Siemer, 2014). In response styles theory (Nolen-Hoeksema, 1991), which was originally created to explain the role of rumination in depression, rumination is a style of thought with passive attention to depressive thoughts and their implications. This is predicted to be causally implicated in both the onset and maintenance of depression. Many studies have shown that rumination can prolong and increase negative mood (see meta-analysis Nolen-Hoeksema et al., 2008). Rumination has also been shown to

be a predictor of future depression (Nolen-Hoeksema, 2000). In experimental settings, rumination is often contrasted with distraction, which has demonstrated that rumination comparatively: increases negative cognitions; sustains negative mood; decreases problem solving strategies and overgeneralises autobiographical memory (Watkins & Moulds, 2005). In anxiety, ruminative thinking in worry has been defined as chains of negative thoughts and images, which are very hard to control. These represent an attempt at problem solving an uncertain but potentially negative outcome (Borkovec, Robinson, Pruzinsky, & DePree, 1983). This form of ruminative thinking is concerned with future potential threats and its definition is less precise as it extends to include catastrophising, uncertainties and risks (Watkins, 2008). Although, the literature is quite consistent in almost equating worry and rumination, it may be better defined as the potential combination of several emotion regulation strategies including rumination and catastrophising.

Recent research has shown that individuals with bipolar disorder ruminate strongly about negative emotion, with some studies suggesting a greater prevalence than in unipolar depression (Kim, Yu, Lee, & Kim, 2012). A potential explanation of this effect was that rumination in bipolar patients may not be a strategy but instead a consequence of ineffective thought control. Bipolar has also been associated with positive rumination, dwelling on the content, consequences and causes of positive emotions (Feldman, Joorman, & Johnson, 2008). This appears to be a specific risk factor for bipolar disorder, where some findings show that individuals with depression or bipolar both ruminate in response to negative affect but only bipolar individuals ruminated to positive affect (Johnson, McKenzie, & McMurrich, 2008). Gruber, Eidelman, Johnson, Smith, and Harvey (2011) compared bipolar individuals not experiencing episodes of mania or depression with healthy controls, where healthy controls reported significantly less rumination for both positive and negative emotion. This suggests that rumination may not simply be a result of the presence of a manic or depressive state or a symptom or ineffective thought control.

Whilst rumination may appear to be a counter intuitive way to deal with negative emotion, findings have shown that depressed individuals tend to believe it can increase self-awareness and understanding (Papageorgiou & Wells, 2001). However, this belief could be a false impression that motivates individuals to apply it, even when it is maladaptive. But, Lyubomirsky & Nolen-Hoeksema (1993) reported that sub-clinically depressed participants associated rumination with enhanced insightfulness. Later additions to response styles theory have also proposed two subcomponents to rumination, brooding (typically maladaptive rumination) and reflective pondering (looking inward to problem solve) (Treynor et al., 2003). This suggests that even one of the most depression associated strategies can be adaptive if used appropriately. When looking at depression and anxiety Watkins (2008) further proposes that the potential for constructive consequences from rumination may have some foundation. In his review, Watkins found that rumination has been implicated in: successful cognitive processing and recovery from upsetting and traumatic events; adaptive planning and preparation for the future; recovery from depression and uptake of pro-health behaviours. Rather than challenging current literature, these findings further support the principle that almost all emotion regulation strategies can be adaptive if used flexibly and in the correct context.

1.12 Suppression

This strategy has long been regarded as almost entirely maladaptive. Suppression is defined as the attempt to inhibit the effects of external cues on internal (e.g. thoughts; known as emotion suppression) and external states (e.g. facial expressions; known as expressive suppression) (Joormann & Siemer, 2014). Emotion suppression has been found to increase negative emotions, depressive symptoms and decrease inhibitory control (Gotlib & Joormann, 2010). Research in clinically depressed or anxious individuals found that in response to a mood induction both groups reported greater use of emotion suppression than controls. This was

also related to greater levels of negative affect as well as increased heart rate (Campbell-Sills et al., 2006). This study tasked participants with a mood induction followed by instructed suppression or acceptance, which found that the suppression condition took longer to recover their mood. This suggests that suppression also interferes with emotion recovery following its use and after the aversive stimulus has ended. This is predicted by the process model of emotion regulation, that response strategies are more effortful and draining than antecedent strategies. A study into clinically anxious individuals using carbon dioxide enriched air to provoke panic symptoms also found that emotion suppression did not reduce distress (Levitt, Brown, Orsillo, & Barlow, 2004). Scores of suppression on the White Bear Suppression Inventory (Wegner & Zanakos, 1994) were able to predict scores of depression over 7 weeks in healthy participants (Meyer & Beevers, 2004) and over 10 weeks in another sample of healthy participants (Luxton & Wenzlaff, 2003). Furthermore, Matheson & Anisman (2003) were able to predict self-reported depression scores across 6 months in healthy individuals.

Studies in healthy subjects suggest that expressive suppression does reduce expressive behaviour but simultaneously increases arousal in the sympathetic nervous system, while failing to reduce emotion intensity (Gross & Levenson, 1993). Liverant, Brown, Barlow and Roemer (2008) also found that expressive suppression reduced acute emotion responses for depressed participants. Studies looking into brain function have also found that expressive suppression increases activation of emotion implicated brain regions (Goldin, McRae, Ramel, & Gross, 2008). In bipolar disorder, one study suggests that bipolar individuals spontaneously use more expressive suppression than healthy controls in response to both negative and positive inductions (Gruber, Harvey, & Gross, 2012)

From the perspective of the process model of emotion regulation, both rumination and suppression are response focused strategies and therefore are more demanding and less effective than antecedent focused strategies (Gross, 2014). However, the adaptiveness of

either strategy is still subject to its appropriate use. Use of emotion suppression following exposure to traumatic scenes was found to reduce reported distress and later intrusive thoughts (Dunn, Billotti, Murphy, & Dalgleish, 2009).

1.13 Reappraisal

Cognitive reappraisal is the third point of the process model of emotion regulation and the last point of intervention before full emotion generation. It entails thinking about stimuli in a different way that changes the emotion or its intensity. This strategy is often only considered in flexible and adaptive ways, focusing on appropriately reducing negative emotion (e.g. Campbell-Sills, Ellard, & Barlow, 2014; Garnefski & Kraaij, 2007; Gross, 2002; Joormann & Siemer, 2014). This direction within the literature has shaped a great deal of the subsequent research. Reappraisal has been associated with a wide array of benefits such as reduced intensity of emotion experience (Gross, 1998), reduced startle response (Jackson, Malmstadt, Larson, & Davidson, 2000), greater parasympathetic tone (Aldao & Mennin, 2012), reduced avoidance (Wolgast, Lundh, & Viborg, 2011) and neuroimaging suggests reduced activation in emotion centres (e.g. the amygdala, Ochsner et al., 2009).

In depressive disorders the tendency to interpret situations negatively is very strong. Therefore, altering those interpretations is a very powerful method to regulate emotion in depression (Joormann & Siemer, 2014). Research in depression has linked less frequent use of reappraisal to increased depressive symptoms (Garnefski & Kraaij, 2006; Gotlib & Joormann, 2010). Furthermore, reduced use of reappraisal was found in a sample diagnosed with depression and anxiety (Garnefski, Legerstee, Kraaij, Van Den Kommer, & Teerds, 2002). Most designs investigating reappraisal have been cross-sectional, making it difficult to establish whether its absence is a risk factor or a symptom.

Specifically in anxiety disorders, reappraisal has been found to reduce emotion intensity (Aldao & Mennin, 2012) as well in a subclinical anxious sample (Campbell-sills et al.,

2011). Although research in the area is limited, bipolar individuals used reappraisal more than healthy controls in response to both positive, negative and neutral emotion (Gruber et al., 2012). However, in bipolar individuals this may be a result of emotion regulation requiring more conscious effort.

However, inflexible use of reappraisal is not beneficial in all contexts. Nezlek & Kuppens (2008) investigated emotions and emotion regulation daily. They found a positive relationship between reappraisal, positive mood and self-esteem, but no relationship between reappraisal and decreasing negative emotion and related negative affect. A meta-analysis by Aldao and Nolen-Hoeksema (2012) found that while reappraisal is negatively associated with anxious and depressive symptoms, it is also much less consistent than other strategies such as rumination and suppression. This potentially suggests its use by depressed and anxious individuals is not flexible and adaptive use is hard to capture in self-report questionnaires.

1.14 Therapeutic Approaches to Emotion Regulation

As recent research shows, emotion regulation has strong links with psychopathology, and therefore has potential as an explicit therapeutic target. While therapies that target emotion regulation have existed for a long time, these are not explicitly emotion regulation therapies and are not informed by emotion regulation research (such as Cognitive Behavioural Therapy (CBT) and Dialectical Behaviour Therapy (DBT)). It has been suggested that in classical treatments such as CBT, emotion regulation is a central mechanism of change (Campbell-Sills, Laura Barlow, 2007). However, many of these treatments are mostly focused on improving the implementation and selection aspects of emotion regulation. They do not actively build on all of the factors involved in emotion regulation and intervene at all relevant points in emotion

generation and regulation (Sheppes, Suri, & Gross, 2015). However, one example of a classical therapy taking a step congruent with an emotion regulation perspective is in attentional bias modification treatment (Grafton & MacLeod, 2014). For this intervention clients with anxiety disorders complete a general computerised training protocol to modify their attentional biases to threat. This specifically targets the attention stage of the modal model and modifies the factors underlying emotion regulation by reducing the overrepresentation of threatening information.

Two therapies developed from emotion regulation literature will be discussed in this chapter due to their relevance to this thesis. The first of these therapies is Affect Regulation Training (ART, Berking & Whitley, 2014), whose components are investigated in chapter two. The second is Emotion Regulation Therapy (ERT, Mennin & Fresco, 2014) as this draws from emotion regulation research to add directly to CBT packages. Its specific target of depression and anxiety comorbidity provides a great deal of overlap with the traits analysed by this thesis. In comparison to cross-sectional and standard longitudinal studies, therapeutic approaches assert practicable models and clinical insight that aid further understanding.

1.15 Affect Regulation Training (ART)

ART is a model of emotion regulation that was developed primarily by Matthias Berking through a synthesis of emotion regulation theories (e.g. Connor-smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000; Gottman & Declaire, 1997; Grawe, 2004; Gross, 1998; Larsen, 2000; Lazarus, 1991; Leahy, 2002; Saarni, 1999), as well as studies with findings between emotion regulation and psychopathology (such as Berking & Wupperman, 2012; Berking et al., 2012) and clinical experience. ART was inspired by Klaus Grawe's (2006) translational ideas in the development of mental health disorders. He picked up on the absence of transdiagnostic treatments focusing on improving emotion regulation strategies when ART was being developed in 2004. This training has gradually increased in popularity in

the German speaking parts of Europe, where it is known as *Training Emotionaler Kompetenzen* (TEK; Berking, 2010).

At the core of ART is the model of adaptive affect regulation (Figure 1.3). This model is comprised of a number of key strategies that are the targets of ART. However, each of these ART categories are best understood as categories that contain a variety of strategies rather than as individual strategies in their own right. These strategies are: awareness (*the conscious ability to be aware of and perceive emotional states); identifying and labelling (The ability to identify and correctly label affective states); understanding (the ability to identify relevant maintaining factors for current affective states); modification (the ability to modify affective states actively); acceptance and tolerance (the ability to accept and tolerate negative affective states when necessary); self-compassion (the ability to support oneself compassionately in distressing situations); and readiness to confront (the ability to put the previous strategies together as required to achieve personal goals) (Berking & Schwarz, 2014).*

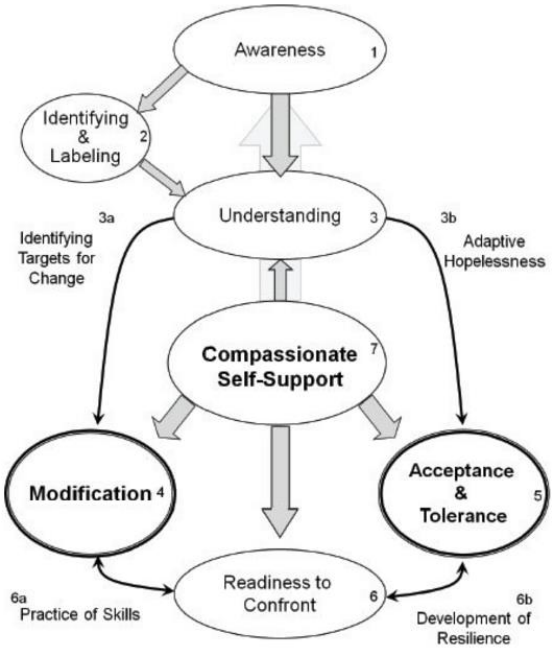

Figure 1.3 The ART model of adaptive affect regulation. Reprinted from "Affect Regulation Training" by Matthias Berking & Jeanine Schwarz, *2014*, *Handbook of Emotion Regulation Second Edition*, p. 532. Copyright 2014 by the Guildford Press.

In addition to these strategies, their interactions and the assumptions behind them, the ART model posits that only modification and tolerance/acceptance strategies are ultimately relevant to mental health. The other strategies in the model are relevant to the extent that they facilitate these core strategies. This was in part based upon research on rumination (such as Morrow & Nolen-Hoeksema, 1990) and clinical observation on the behalf of Matthias Berking and colleagues. Through clinical observation they saw many individuals were able to perceive their emotion states, analyse them and work to explain them but without achieving any benefit from these activities. Berking & Schwarz (2014) also found evidence suggesting that excessive use of these non-core strategies is partly responsible for the maintenance of disorders. This was thought to be due to higher awareness and understanding alongside a lack of self-compassion or resilience making the situation less tolerable than just a lack of awareness. This correlates with other work discussed earlier, where participants found rumination gave them a deeper insight but that insight had not helped regulate their emotions.

The ART model is behind the ART program, which is an integration of principles and interventions from a selection of psychotherapeutic approaches to develop general emotion regulation strategies (Berking & Schwarz, 2014). This is targeted at individuals likely to benefit from being taught more adaptive regulation strategies. The first part of the programme is an educational introduction to emotions, their evolutionary background, purposes, risks and benefits as well as some of the mechanisms behind emotion processing. This leads to seven strategies that are initially practiced in a long version and then used in very short periods (3 minutes to 3 seconds). These initial strategies are: muscle relaxation; breathing relaxation; non-judgemental awareness; acceptance and tolerance; compassionate self-support; analysing emotions and modifying emotions. Once practiced, the strategies are then linked together in the order specified above. This is practiced daily for about 20-30 minutes along with three short exercises (less than 3 minutes each) over the six-week period. In order to support this

behaviour, participants are given hand-outs, worksheets, guided audio files and prompting text messages.

Although research into the effectiveness of ART is still in its early stages, due to its recent development, several studies in a variety of contexts have shown promising results. One of these studies by Berking, Wupperman, et al. (2008) tested 289 patients from a mental health hospital in Germany with no diagnostic specificity. All patients received 6 weeks of CBT combined with additional multidisciplinary treatment as required. From this group, patients were randomly selected to switch four sessions of CBT per week for an abbreviated version of ART over a 3-week period. After six weeks of treatment, individuals who had taken part in ART displayed significantly larger improvement of emotion regulation strategies than the CBT only group. Secondly, these participants also demonstrated a significant decrease in depressive symptoms and negative affect as well as a marked increase in positive affect.

Another study by Berking, Ebert, Cuijpers, & Hofmann (2013) undertook a randomised control trial with a sample of 432 inpatients diagnosed with major depressive disorder (MDD). Again, the participants were randomly divided into two groups. One group received routine multicomponent CBT, which also worked to target comorbid secondary disorders. In MDD, participants received a minimum of one 45-minute session of individual therapy and four 45 minute sessions of group psychotherapy per week. The second group received a combination of the CBT program with ART, which was modified due to organisational constraints to four 1.5 hour sessions. This study found significant improvements when CBT was combined with ART. Additionally, other gains were found in acceptance and tolerance, compassionate self-support and modification. A non-clinical study was also carried out by Berking, Meier, & Wupperman (2010) on a sample of 31 volunteers from a group of 350 informed about the treatment. Prior to receiving ART, their emotion regulation strategies were found to be significantly lower than that of a control group. However, after the programme no difference remained in emotion

regulation strategies between groups. Some of the core elements of this model are explored further in Chapter Two, which challenges the assumption that all the foundation strategies have little clinical relevance.

1.16 Emotion Regulation Therapy (ERT)

ERT was developed by Douglas Mennin, David Fresco and colleagues to tackle an increasing subgroup of individuals with high comorbidity, specifically generalised anxiety disorder (GAD) and depression who failed to make previous treatment improvements. This was based on findings such as Borkovec & Ruscio (2001) who found that only 50-60% of clients treated for GAD demonstrated clinically significant change. Similarly, a meta-analysis by Cuijpers, van Straten, Andersson, & van Oppen (2008) found that although depression treatment was effective, it only achieved a small effect size. Corroborating the assumptions behind the development of this emotion regulation focused treatment Newman, Przeworski, Fisher, & Borkovec (2010) found that individuals with comorbid GAD and depression did not gain durable treatment effects. Similar results were also found in antidepressant treatment outcomes where depression with comorbid anxiety proved to be the most treatment resistant (Farabaugh, Bitran, & Witte, 2010).

Mennin and Fresco proposed that there is a commonality between these disorders, in that they both reflect heightened emotional experience (to a greater extent than other conditions) such as emotionality, emotion intensity or neuroticism (such as Mennin et al., 2005, 2007). Further evidence for this has been found in factor-analytic studies demonstrating that both disorders share a higher order factor for prolonged negative affect (Krueger & Markon, 2006; David Watson, 2005). Also, both depression and GAD share inherited factors relating to accentuated emotionality (Kendler, Gardner, Gatz, & Pedersen, 2006). These factors have also been linked to treatment resistance in otherwise effective therapies (Olatunji, Cisler, & Tolin, 2010).

Motivation dysfunction is also proposed to be present in the distress disorders where individuals may undergo frequent conflicting pulls from safety-threat systems and reward systems (Dollard & Miller, 1950). Unlike healthy individuals, they are significantly less effective at resolving these conflicts in motivation. ERT draws upon Aupperle & Paulus' (2010) model of motivation balancing where individuals with anxiety and mood disorders struggle to resolve conflicting motivations. This is due to a series of potential deficits: an over-representation of safety-threat evaluation; an under or over-representation of approach evaluations and insufficient arbitration of avoidance or approach strategies.

Another common factor between the two distress disorders is rumination as a means of coping with highly emotional experiences (Watkins, 2008). For example, excessive worry is an emotion regulation strategy attempting to reduce distress (Borkovec, Alcaine, & Behar, 2004). This is a similar process to depressive rumination, which is an enduring cognitive process, often focused upon past failures and negative self-beliefs (Watkins, 2008). Both processes (worry and rumination) are enduring and applied to escape or dampen emotionality. This often undermines constructive behavioural action and can cause individuals to lose out on personal growth and life fulfilling events. A profile of these 'distress disordered' individuals develops who have an excessive reliance upon these emotion regulation strategies. The strategies are focused upon avoiding or escaping potentially distressing situations in conjunction with weakened contextual learning repertoires. These three factors and their therapeutic targets are represented in Figure 3 below:

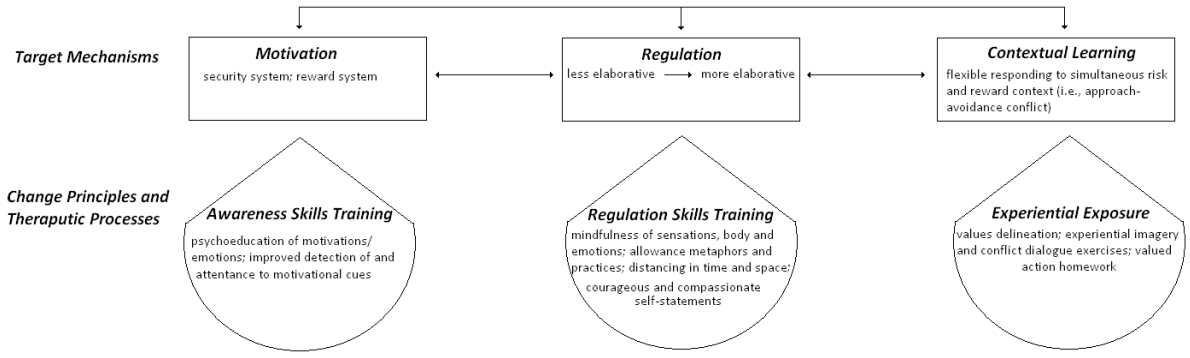

Figure 1.4 The Conceptual model of target mechanisms, change principles, and therapeutic processes in emotion regulation therapy. Reprinted from "Emotion Regulation Therapy" by Douglas S. Mennin & David M. Fresco, *2014*, *Handbook of Emotion Regulation Second Edition*, p. 532. Copyright 2014 by the Guildford Press.

ERT was also designed to integrate CBT principles and techniques alongside emotion regulation focused interventions based upon findings from the emotion regulation literature. Therefore, Mennin & Fresco (2014) define ERT as a theoretically derived and evidence based treatment expanding from a CBT foundation through targeting of mechanisms common to the distress disorders (such as perseverative thought, motivational emotional activation resulting in narrowing learning repertoires). These simultaneously aim to normalise emotion generation and regulation strategies. This brief overview of ERT will focus on aspects of the therapy that are drawn from emotion regulation literature and focused on emotion regulation. Other aspects that this therapy draws upon highly (such as experiential exposure from CBT) will not be mentioned.

The first component unique to ERT is motivational awareness strategies training (Mennin & Fresco, 2014), which is designed to develop accurate and rapid detection of cues signalling motivational pulls. Previous studies have also found clear benefits linked to emotional and behavioural clarity (for a meta-analysis see: Lanaj, Chang, & Johnson, 2012). This treatment begins with psychoeducation to increase understanding of motivations and underlying emotions in the personally relevant context of the individual. Included within this education is a rationale for the benefits of observing emotions with greater clarity. An example of this given to clients is a musical orchestra, where the music represents the motivational pulls in their lives. In an ideal situation, the music is synchronised and harmonious. In this way, the clients are encouraged to attend to each part of the orchestra such that they can discern each part and its role in the overall composition. Clients then later

expand on this with the therapist to help them view the situation from various motivational stances (such as approach or avoidance) with the aim that life comprises of different motivations. This results in an understanding that different responses are possible depending on motivations and emotions.

Following this, clients undergo training to improve rapidity and accuracy of cue detection in everyday life. This is based upon earlier work by Linehan (1993), where clients are taught to increase their self-awareness of life situations to identify antecedents with greater accuracy, feelings, thoughts and behaviours that result from them. This is part of a process to bring dysfunctional automatic emotion regulation strategies into conscious awareness where responses can be better interpreted and regulated. This understanding is built through use of a snowball metaphor with clients (Mennin & Fresco, 2014) where a pure emotional experience is imagined as a pristine snowball rolling down a hill. As it descends it picks up dirt and twigs, becoming harder and icy (representing the unfolding of emotional experience). This informs the client of a temporal view of emotion regulation and how much less effort is necessary to handle emotions closer to their onset. The final stage of this process is the encouragement of clients to practice self-monitoring in the form of Catch Yourself Reacting (CYR). This begins as a process to identify antecedents of emotions and the emotions themselves, initially completed with the therapist and then encouraged to be done at home.

The next component unique to ERT is regulatory skills training, which is based on Gross' Process Model of Emotion Regulation and related clinical as well as experimental literature. ERT applies several CBT intervention processes that tackle unfolding emotional experience from different time points. These four elaborative skills are: attending (focus, sustain and adaptably shift attention); allowance (the ability to openly experience and allow emotional experience); distancing (the ability to observe, identify and create psychological

perspectives from inner experiences) and reframing (an ability to alter an evaluation of an event to manipulate its emotional intensity).

Although ERT is a new therapy there are preliminary results of its efficacy, namely an open trial (n=19; Mennin & Fresco, 2011) and a RCT (n=60; Mennin, Fresco, Heimberg, & Ciesla, 2012). In both trials, participants reported high levels of satisfaction and encountered low levels of attrition during the treatment. This is represented in 18 of the 19-open trial and 26 of 30 RCT participants completing the treatment. The open trial found, from both clinician and client reports, reductions in measures of GAD, worry, trait depressed and trait anxious symptoms. This mirrored self-reported improvements in quality of life with a large effect size. These gains were still maintained 9 months following treatment.

The RCT study sought to compare ERT with a modified attention control condition, which comprised of clients periodically speaking through telephone calls to a clinician that provided supportive listening. ERT clients experienced significantly less GAD severity, worry, trait depression and trait anxiety symptoms. This also corresponded with self-reported improvements in functionality and quality of life with effect sizes ranging from medium to large. These gains remained in effect when tested 9 months following treatment.

Finally, a subgroup of clients with GAD and comorbid depression (n=30) were treated where both clinician and self-report found significant reductions in GAD severity, worry, rumination, anhedonia, trait depression and anxiety. In addition, significant improvements in functionality and quality of life, were comparable to the findings of the overall two trials. This would suggest that the comorbidity of depression did not interfere with treatment efficacy. However, there have not been studies to test this therapy outside of its nuanced target population and it is possible that some of these strategies may be successful in other contexts.

1.17 Conclusion

The field of emotion regulation is still relatively new and rapidly expanding (Gross, 2014). This contributes to a very diverse literature and many unresolved competing theories and models. This brief review was designed to provide a general overview of the dominant themes relevant to this thesis as well as emotion regulation research from a psychopathological perspective. Emotion regulation is at the early stages of application to therapeutic intervention, with some examples already drawing strongly from existing literature, which are performing well. However, it has also been demonstrated that there is much work left to be done to better understand specific strategies and their transdiagnostic relationships with mental health, most notably catastrophising. In an environment where case complexity and comorbidity have strong impacts on treatment success rates (Weisz et al. 2013), new and transdiagnostic measures may provide some of the necessary solutions.

1.18 Overview of Thesis content

This thesis is comprised of seven chapters and five studies. The first study (Chapter Two) is a questionnaire battery that assesses a community population with a series of emotion regulation questionnaires to cover a broad array of emotion regulation strategies. These include Berking's (2008) key components and cognitive emotion regulation strategies. These are then compared with indicators for depression, anxiety, stress and hypomania. These associations are then used to build profiles for each mental health indicator to bring out the emotion regulation strategies that best predict that indicator while controlling for the other indicators.

Study two (Chapter Three) is the development of a State-Trait Emotion Regulation Questionnaire for both positive and negative affect. This questionnaire was developed from a

wide variety of existing measures to create a broader and less theoretically designed (more ecologically valid) questionnaire. The purpose was to create a questionnaire that could better experimentally measure emotion regulation and be comparable in any context. However, the questionnaire did not validate, potentially due to its ambitious scope.

Study three (Chapter Four) built upon strong associations found in Chapter Two between catastrophising and mental health indicators. This lab based study induced catastrophising in one group of individuals and compared mood changes with a control group. This study found significant differences between groups, where catastrophisers demonstrated higher negative and lower positive mood. This suggests that catastrophising has a causal role in mood change

Study four (Chapter Five) creates a new measure of catastrophising. This was designed as existing non-vignette measures are only two or four item subscales and this was limiting the conclusions and potential understanding that could be drawn from investigating catastrophising. The items were generated by participants and the questionnaire successfully formed a two-factor model and validated.

Study five (Chapter Six) builds on many of the previous studies to develop a mobile app based catastrophising intervention (and mirror control condition) within a community population. This would serve as an alternative test for the causal relationship between catastrophising and mood suggested in Chapter Three. This would also test the potential value of using catastrophising as a clinical target. The experiment found that individuals on the catastrophising app demonstrated lower levels of catastrophising, lower negative mood and higher positive mood compared to controls.

Chapter Two: Profiling Emotion Regulation Strategies Against Mental Health Indicators

2.1 Introduction

Examining the associations between emotion regulation strategies and mental health are a central theme of this thesis. This study aims to provide an overview of a wide variety of strategies and mental health related continuum indicators in adolescents (in the present study: depression, anxiety, stress and hypomania). While the majority of the existing emotion regulation literature has used correlation techniques across a range of questionnaire measures to identify these relationships; this study aims to take one step further and create emotion regulation profiles, which predict specific mental health indicators. The range of emotion regulation strategies and questionnaire measures in this area makes any fully inclusive test impractical (see Chapter Three for a more exhaustive list of adolescent applicable measures). Therefore, pre-existing measures must be selected from the literature for their potential relevance to these profiles. To accumulate a breadth of relevant strategies and not impose too great a burden on the participant, questionnaires will be selected not just by reliability but also by the number of subscales. The potential pool of questionnaires was also greatly reduced due to requiring previous testing on an adolescent population.

Many emotion regulation questionnaires tend to focus on several strategies, the most notable being the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), which has been cited 3012 times (according to Google Scholar, September 2015). The ERQ uses reappraisal and expressive suppression as classic examples of generally adaptive and maladaptive strategies. Gross & John (2003) found associations with positive mood (reappraisal r=.42; suppression r=-.33) and negative mood (reappraisal r=-.51; suppression r=.39). Associations were also found with depression (Beck Depression Inventory, BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) for reappraisal (r=-.23) and suppression (r=.25).

While this questionnaire's dominance in the literature would suggest its inclusion, its two strategy specialisation limits its use. Additionally, these strategies are included in broader questionnaires. Applying this approach more widely reduces the questionnaire selection pool considerably, such as the Rumination Scale (Nolen-Hoeksema, 2003) or the Mindful Attention Awareness Scale (Brown & Ryan, 2003).

One such questionnaire also prevalent in the literature, and selected for the present study, is the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2001). This assesses nine cognitive emotion regulation strategies and was found to have strong relationships with depression (e.g. self-blame r=.31 & rumination r=.44) and anxiety (e.g. self-blame r=.23 & rumination r=.44). One unusual finding by the original validation does not explain the negative correlation found in both depression and anxiety with catastrophising (depression r=-.21; anxiety r=-.10) once the other eight strategies had been partialled out (unpartialled depression r=.35; anxiety r=.26). This would suggest that catastrophising is generally adaptive on its own, which may be a misleading conclusion. When the authors partialled out the other strategies, rumination as defined by the CERQ (also measured by the CERQ defined by how often thoughts go round and round in your head) covers a cyclical element that is also present in catastrophising. Although, catastrophising is closer to a spiral due to the emphasis on magnification than the cyclical nature of rumination. The result appears to be that by controlling for rumination, catastrophising, as measured by the CERQ, lost a core component. A later study comparing the CERQ between control and clinically depressed and anxious participants found that the clinical population reported to be significantly more likely to catastrophise, ruminate and self-blame (Garnefski, Legerstee, Kraaij, Van Den Kommer, & Teerds, 2002). This study also reported unexpected results for their acceptance subscale, where clinically depressed and anxious participants reported using it significantly more. This has led to a change in the interpretation of the acceptance subscale

as capturing acceptance's maladaptive as well as adaptive aspects (Garnefski et al., 2002), potentially explaining the frequent null results in community correlations.

Although, little research has considered CERQ emotion regulation strategies in bipolar or hypomanic mood, a few have used the Hypomanic Personality scale (HPS; Eckblad & Chapman, 1986). For example, Green et al. (2011) found that only rumination predicted hypomanic personality traits in type I bipolar and only catastrophising predicted hypomanic traits in unaffected relatives, with no significant results in a control population, except for a non-significant trend in catastrophising. Comparatively, Fletcher, Parker, & Manicavasagar (2013) found all CERQ strategies except other-blame and acceptance were significantly different between controls and bipolar patients, where controls reported higher positive refocusing, planning, and perspective taking. Additionally, no differences were found between bipolar and unipolar groups. These studies appear to be opposing, however Green et al. (2011) used emotion regulation scores to predict clinical and healthy HPS scores, whereas Fletcher, Parker, & Manicavasagar (2013) compared clinical and healthy groups emotion regulation scores directly. So, whilst these results may simply be contradictory, this might be an effect of using the HPS as a measure of bipolar disorder, rather than grouping via diagnosis.

The second measure applied by the present study is the Negative Mood Regulation (NMR; Catanzaro & Mearns, 1990) which is a measure of a how confident individuals feel in manipulating their own mood. In its validation, it was shown to be significantly related to the BDI ($r=-.37$). It was also compared against an array of 11 emotions, only showing significant correlation with sadness ($r=.28$). Kassel, Bornovalova, & Mehta (2007) found the NMR to have an inverse correlation with anxiety (State subscale of State-Trait Anxiety Inventory $r=-.56$) as expected and replicated its previous relationship with depressive scores (Inventory to Diagnose Depression $r=.56$). There is no work known to the researchers investigating the NMR in hypomania or bipolar disorder.

Another set of emotion regulation strategies covered in the previous chapter, are the ART strategies covered in Chapter One (Berking et al., 2008). The Emotion Regulation Strategies Questionnaire (ERSQ, Berking & Znoj, 2008) was a questionnaire measure developed alongside the therapy, however it has never been translated or tested outside of Germany. Therefore, like the ERSQ, the Affect Regulation Therapy Questionnaire (ART-Q) was developed on the same basis to measure the same strategies for this study. As the strategies have been carefully selected for the ART programme, which is a transdiagnostic treatment, we expect to see effects across a range of mental health indicators.

The second core element to be investigated in this sample is differences in emotion regulation between older and younger adolescents. Previous studies have found that brain areas associated with emotion and its regulation undergo significant changes in this age range (see review: Casey, Jones, & Hare, 2008). These changes in volume and structure suggest they are being fine-tuned for adulthood, where emotion associated centres in the limbic system tend to develop earlier than prefrontal regions associated with emotion regulation. Adolescents have also been shown to react more impulsively than adults and children even when taking into account that adolescents are often in more risky situations than children (e.g. driving a car). This lag in prefrontal development has been implicated in an effect where adolescents are able to accurately assess risky situations but are unable to override impulses in emotional situations (Reyna & Farley, 2008). Gullone, Hughes, King, & Tonge (2010) used an adolescent and child version of the ERQ to assess emotion regulation development in early adolescence over a two-year period (with participants initially aged between 9-15 years) showing that with age, expressive suppression decreased but reappraisal remained consistent. However, research into many other specific strategies during adolescence remains largely untested. However, a review by Zimmer-Gembeck & Skinner (2011) found trends in older adolescents towards increased regulatory ability and emotional understanding as well as more flexible use of strategies. Therefore, based on previous research it might be reasonable to see

a mild increase in reported use of adaptive strategies and a decrease in maladaptive strategies. This also further refines the potential pool of questionnaires as only a few questionnaires have been tested on younger samples.

An important variable to consider when investigating emotion regulation is gender, where studies have found differences for certain strategies. In general, women report a greater use of almost all emotion regulation strategies than men, except for substance use (see for review: Nolen-Hoeksema, 2012). This includes typically maladaptive strategies such as rumination but not suppression as well as typically adaptive strategies such as reappraisal and acceptance. Therefore, it is expected that there should be significant differences across a wide range of emotion regulation strategies. This gender difference in typically maladaptive strategies have been shown to account for a significant proportion of diagnosed depression and anxiety in females compared to males (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

Previous studies with the CERQ have confirmed similar patterns, finding that females ruminate, catastrophise and positively refocus, significantly more than males, where males report no greater use of any strategy (Garnefski, Teerds, Kraaij, Legerstee, & van den Kommer, 2004). Furthermore, the study found that catastrophising, rumination and reappraisal were the strongest predictors of depression regardless of gender. However, various tests of the NMR have not found any significant gender differences (see Catanzaro & Mearns, 1990; Kassel et al., 2007).

The present study was designed as an exploratory extension of previous studies, using a large variety of emotion regulation strategies (nine from CERQ, nine ART strategies and NMR) to correlate with a range of mental health indicators, depression, anxiety and hypomania. This data will then be used to create emotion regulation profiles for each mental health indicator, while controlling for the other indicators. This will expand current understanding beyond correlations to pinpoint which indicator each strategy influences once

others are controlled for. Furthermore, this may indicate the pathway that each strategy influences multiple indicators. For example, rumination's correlations with anxiety and stress may be indirectly through its association with depression. This allows for a deeper understanding of how each strategy functions and how best to measure and target it. The extension into adolescent age range will develop understanding of how emotion regulation develops and indicate where developments are occurring. This study is an exploratory initial step into a broad but manageable combination of mental health indicators and emotion regulation strategies.

2.2 Method

2.2.1 Participants

For this study, we planned to recruit several hundred participants between the ages of 13 to 25 to encapsulate the adolescent age range. To collect data from younger adolescents 70 schools within Berkshire and Hampshire were contacted to take part in this study. The school head teachers were initially emailed and then received two follow up phone calls. Each school was asked to distribute letters, either by electronically or on paper, to students and their parents with the required website and relevant information. Out of the 70 schools that were contacted only one agreed to take part. To collect older adolescent participants, students were recruited from the University of Reading student population through the Psychology and Clinical Language Sciences Research Panel.

215 adolescents were recruited from both schools and from the University Research Panel from 13-25 years old. Of this group 54 were male. All participants were primarily English speaking and white. A priori power analysis was carried out based on the 0.05 f^2 cut off point with up to 15 predictors, which required a sample size of at least 126 to achieve adequate power (.80).

2.2.2 Design

This Study used “surveygizmo.com” to produce an online questionnaire battery for data collection. This was designed to gather data on a variety of indicators and attributes relating to hypomania, depression, anxiety, impulsiveness and emotion regulation from a community adolescent population. It comprised of a total of 135 questions from standard measures with good psychometric properties, demographic questions and one questionnaire developed for this study. This data was collected over a period of six months (February 2013 to July 2013). Ethical approval for this study was obtained from the University of Reading Ethics Committee.

2.2.3 Materials

The first step of this study required the participants to complete a brief set of questions involving gender, age, number of close friends, family and ethnicity. This allowed us to index the diversity of our participants in this study (Appendix 1).

2.2.3.1 Hypomanic Attitudes and Positive Predictions Inventory (Brief-HAPPI)

The Brief-HAPPI (Mansell & Jones, 2006) is a questionnaire with items derived from a cognitive model proposed by (Mansell, 2007), to sample a wider range of cognitions in bipolar disorder. The Brief-HAPPI consists of a series of 30 statements with the instruction to make a rating to indicate to what extent you believe each one on a scale from 0-100%. From these 30 items 5 are filler statements that were chosen to have no relation to bipolar disorder and 10 items were reversed. Post reversal, high total percentages indicate increased bipolar cognitions. Mansell & Jones (2006) administered this questionnaire to 56 individuals with a diagnosis of bipolar disorder and 39 healthy controls. The results were found to discriminate satisfactorily between the two groups where Brief-HAPPI scores correlated strongly with other bipolar

scales. Scores from the bipolar group also correlated with a depression scale which was not seen in the control group (Appendix 2).

2.2.3.2 Hypomanic Personality Scale (HPS-20)

The HPS-20 (Meads & Bentall, 2008) is a shortened version of the 48 item HPS (Eckblad & Chapman, 1986), that was reduced through Rasch analysis with data from 318 participants carefully isolating items that did not fit the model. The HPS-20 comprises of 20 statements that can be scored 'True' (scored 1) or 'Not True' (scored 0) (Appendix 3). These scores range from 0-20, with higher scorers indicating higher levels of hypomania. The HPS-20 was found by Meads & Bentall (2008) to have an internal Cronbach's alpha of .80 as well as correlating with the HPS at .94 (n = 299).

2.2.3.3 Depression, Anxiety and Stress Scale (DASS-21)

The DASS-21 (Lovibond & Lovibond, 1995) is a shorter version of the DASS-42 (Lovibond & Lovibond, 1995) with seven items chosen from each scale. The DASS-21 requires that participants rate the extent to which they have experienced each symptom over the past week on a 4-point scale (Appendix 4). The scores for each subscale are determined by summing all seven items of the scale. (Antony, Bieling, Cox, Enns, & Swinson, 1998) further investigated the psychometric properties of the 42 and 21 item versions in clinical and community samples finding that the DASS-21 had strong Cronbach's alphas for each of its three scales: Depression (.94), Anxiety (.87) and Stress (.91). These internal scales also correlated well with similar measures for those factors. In addition, clinically depressed participants scored significantly higher than other groups in the depression and stress scales. Participants with clinical levels of anxiety also scored significantly higher on the anxiety scale. Individuals in the community sample scored lower on all three subscales than those in clinical groups.

2.2.3.4 Center for Epidemiological Studies Depression Scale for Children (CES-DC)

The CES-DC (Fendrich, Weissman, & Warner, 1990) was created to be used as a tool for screening children and adolescents for depression (Appendix 5). It is a 20 item questionnaire with items selected from other depression scales covering six primary symptom areas. Each of these items is rated on a scale from 0-3 based on the frequency of that event over the past week, with higher scores indicating higher symptomatology. To validate this scale, Fendrich, Weissman & Warner (1990) tested a sample of 220 children at high or low risk for major depression. They found that the scale had an alpha coefficient of .89. In addition, children and adolescents diagnosed with major depressive disorder scored significantly higher than those without, these scores also correlated strongly with DSM-III criteria.

2.2.3.5 Barratt Impulsiveness Scale (BIS15)

The BIS15 (Spinella, 2007) is the shorter 15 item version of the 30 item BIS-11 (Patton, Stanford, & Barratt, 1995), which is a very widely used measure of impulsiveness (Appendix 6). The BIS15 consists of three subscales (attention impulsivity, motor impulsivity and non-planning) of five items. Items are recorded on a 4 point Likert scale (1= rarely/never, 4 = almost always). Spinella (2007) found an overall Cronbach's alpha of .79 (n=100) for the BIS15 and moderate to strong relationships between subscales.

2.2.3.6 Negative Mood Regulation (NMR)

The NMR (Catanzaro & Mearns, 1987) scale was designed to measure generalised expectancies in negative mood regulation (Appendix 7). The NMR comprises of 30 items on a five point Likert scale (1= strongly disagree, 5= strongly agree). Across a series of four different

samples Catanzaro & Mearns (1987) found that the NMR produced Cronbach's alphas ranging from .86-.92.

2.2.3.7 Cognitive Emotion Regulation Questionnaire (CERQ-short)

The CERQ-short (Garnefski & Kraaij, 2006) is a shorter 18 item version of the 36 item CERQ (Garnefski, Kraaij & Spinhoven, 2002) (Appendix 8). This questionnaire was designed to measure nine specific cognitive emotion regulation strategies in response to threatening or stressful life events (Self-blame, Other-blame, Rumination, Catastrophising, Putting into Perspective, Positive Refocusing, Positive Reappraisal, Acceptance and Planning). In the CERQ-short each subscale contains two items. These items are measured on a five point Likert scale (1= (almost) never to 5= (almost) always). Garnefski & Kraaij, (2006) found that in a sample of 611 individuals the Cronbach's alpha for separate subscales ranged from .68 to .81.

2.2.3.8 Emotion Regulation Skills Questionnaire (ART-Q)

The ART-Q is a questionnaire created for this study that represents the nine emotion regulation strategies identified by Berking et al., (2008) (Appendix 9). This questionnaire consists of nine questions, one for each skill, each rated on a ten-point scale to indicate how often they use it. To create the scale the strategies were formed into questions as directly as possible to maintain face validity by the addition of "when you encounter a negative situation, to what extent do you [skill]". As each skill is rephrased as a question, only one question exists per subscale. Every question had a rating from 0-10 and as the strategies are all distinct from one another no reliability or factor structure testing was completed.

2.2.4 Procedure

All participants that volunteered both from the University of Reading, School of Psychology Research Panel and from schools were immediately directed to the survey website where they were first presented with an information sheet and consent form. University

students gave their university ID to gain course credits. Following this, the participants were asked a series of demographic questions, including age and gender. This then opened the primary section of the survey with one section for each of the questionnaires presented above, in the order above.

Time taken for completion of this questionnaire battery ranged from 15-25 minutes depending on participant responses. Once the participant had completed the survey they were thanked and taken to a debrief sheet and again given contact details to ask any potential queries.

2.2.5 Statistical Analyses

The data was downloaded directly into a .csv file from the website Surveygizmo. The data was then reviewed in excel for patterned responses (such as repeating scores), excessive time (over an hour) and duplicates, which removed 11 participants. Reversed scored questions were then corrected and total scores for each questionnaire and subscale were created. This data was then transferred into SPSS to investigate normality. As some measures (such as DASS and CES-DC) were found to be non-normal as well as some emotion regulation measures (such as NMR) transformations were attempted, but none managed to sufficiently establish normality. Therefore, the data was transferred to R carry out partial spearman correlations between an emotion regulation questionnaire (NMR, CERQ and ART-Q) and the indicator measures (CES-DC, DASS, HPS, HAPPI and BIS). These tests partialled out age. All correlation analysis was corrected for multiple comparisons through the Bonferroni method, such a conservative method was used due to the exploratory nature of the results.

The second stage of analysis divided the results into two sections based on age (17 and below and 18+) to compare emotion regulation strategies between groups to test for developmental differences.

The final stage of analysis is a two-step multiple regression of mental health indicators that were found to have multiple correlations with emotion regulation strategies, where the first step applies only other indicators that correlated with that indicator and the second step inputs emotion regulation strategies that correlated with that indicator.

2.3 Results

2.3.1 Sample Characteristics

There were 211 valid participants in total comprising 53 males (25%) and 158 females (75%). The ages ranged from 13-25 with a mean of 19.21 (SD=2.49). As these questions were required to proceed to the next portion of the questionnaire there was no missing data. The mean age for females (19.20) was not significantly different from the females (19.25): t (209) = .12, p= .90.

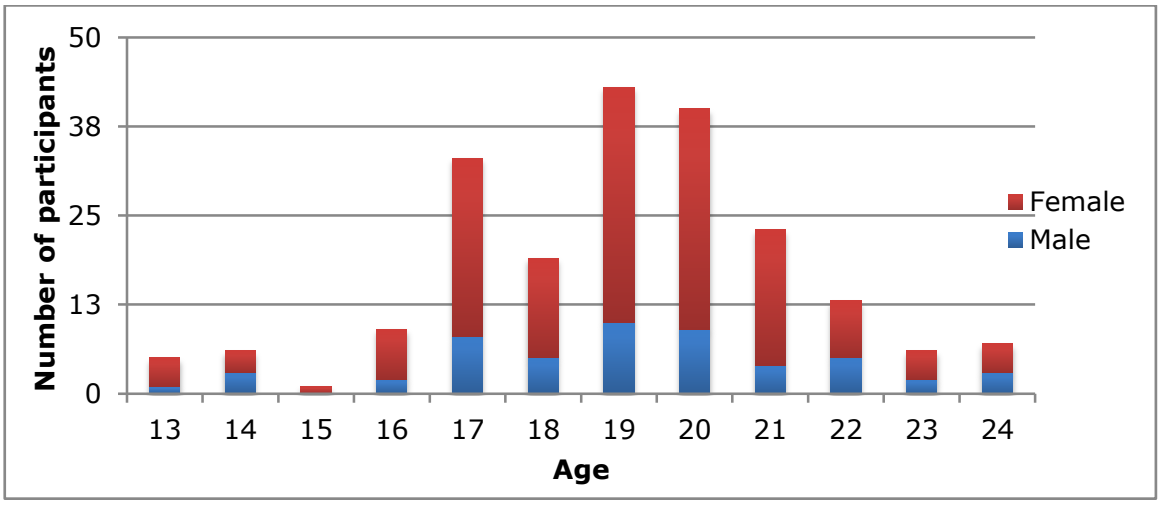

Figure 2.1 Distribution of participants by age and gender

In addition to these demographic measures, participants also reported their ethnicity which was predominantly white (181, 86%).To capture other baseline measures participants were asked if they thought they came from a single parent family (yes = 34, 16%; no = 174,

82%; decline to respond = 3, 2%) as well as the number of close friends they had (none = 12, 6%; one = 19, 9%; two = 43, 20%; more than two = 137, 65%).

Table 2.1 Scale means and standard deviations for all questionnaires, excluding the CERQ and ART-Q. n=211

Scale	Group mean M (SD)	Gender		Mean score at validation for control group M (SD)*
		Female M (SD)	Male M (SD)	
Brief-HAPPI	40.72 (10.24)	40.57 (9.69)	41.17 (10.24)	33.04 (8.68)
HPS-20 **	9.47 (3.21)	9.14 (3.31)	10.03 (3.00)	8.20 (4.30)
DASS - Anxiety	4.90 (3.72)	5.11 (3.90)	4.28 (3.11)	1.88 (2.95)
DASS - Stress	8.01 (4.24)	8.11 (4.28)	7.72 (4.16)	4.73 (4.20)
CES-DC	23.73 (12.31)	24.26 (1.00)	22.17 (1.57)	12.80 (8.70)
BIS15	31.53 (6.13)	31.47 (6.13)	31.72 (6.20)	32.60 (6.90)
NMR	93.91 (18.24)	93.88 (17.25)	93.98 (21.11)	103.24 (16.94)

**Brief-HAPPI, Mansell & Jones (2006); HPS-20, Meads & Bentall (2008); DASS, Henry & Crawford (2005); CES-DC, Fendrich, Weissman & Warner (1990); BIS15, Spinella (2007); NMR, Catanzaro & Mearns (1987). **n=211 for all scales apart from HPS where n=100*

2.3.2 Comparisons with validation scores

The current sample was not found to be significantly different to the original validation control group scores (higher than Brief-HAPPI, $t(248)=4.40$, $p<.001$; higher than HPS-20, $t(416)=2.72$, $p<.001$; higher than DASS–Anxiety, $t(2003)=13.65$; $p<.001$; higher than DASS-Stress, $t(259)=10.639$, $p<.001$; higher than CES-DC, $t(337)= 8.79$, $p<.001$; lower than BIS15, $t(384)= -2.16$, $p<.05$; and lower than NMR, $t(322)= -3.72$, $p<.001$). Furthermore, comparisons with some clinical samples assessed at original validation were made where the sample scored

significantly lower on the Brief-HAPPI than validation bipolar participants (t (265) =2.67, p<.001) but no significant difference was found between the sample and participants diagnosed with major depressive disorder in the CES-DC validation (t (48) = 1.06, p=.29). No significant intra-sample gender differences were found.

2.3.2.1 CERQ subscales

211 participants had valid data for the CERQ and the means for each subscale are shown with a comparison to the scores found in the validation of the CERQ-short in Table 2.2. Within each subscale scores could range from 2-10. There was a significant effect of gender on CERQ scores, F (8, 202) = 2.449, p < .05, however follow up tests revealed no significant differences but positive refocusing was approaching significance. All subscale scores were significantly higher in the sample than the CERQ-short validation study (Garnefski & Kraaij, 2006).

Table 2.2 Scale means and standard deviations for the CERQ-short results found in this study and the original validation of the questionnaire. N=211.

CERQ-short subscales	M (SD, study 1)	Gender		M (SD, Garnefski & Kraaij, 2006)
		Female M (SD)	Male M (SD)	
Self-Blame	6.74 (1.72)	6.70 (1.71)	6.85 (1.76)	4.13 (1.81)
Other-Blame	5.63 (1.34)	6.93 (1.35)	6.89 (1.42)	3.10 (1.53)
Acceptance	7.44 (1.70)	7.37 (1.66)	7.64 (1.83)	5.49 (2.14)
Rumination	7.22 (1.79)	7.33 (1.72)	6.91 (1.96)	4.98 (2.04)
Positive refocusing	5.85 (1.94)	6.00 (1.94)	5.42 (1.89)	4.54 (1.94)
Refocus on planning	7.27 (1.62)	7.15 (1.53)	7.62 (1.82)	6.05 (2.12)
Positive reappraisal	7.02 (2.04)	6.95 (2.08)	7.25 (1.91)	6.23 (2.25)
Putting into perspective	6.70 (1.81)	6.66 (1.77)	6.79 (1.94)	5.85 (2.16)
Catastrophizing	5.78 (2.07)	5.78 (2.00)	5.77 (2.27)	3.30 (1.64)

* Sample means all significantly different to Garnefski & Kraaij (2006) means where p<.001.

2.3.2.2 ART-Q subscales

211 participants had valid data for the ART-Q and the means for each subscale are shown in Table 2.3. Within each subscale scores could range from 1-10. Several significant

differences were found in scores by gender: Aware of emotions (t (77.85) = -2.16, p< .05); Interpret body sensations (t (209) = -1.99, p<.05) and Understand prompts of emotions (t (209) = 2.07, p< .05), where males only scored higher on the later subscale.

Table 2.3 Scale means and standard deviations for the ART-Q results found in this study and the original validation of the questionnaire. N=211.

		Gender	
ART-Q scales	M (SD, study 1)	Female M (SD)	Male M (SD)
Aware of emotions	7.31 (2.14)	7.51 (2.02) *	6.72 (2.41) *
Identify and label emotions	6.74 (2.41)	6.66 (2.36)	6.98 (2.55)
Interpret body sensations	6.66 (2.41)	6.85 (2.30) *	6.09 (2.64) *
Understand prompts of emotions	4.51 (2.80)	4.28 (2.76) *	5.19 (2.79) *
Self-support in distressing situations	4.20 (2.60)	4.08 (2.57)	4.57 (2.69)
Modify negative emotions	4.16 (2.66)	4.11 (2.65)	4.30 (2.71)
Accept emotions	5.10 (2.58)	5.05 (2.55)	5.26 (2.70)
Resilience/tolerance of negative emotion	5.62 (2.64)	5.56 (2.60)	5.79 (2.78)

Confront distressing situations to achieve goals	5.61 (2.72)	5.50 (2.58)	5.92 (3.08)

*significant difference between genders where p<.05

2.3.3 Relationships between emotion regulation strategies and mood measures

2.3.3.1 CERQ subscales

There were several significant correlations between various mood measures and the CERQ as shown in Table 2.4 below:

Table 2.4 Partial Spearman correlations of the CERQ with measures of mood, impulsiveness, anxiety and hypomania using a Bonferroni adjusted significance level of 0.001(.05/54) where age is partialled out. N=211.

CERQ subscales	CES-DC	HPS	HAPPI	DASS Anxiety	DASS Stress	BIS
Self-Blame	.280*	.212	.174	.290	.299*	.005
Other-Blame	-.002	-.157	-.060	.004	-.051	-.044
Acceptance	.163	-.031	.178	.129	.171	-.050
Rumination	.413*	.207	.265*	.372*	.399*	.108
Positive refocusing	-.208	.100	.188	-.050	-.123	.027
Refocus on planning	.005	.289	.174	.070	.016	-.085
Positive reappraisal	-.102	.139	.129	.015	-.060	-.124
Putting into perspective	-.105	.185	.093	-.100	-.142	.005
Catastrophizing	.593*	.102	.239*	.558*	.555*	.093

*p<.001

2.3.3.2 ART-Q subscales

There were significant correlations between the ART-Q and various measures shown in Table 2.5 Bellow:

Table 2.5 Partial Spearman Correlations of the ART-Q with measures of mood, impulsiveness, anxiety and hypomania where age is partialled out using a Bonferroni adjusted significance level of 0.001(.05/54). N=211.

ART-Q subscales	CES-DC	HPS	HAPPI	DASS Anxiety	DASS Stress	BIS
Aware of emotions	-.038	-.087	-.086	.015	-.003	-.128
Identify and label emotions	-.251*	-.021	-.126	-.187	-.197	-.212
Interpret body sensations	-.005	.003	-.081	.064	-.052	-.123
Understand prompts of emotions	-.545*	-.185	-.362*	-.471*	-.515*	-.306*
Self-support in distressing situations	-.397*	-.011	.000	-.258*	-.384*	-.101
Modify negative emotions	-.375*	-.020	.000	-.316*	-.376*	-.084
Accept emotions	-.099	.041	-.129	-.091	-.146	.048
Resilience/tolerance of negative emotion	-.292*	-.114	-.278*	-.277*	-.378*	-.029

Confront distressing situations to achieve goals	-.241*	-.065	-.252*	-.263*	-.340*	-.147*

*p<.001

2.3.3.3 NMR

There were significant correlations between the ESRQ and various measures shown in Table 2.6 below.

Table 2.6 Partial Spearman Correlations of the NMR with measures of mood, impulsiveness, anxiety and hypomania where age is partialled out using a Bonferroni adjusted significance level of 0.001(.05/6). N=211.

	CES-DC	HPS	HAPPI	DASS Anxiety	DASS Stress	BIS
NMR	-.585*	-.112	-.122	-.446*	-.531*	-.151

*p<.01.

2.3.4 Age comparisons

Table 2.7 and 2.8 display comparisons between the age groups for each subscale of the CERQ and ART-Q respectively.

Table 2.7 Means and standard deviations for the 17 and below age group as well as the 18 and above age group with independent t-test comparisons and effect size (r) across CERQ subscales. Using a Bonferroni adjusted significance level of 0.006(.05/9) no tests remained significant. N=211.

CERQ subscales	<17 M (SD)	>18 M (SD)	t	r
Self-Blame	7.07 (1.77)	6.62 (1.70)	1.66	.11
Other-Blame	7.07 (1.50)	6.87 (1.32)	0.97	.07
Acceptance	7.48 (1.68)	7.43 (1.71)	0.20	.01
Rumination	7.07 (1.94)	7.27 (1.74)	-0.71	.05
Positive refocusing	5.74 (2.20)	5.89 (1.85)	-0.49	.03
Refocus on planning	7.09 (1.55)	7.32 (1.65)	-0.91	.06

Positive reappraisal	6.76 (2.28)	7.11 (1.94)	-1.11	.08
Putting into perspective	6.50 (1.62)	6.76 (1.87)	-0.90	.06
Catastrophizing	6.31 (2.09)	5.59 (2.03)	2.24	.15

Table 2.8 Means and standard deviations for the 17 and below age group as well as the 18 and above age group with independent t-test comparisons and effect size (r) across ART-Q subscales. Using a Bonferroni adjusted significance level of 0.006(.05/9) no tests were significant. N=211.

ART-Q subscales	<17 M (SD)	>18 M (SD)	t	r
Aware of emotions	7.22 (2.28)	7.34 (2.11)	-0.36	.02
Identify and label emotions	6.43 (2.48)	6.85 (2.38)	-1.11	.08
Interpret body sensations	6.91 (2.28)	6.57 (2.45)	0.88	.06
Understand prompts of emotions	4.81 (2.64)	4.40 (2.84)	0.94	.06
Self-support in distressing situations	3.81 (2.75)	4.33 (2.54)	-1.26	.09
Modify negative emotions	4.06 (2.84)	4.20 (2.61)	-0.34	.02
Accept emotions	5.11 (2.50)	5.10 (2.62)	0.02	.00
Resilience/tolerance of negative emotion	5.87 (2.78)	5.54 (2.60)	0.80	.06
Confront distressing situations to achieve goals	5.72 (2.83)	5.57 (2.68)	.360	.02

2.3.5 Inter-correlations between indicator measures

Following this analysis further Spearman correlations were conducted between indicator measures, as shown in Table 2.9 below:

Table 2.9 Spearman Correlations between measures of mood, impulsiveness, anxiety and hypomania and hypomanic attitudes using a Bonferroni adjusted significance level of 0.01(.05/5). N=211.

Indicator measures	CES-DC	DASS Anxiety	DASS Stress	HAPPI	HPS	BIS
CES-DC	1	.703*	.749*	.370*	.140	.258*
DASS Anxiety	.703*	1	.686*	.365*	.184	.263*
DASS Stress	.749*	.686*	1	.447	-.002	.234*
HAPPI	.370*	.365*	.447	1	.449*	.311*
HPS	.140	.184	-.002	.449*	1	.392*
BIS	.258*	.263*	.234*	311*	.392*	1

*p<.01.

2.3.6 Emotion Regulation profiles

2.3.6.1 Depression

Below is a multiple stepwise regression to predict depression scores, using the first step to covary for correlated indicator scores and the second step to introduce associated emotion regulation strategies.

Table 2.10 Multiple regression analysis predicting depression as measured by the CES-DC through emotion regulation strategies, controlling for variance explained by correlated indicator and personality factors. N=211.

	B	SE B	β
Step 1			
Constant	2.43	3.01	
HAPPI	0.02	0.06	.02
BIS	0.10	0.09	.05
DASS Anxiety	1.20	0.19	.36***
DASS Stress	1.41	0.18	.49***
Step 2			
Constant	17.87	6.48	
HAPPI	0.06	0.06	0.05
BIS	0.02	0.09	.01
DASS Anxiety	0.97	0.19	.29***
CERQ Self-Blame	-0.33	0.31	-.05
CERQ Rumination	0.56	0.31	.08
CERQ Catastrophizing	0.64	0.34	.11
ART-Q Identify and label emotions	-0.09	0.23	-.02
ART-Q Understand prompts of emotions	-.62	0.21	-.14**
ART-Q Self-support in distressing situations	-0.54	0.31	-.11

ART-Q Modify negative emotions	0.35	0.30	.08
ART-Q Resilience/tolerance of negative emotion	-.03	0.27	-.01
ART-Q Confront distressing situations to achieve goals	0.31	0.26	.07
NMR	-0.12	0.04	-.18**

Note : R^2 = .53 for Steph 1, ΔR^2 = .16 for Step 2 (p <.001). *p <.05, **p<.01, ***p<.001

2.3.6.2 Anxiety

Below is a multiple stepwise regression to predict anxiety scores, using the first step to covary for correlated indicator scores and the second step to introduce associated emotion regulation strategies.

Table 2.11 Multiple regression analysis predicting relationships between anxiety as measured by the anxiety subscale of the DASS through emotion regulation strategies, controlling for variance explained by correlated indicator and personality factors. N=211.

	B	SE B	β
Step 1			
Constant	-1.26	1.01	
HAPPI	-0.00	0.02	-.01
BIS	0.02	0.03	.03
CESDC	0.14	0.02	.45***
Step 2			
Constant	-4.18	2.37	
HAPPI	-0.12	0.02	-.05
BIS	0.03	0.03	.05
CESDC	0.13	0.02	.42***
CERQ Self-Blame	0.16	0.11	.08
CERQ Rumination	-.09	0.11	-.04
CERQ Catastrophizing	0.29	0.12	.16*

ART-Q Understand prompts of emotions	-0.09	0.08	-.07
ART-Q Self-support in distressing situations	0.25	0.11	.18*
ART-Q Modify negative emotions	-0.15	0.11	-.11
ART-Q Resilience/tolerance of negative emotion	0.08	0.10	.06
ART-Q Confront distressing situations to achieve goals	-0.10	0.09	-.07
NMR	0.12	0.02	.08

Note : R^2 = .51 for Step 1, ΔR^2 = .05 for Step 2 (p <.001). *p <.05, **p<.01, ***p<.001

2.3.6.3 Stress

Below is a multiple stepwise regression to predict stress scores, using the first step to covary for correlated indicator scores and the second step to introduce associated emotion regulation strategies.

Table 2.12 Multiple regression analysis predicting relationships between stress as measured by the stress subscale of the DASS through emotion regulation strategies, controlling for variance explained by correlated indicator and personality factors. N=211.

	B	SE B	β
Step 1			
Constant	-0.62	1.05	
DASS Anxiety	0.32	0.07	.28***
HAPPI	0.08	0.02	.06***
BIS	-0.00	0.03	.04
CESDC	0.17	0.02	.68***
Step 2			
Constant	1.11	1.05	
DASS Anxiety	0.28	0.07	.24***
HAPPI	0.07	0.02	.16**
BIS	-0.01	0.03	.01
CESDC	0.12	0.02	.35***

CERQ Self-Blame	0.08	0.11	.03
CERQ Rumination	-0.07	0.11	-.03
CERQ Catastrophizing	0.20	0.12	.10
ART-Q Understand prompts of emotions	-0.85	0.08	-.06
ART-Q Self-support in distressing situations	-0.22	0.11	-.14*
ART-Q Modify negative emotions	0.08	0.11	-.05
ART-Q Resilience/tolerance of negative emotion	-0.10	0.10	-.06
ART-Q Confront distressing situations to achieve goals	-0.09	0.09	.35*

Note : R^2 = .51 for Step 1, ΔR^2 = .05 for Step 2 (p <.001). *p <.05, **p<.01, ***p<.001

2.3.6.4 Hypomania

Below is a multiple stepwise regression to predict hypomania scores, using the first step to covary for correlated indicator scores and the second step to introduce associated emotion regulation strategies.

Table 2.13 Multiple regression analysis predicting relationships between hypomanic attitudes as measured by the HAPPI through emotion regulation strategies, controlling for variance explained by correlated indicator and personality factors. N=211.

	B	SE B	β
Step 1			
Constant	22.84	3.23	
BIS	0.38	0.10	.24***
CESDC	0.20	0.07	.10
DASS Anxiety	0.26	0.23	.24**
Step 2			
Constant	21.46	5.08	
BIS	0.35	0.10	.22**
CESDC	0.17	0.08	.21*
DASS Anxiety	0.09	0.24	.03
CERQ Rumination	0.35	0.38	.06
CERQ Catastrophizing	0.25	0.40	.05

ART-Q Understand prompts of emotions	-0.63	0.26	-.18*
ART-Q Self-support in distressing situations	0.64	0.38	.17
ART-Q Modify negative emotions	0.23	0.36	.01

Note : R^2 = .34 for Step 1, ΔR^2 = .10 for Step 2 (p <.001). *p <.05, **p<.01, ***p<.001

2.4 Discussion

Initial data analysis comparing the current sample with previous validations found an array of significant deviations. This was most striking in depression scores, which were not significantly different to a clinically depressed population. Overall, the sample displayed significantly more maladaptive tendencies across almost all measures. This is relatively consistent across each measure and therefore the data should be considered in the light that this sample has greater mood difficulties than normal. Due to an effect across all measures, this interpretation is the most satisfactory explanation of the observed trend rather than by noise in the dataset. Therefore, this dataset has more pronounced effects than other community populations.

When validating with original measures many of the distributions in the measures were non-normal implying the use of the Mann Whitney U test. However, without access to the raw validation data to create ranks, only t-tests were possible. Furthermore, the testing against previous validations is subject to unequal sample sizes and even though the differences are rarely small, they should be treated with caution. Both factors should also be considered with effects of gender as predicted differences in the CERQ were not found (rumination, catastrophising and reappraisal), although the ART-Q found females reporting significantly more emotional awareness and better at interpreting physiological awareness but less effective at understanding what behaviours those emotions were prompting.

From the main results, the correlations with the CERQ (Table 6) and measures of depression, anxiety and stress are a broad replication of previous results but in a younger sample (see Garnefski & Kraaij, 2006). Although, far fewer significant results were identified due to Bonferroni corrections, the remaining results mirror the strongest correlations in previous studies (rumination, self-blame and catastrophizing). The conservative nature of Bonferroni correction does increase the risk of false negatives (Simes, 1986) but this works to

the purpose of the study by identifying the most prominent associations. Despite this, it was expected that more emotion regulation strategies would have associations with these continuum measures, particularly the more commonly prescribed adaptive strategies (such as reappraisal), which appeared to have little to no association with the mental health measures. It is possible that this is because the sample had not been trained in emotion regulation techniques and that they are not commonly naturally occurring. Interestingly, both rumination and catastrophising demonstrated transdiagnostic tendencies across depression, anxiety and hypomanic attitudes, whereas self-blame was unique to depression post Bonferroni correction.

The results from the ART-Q (Table 7) demonstrate a good replication of the associations that are predicted by the ART model. Following Bonferroni correction many effects remained significant across different continuum measures, suggesting that ART has selected an effective series of adaptive emotion regulation strategies for transdiagnostic treatment. The ART model proposes that some strategies are not directly clinically active (such as awareness, identifying and understanding of emotion) but facilitate strategies that are. Additionally, Self-compassion has a unique role within the model as a moderator for the active strategies but also reduce the potential short term negative effects of the other indirect strategies (Berking & Schwarz, 2014). Each of the clinically active strategies was found to be significant across a variety of continuum indicators (resilience/tolerance, modification and confronting difficult situations), with the notable exception of acceptance. The null results for acceptance were mirrored by a similar subscale in the CERQ. However, previous uses of CERQ have established that the acceptance subscale appears to unintentionally measure the maladaptive aspects of acceptance as well, which may somewhat explain the null results (Garnefski, Kraaij, & Spinhoven, 2001). This could be due the questions also capturing an inflexible and habitual accepting attitude, which would be ineffective in a variety of contexts.

Therefore, its performance in this measure, and others in the literature, may not be representative of the true significance of clinically taught and adaptive accepting attitude.

From ART's active strategies, a willingness to confront difficult situations to achieve important goals was the most transdiagnostic, appearing in all continuum indicators except for the HPS. This skill was anticipated to be highly correlated across all indicators as ART assumes this skill to be the most integral to healthy functioning, where even other clinically active strategies are geared to moderate it. Modification, which is a broader classification of reappraisal measured by the CERQ showed significant correlations specific only to depression and anxiety, suggesting some specificity unlike resilience and tolerance of negative emotions.

An unexpected result from the ART-Q was the highly significant and transdiagnostic impact of understanding the prompts of emotions. A skill that ART considers to be a facilitator to the active strategies has been found by this study to have a direct association with each continuum indicator, except for the HPS. This could highlight that a deeper understanding of the functions of emotions beyond being aware of or being able to label them has its own important and potentially clinical role. Additionally, this is the only skill that has been reported significantly more by males than females and appears to be highly adaptive. Further research would be required to identify if this effect is consistent and if it contributes to the gender differences in reported depression and anxiety.

The primary limitation from the ART-Q is the creation of a new questionnaire to measure it. This questionnaire was designed to measure the core ART strategies as directly as possible and as these strategies are entirely independent, testing through Cronbach's alpha or assessing factor structure would not be relevant. This creates an unresolved issue of validity. Although, as the strategies are worded as clearly as possible and are not subtle, this is not necessarily a significant issue.

The NMR (Table 2.6), measuring how well an individual believes they can change their negative emotion, closely replicates previous research in depression and anxiety (Kassel et al., 2007). However, the more novel investigation of its application to hypomania and impulsivity yielded no measurable effects.

Throughout each of these emotion regulation measures the HPS did not perform as predicted, demonstrating no significant correlations with any skill. This was not expected as the HPS has previously been shown to correlate with depression and specifically rumination (Meads & Bentall, 2008). However, null results between the HPS and the CERQ have already been demonstrated by Green et al. (2011), which this study replicates. But the inconsistent findings of this study may be partially explained because there were only results for 100 participants compared to 211 for the other measures. This limitation is due to the questionnaire being added to the battery half way through testing. Even though this reduced power would have an important role in suppressing the effects that may be present, no correlations with emotion regulation strategies even approached significance without Bonferroni correction. Furthermore, the HPS performed as anticipated by showing strong correlations with both the HAPPI and the BIS (Table 2.9), suggesting that the sample size cannot explain the scale of null results alone. This would lend to the conclusion that hypomanic attitudes measured by the HAPPI are more directly linked to emotion regulation.

The second aspect of this study, to investigate the development of emotion regulation within an adolescent sample, found no significant difference in emotion regulation strategies between age groups (Table 2.7 & 2.8). Whilst this result may be a true representation of the population it would be premature to conclude that from this dataset. Firstly, as shown in Figure 2.1, the range of ages in the sample is not equally spread, but predominantly in the centre of the range. This data clustering around such a central point will greatly weaken inter-

age comparisons. This was due to a poor uptake of recruitment, where one out of the 72 schools contacted consented.

2.4.1 Emotion Regulation Profiles

The third aspect of this study was to develop separate emotion regulation profiles for the indicator measures using multiple regression (Table 2.10, 11, 12 & 13). These profiles were created to gain a greater understanding of the roles played by different emotion regulation strategies. The HPS and BIS were excluded from this stage of analysis due to the absence of previous effects to profile. The regressions were carried out in two steps. To identify what variance was uniquely explained by the emotion regulation strategies, the first step contained other indicator measures that had been shown to correlate with that indicator. One exception to this process was the correlation between the HAPPI and the HPS, as they have such significant conceptual overlap that it may mask the variance explained by other variables. The second step added emotion regulation strategies already found to have associations with the mental health indicator. The resulting effects for each emotion regulation strategy were their unique contributions to that indicator.

The regression for depression (Table 2.10) found that when other correlated indicators (anxiety, stress, hypomanic attitudes and impulsivity) were controlled for, the CERQ strategies and key strategies (resilience/tolerance, modification and confronting difficult situations) from ART that significantly correlated with depression initially, no longer accounted for a significant proportion of the variance. Though unexpectedly, understanding the prompts of emotions maintained its significance, suggesting that a deeper understanding of one's emotions is almost uniquely important in depression. It is noted that while self-compassion was associated with stress and anxiety, its relationship with depression evaporated once this was accounted for. It is possible that self-compassion works through the intrusive thoughts in stress and anxiety to appear to influence depression, but this requires further work to establish with

greater certainty. It certainly does not align with current theoretical understanding (Gilbert, 2005). Potentially, a replication with different measures for the same indicators could also provide another useful perspective.

In the anxiety profile (Table 2.11) catastrophising and self-compassion remain the only emotion regulation strategies that significantly explain variance beyond the depression measure. This suggests that catastrophising is primarily associated with anxiety and its transdiagnostic associations are via anxiety. While in the stress regression both self-compassion and willingness to confront obstacles to achieve goals remained significant. Self-compassion was found to be a key component with a unique contribution to both anxiety and stress. As stated by its absence in the depression profile, this suggests more research is needed to verify this relationship. It is intuitive that confronting difficult situations to achieve goals appears to originate in stress, despite being highly transdiagnostic. The two strategies that remained significant where self-compassion and focusing on overcoming obstacles to achieve goals, which are the same strategies from ART that influenced anxiety. This seems intuitive as stress is generally associated with specific pressures and stressors that need to be overcome. Also, by its definition stress is caused by getting wrapped up in the demands placed on the individual, external or internal, which tend to be unforgiving and uncompassionate.

The hypomanic profile (Table 2.13) created through the HAPPI found that of the emotion regulation strategies that originally correlated with the measure, only understanding the prompts of emotions remained, with a small effect. This understanding that stretches beyond awareness was also found in the depression profile. Perhaps the deeper understanding of the prompts to emotions is the key to maintaining a balanced mood between depression and hypomania.

These results suggest that while many of these indicators are transdiagnostic they may influence many of these indicators through another indicator. Perhaps this challenges the

current perspective that looks at each of these indicators (such as, depression, anxiety and stress) separately, when they may all be present despite only one being observed or diagnosed. Furthermore, based on these results it is worth considering that all distress disorders are better explained as varying ratios of depression anxiety and stress and not separate issues with high co-morbidity.

These results highlight that many of these emotion regulation strategies are primarily associated with only one of the indicators, which appears to be the pathway through which they are significantly associated with other indicators. The potential clinical implications of this would be that the dominance of certain emotion regulation strategies would suggest the issue is the most relevant for the client to focus on. This would be especially useful in more complex cases where the overlap between conditions such as depression and anxiety may be difficult to differentiate. It also allows for more targeted treatment of specific conditions, allowing for a stronger focus on one specific issue. This lends itself to a more modular therapeutic approach.

2.4.2 Limitations

One of the limiting factors for this study were the sample, as discussed earlier the poor age distribution made age based comparisons impractical. Additionally, the unequal sample sizes between female and male participants hinders gender comparisons.

Perhaps the most important limitation is the gap between the study's theoretical scope and the confines of the methodology. This is the breadth covered by the questionnaire battery and its atheoretical intentions. There are a finite number of questions that can be presented to a participant without resulting in large attrition rates. Therefore, the study in a more ideal form would consider an incredible variety of emotion regulation strategies and a comprehensive battery of mental health indicators. Without this diversity, it is possible some

vital relationships that interact with the ones found, may be missed. In hindsight, it would have been more insightful to use a measure of stress instead of the HPS, which may have revealed relationships relevant to the ones found above.

This study also depended wholly on self-report and therefore the results are dependent upon the limits of the participant's introspective insight. They are also subject to the biases of those individuals that shape how they interpret the questionnaire items and how they have interpreted their experiences. For this study, these factors are difficult to avoid and must be accepted. Another issue commonly associated with self-report questionnaires are demand characteristics. It is unlikely that participants felt compelled to interpret their answers one way or another as no expectations were set for the experiment and there was no task. However, the above average maladaptive nature of the results might either suggest some bias by the participants or a random effect of the sample.

2.4.3 Future Studies

As stated above, a complete set of emotion regulation strategies and mental health indicators for this study would present such an impractical burden on the participant, making any further study on this question retain that limitation. Using more incentives to attract a diverse range of schools into co-operating with the study would be a worthwhile replication alone. However, using the results of this study, abandoning the bipolar measures and using a stress measure would provide valuable data to cover the depression, anxiety and stress triad. Removing the NMR would also reduce some more of the burden on participants. While this would reduce the scope of the study, the additional data gained from reduced attrition rates would be highly valuable. Due to the exploratory and self-reflective nature of this study there does not seem to be practical alternatives to a questionnaire battery. The only other method to consider in developing this study would be to carry it out via a structured interview. While this is considerably more resource intensive, some of the limitations remain the same such as

the participant's ability to accurately reflect on and understand their emotions. But others could be improved, such as ensuring that the participant understands what is being asked and it may ensure greater focus. This different set of limitations would provide an interesting contrast with the current dataset and help identify effects that may be induced by that methodology.

2.4.4 Conclusion

This exploratory study has raised a series of questions and future directions, some of which are developed replications of previous studies. One example of this is the transdiagnostic nature of catastrophizing through anxiety. This has been found several times in the literature but has never been pursued. This finding shaped the direction of chapters four, five and six in searching for a greater understanding of catastrophising's effects on mood and mental health indicators. Another interesting result was the prevalence of understanding the prompts of emotions and how deeply it can influence mood. As with many exploratory studies, this study raises a lot of questions and raises how much more research is still required in emotion regulation before we even have some established general understanding. There are many theories in emotion regulation and there must be considerably more work to unite them across so many indicators and contexts.

Chapter Three: Developing a State-Trait Emotion Regulation Questionnaire

3.1 Introduction

Where the previous chapter focused on an atheoretical approach between emotion regulation strategies and mental health indicators, this chapter takes an atheoretical approach to measurements of emotion regulation. Many of the most used emotion regulation questionnaires are drawn directly from a theory (e.g., ERQ, CERQ & NMR). A measure of emotion regulation derived from a pre-existing theory will provide an ideal platform for measuring that theory's predictions and, depending on the theory, provide useful clinical insight. However, somewhat tautologically, these approaches are only concerned with measuring the strategies relevant to their theory. Whilst they often perform well in this regard, they do not aim to reflect the full range of emotion regulation strategies individuals are using. Whilst this might suggest an alternative approach with infinite items, measuring all possible strategies for all possible situations, there is another more feasible method. Collating a large pool of items from previous questionnaires and then using participant responses to create a measure that better reflects what strategies are most frequently applied. This would aim to create a tool better able to measure what strategies individuals are generally applying rather than observing from a specific perspective. However, this would still be subject to the limitations of the initial item base, so to compensate the initial pool of items must be selected carefully. In addition to an atheoretical approach, this emotion regulation measure had two other important facets.

A second, but equally important, approach for this study is creating a pair of related state trait measures of emotion regulation. This would allow a measure of how individuals consciously regulated a specific situation (state) and how they generally report regulating themselves (trait). Almost all emotion regulation measures known to the author measure the later. Trait scores can be consistent and therefore imply a general emotion regulation style.

However, such a general method sacrifices the context of that emotion regulation. Any strategy applied inflexibly or used habitually can be maladaptive (Mennin & Fresco, 2014). One of the most pertinent examples in the literature is the acceptance scale of the CERQ, sometimes found to be maladaptive (Garnefski, Kommer, et al., 2002) or associated (e.g. Abdi, Taban, & Ghaemian, 2012; Jermann, Van der Linden, d'Acremont, & Zermatten, 2006) with clinical measures. A strategy such as acceptance is sensitive to context for its adaptiveness. Additionally, strategies generally assumed to be adaptive show weaker relationships with mental health than generally maladaptive strategies (e.g., ERQ and CERQ). This may be because a trait measure cannot distinguish between its maladaptive and adaptive use, resulting in more noise in generally adaptive strategy data. Therefore, a state measure of these strategies would potentially provide the context for more predictive adaptive and maladaptive emotion regulation strategies. Only two state emotion regulation questionnaires are known to the authors, both were adapted from the ERQ to measure suppression and cognitive reappraisal. One was developed by Egloff, Schmukle, Burns, & Schwerdtfeger (2006) and the other by Gruber, Harvey, & Gross (2012). Both versions showed adequate to good internal consistency and Egloff et al. (2006) found good stability over time.

Emotion regulation, especially in self-report measures, is often only characterised in response to negatively interpreted situations (such as the CERQ, DERS and NMR). This is partially because the way individuals regulate negative emotion has intuitive implications in psychopathology. However, some scholars posit that there has been a disproportionate focus on negative emotions (Wood & Tarrier, 2010) as positive emotions are also associated with psychopathology in bipolar (Gruber, Johnson, Oveis, & Keltner, 2008) and depression (Gotlib & Joormann, 2010). Additionally, as both positive and negative emotion are considered to be two separate continuums it is reasonable to question whether findings for negative regulation are found in positive regulation (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). There are few measures that do focus on positive regulation such as the Responses to Positive Affect Scale

(Feldman, Joorman, & Johnson, 2008), which was based on the earlier revised Response Styles Questionnaire (RSQ; Thomas & Bentall, 2002) examining rumination and distraction. However, like the RPA, these are trait measures and grounded in a specific theory.

To take on these three important aspects, the State/Trait Emotion Regulation Questionnaires (STERQ) were created, where the trait measure had positive/negative counterparts and the state scale was not valence specific to best capture the emotion regulation strategies applied in that moment. Development was spread across two testing phases: item generation and exploratory factor analysis (phase one), and confirmatory factor analysis (phase two). Within these phases, positive and negative emotion had to be tested in two separate conditions. Furthermore, to make the questionnaire applicable to the largest age range, previous items were only considered from measures used in adolescent populations.

Due to the complex design of this study, to test and then verify four questionnaires, the Method and Results have been restructured to maintain logical progression. The method is divided into two halves; Phase One contains the method for the initial testing of the questionnaire and Phase Two for the verification. For ease of understanding the Results section has been again broken down into Phase One and Two. Additionally, each of these phases has been further split into the positive and negative scales

3.2 Method

3.2.1 Phase One

3.2.1.1 Participants

Phase one for both method and result sections recruited participants from the University of Reading Research Panel (SONA) and some additional websites used for recruitment:

www.twitter.com

www.freeads.co.uk

www.gumtree.co.uk

www.reddit.com/r/samplesize

www.onlinepsychresearch.co.uk/

psych.hanover.edu/Research/exponnet.html

www.facebook.com/onlinepsychologyresearch

STERQ positive obtained data for 578 people pre-exclusions, where only 288 of these were included in the principal components analysis. The STERQ negative obtained data for 612 people, and following exclusions 418 were included in the initial principal components analysis. Table 3.1 contains the reasons for these exclusions for both STERQ positive and negative.

Table 3.1 Participants excluded from phase one.

Reason for Participant Exclusion	Number excluded	
	STERQ Positive	STERQ Negative
Incomplete Responses	209	96
Time to Complete > 1hr or participant reported taking break	20	18
Time to Complete <18 minutes (positive) or <8 minutes (Negative)	46	21
Duplicate Data (i.e. participant completed more than once)	5	-
Two or more incorrect answers to memory questions	1	5
Technical Difficulties	9	53
Same response given throughout	-	1
TOTAL	290	194

3.2.1.2 Design

The State Trait Emotion Regulation Questionnaire (STERQ) was created and tested within two phases. Initial pre-testing in phase one consisted of item generation, which was then tested through a principal components analysis, resulting in item reduction in two studies separated by their valence (STERQ positive and STERQ negative). Both phases of this experiment were carried out alongside another Doctoral researcher, Jo Bower.

3.2.1.3 Measures

3.2.1.3.1 STERQ

To attain the breadth of emotion regulation strategies planned for this study item generation initially focused on gathering and modifying items from pre-existing emotion regulation questionnaires. As one of the initial ambitions for STERQ was to create a questionnaire valid for use with adolescent and adult populations, scales were only selected if they had previously been used in adolescent populations. A 35 year review for adolescent measures of emotion regulation by Adrian, Zeman, & Veits (2011) was used to select many of the measures. Following this, the search terms “emotion regulation questionnaire”, “emotion regulation scale”, “affect regulation scale”, “affect regulation questionnaire”, “positive emotion regulation scale” and “positive emotion regulation questionnaire” were searched into both Google Scholar and Web of Knowledge to identify further existing measures. Due to a lack of state scales, only trait items were found to be later translated into state items.

Trait items were considered from the following questionnaires: Child Affect Questionnaire (factors only) (Kingery et al., 2009), Cognitive Emotion Regulation Questionnaire (N Garnefski et al., 2001), Childrens Emotion Management Scale (Zeman et al 2001), Cognitive and affective mindfulness scale (G. Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007), COPE Scale (Carver, Scheier, & Weintraub, 1989), Difficulties in emotion regulation scale (Weinberg & Klonsky, 2009), Dispositional positive emotion scale (Kring, Smith, & Neale, 1994), Early Adolescent Temperament Scale (Capaldi & Rothbart, 1992), Emotion amplification and reduction scale (Hamilton et al., 2009), Emotional approach to coping scale (Stanton, Kirk, Cameron, & Danoff-Burg, 2000), Emotion expression scale for children (Penza-Clyve & Zeman, 2002),Emotion regulation questionnaire for children and adolescents (Gullone & Taffe, 2012), Emotion regulation index for children and adolescents(Zeman, Cassano, Perry-Parrish, & Stegall, 2006), Emotion regulation of others and self-scale (Niven, Totterdell, Stride, & Holman, 2011), Mindful attentional awareness scale (Carlson & Brown, 2005), Negative Mood

Regulation Scale (Catanzaro & Mearns, 1990), Responses to Positive Affect (G. Feldman et al., 2007) and the Response to stress questionnaire(Connor-smith et al., 2000).

The summation of these questionnaires resulted in 491 items, which were grouped into categories. At this stage items were removed if the researchers believed that they were duplicates of other items in that category or if they failed to translate well into state items. This process reduced the total number of items to 368. The second extraction process targeted items that could only be relevant in very specific situations. Then to create the questionnaire for phase one testing, the items that best translated into state scales were selected from every category and re-worded to be suitable for both positive and negative scales. An additional nine of the final items that were not suitable for the state scale were included in the trait scale. The final scales comprised of 41 trait items and 32 state items (Appendix 10 & 11).

3.2.1.3.2 Mood Induction

To test the state scales of the STERQ, participants were given either a positive or negative mood induction via a video clip. The positive mood induction was a 7 minute and 13 second video clip taken from “Mr Bean”. The STERQ negative study took an excerpt from “The Lion King” showing the death of Mufasa, which lasted 3 minutes 21 seconds. The clips were chosen carefully so as not to rely on language or culture for their effect. Emotion was measured before and after a mood induction on a 5 point Likert scale measuring how much people felt on three positive emotion (happy, amused and excited) and negative emotion (sad, anxious and angry). These were totalled to give positive and negative scores.

3.2.1.4 Procedure

Both the positive and negative valance groups used the same procedure with different videos and were created and conducted through survey gizmo (www.surveygizmo.com). The

information provided to the participants informed them that the study was assessing their responses to a short video clip. If participants gave consent they were taken to the first page of the study to provide demographic information. Next the STERQ trait (Appendix 10) was completed followed by a baseline mood rating (Appendix 12). The participants then watched either a positive or negative mood induction and completed the mood ratings again. Participants then completed the STERQ state scale (Appendix 11) and answered some questions concerning the video clip to test compliance (Appendix 12).

3.2.1.5 Statistical Analysis

The survey data was downloaded directly from the survey site into .csv format. From this format the participant checks and exclusions were made. The remaining data was then exported into SPSS 21 for analysis. Before STERQ analysis, the mood induction was checked by comparing baseline and post induction positive and negative mood totals through paired sample t-tests. Skew and kurtosis as well as variance were initially checked for each item. Trait and state data from both studies were all analysed separately through exploratory principal components analysis (positive trait, positive state, negative trait and negative state). The number of factors extracted was determined by eigenvalues greater than one and the scree plot. In addition to this consideration was taken to the other scales to allow for between scale integration. Cronbach's alpha Reliability analysis was then conducted on the final factors for phase one.

3.2.2 Phase Two

3.2.2.1 Participants

Both phases in study one recruited participants from the University of Reading Research Panel (SONA) and additional websites specialised for recruitment:

www.twitter.com

www.freeads.co.uk

www.gumtree.co.uk

www.reddit.com/r/samplesize

www.onlinepsychresearch.co.uk/

psych.hanover.edu/Research/exponnet.html

www.facebook.com/onlinepsychologyresearch

STERQ positive obtained data for 319 people pre-exclusions, where only 139 of these were included in the principal components analysis. The STERQ negative obtained data for 344 people, and following exclusions 114 were included in the initial principal components analysis. Table 3.2 contains the reasons for these exclusions for both STERQ positive and negative.

Table 3.2 Participants excluded from phase two.

Reason for Participant Exclusion	Number excluded	
	STERQ Positive	STERQ Negative
Incomplete Responses	167	198
Time to Complete > 44 minutes (positive) >60 minutes (negative)	8	19
Two or more incorrect answers to memory questions	4	2
Technical Difficulties	0	11
Same response given throughout	1	0
TOTAL	180	194

3.2.2.2 Design

To verify the refined STERQ measures another pair of positive and negative mood induction studies were carried out. Secondly an additional neutral induction was added to the paradigm to test for state sensitivity if STERQ had been verified. Finally, provided successful verification, it was also planned to test convergent validity with measures of depression, anxiety, stress and emotion regulation. Both phases of this experiment were carried out alongside another Doctoral researcher, Jo Bower.

3.2.2.2.1 Mood Induction

Both the positive and negative studies contained two video clips each. The neutral clip for the positive study was 2 minutes and 4 seconds of “frozen planet” and the positive clip was a comedy sketch called “helping hands” from “Whose line is it anyway?” lasting 2 minutes 50 seconds. The neutral clip for the negative study was another clip from “frozen planet” lasting 3 minutes and 52 seconds and the negative clip was 6 minutes and 20 seconds taken from the beginning of “Up”. A neutral clip was selected to test for state sensitivity in different contexts. Emotion was measured before and after each induction on a 5-point Likert scale measuring how much people felt on three positive emotions (happy, amused and excited) and negative emotion (sad, anxious and angry). These were totalled to give positive and negative scores.

3.2.2.2.2 Convergent Validity Measures

In order to investigate relationships with depression, anxiety and stress the DASS-21 (Lovibond & Lovibond, 1995) (Appendix 4) was selected. To measure associations with hypomania, the HPS-20 was chosen (Appendix 3). Then to compare with other emotion regulation measures the short 18-item CERQ (Garnefski & Kraaij, 2006) (Appendix 8) and the DERS (Kim L. Gratz & Roemer, 2004) (Appendix 13).

3.2.2.3 Procedure

Both phase two studies were created and carried out via survey gizmo (www.surveygizmo.com) and used the same procedure as each other, with different video clips. The website initially provided participants with an information page (Appendix 14) followed by a consent page (Appendix 15), which informed participants the study was assessing responses to video clips. Once informed consent was obtained participants were taken to the first page of the questionnaire asking for demographic information. The first questionnaire to complete was the STERQ trait, positive (Appendix 16) or negative (Appendix 17) depending on the condition. Next, participants completed baseline mood ratings for the neutral video clip and then mood ratings and state STERQ immediately after. In between both

inductions the participants were asked to complete the DERS, CERQ, DASS and HPS. Before watching the second mood induction clip, another baseline mood rating was completed and again following the induction along with the state STERQ (Appendix 18) followed by memory questions to test compliance (Appendix 19).

3.2.2.4 Statistical Analysis

The data from surveygizmo was downloaded directly into .csv format, where participant checks and exclusions were made. The remaining data was then exported into SPSS 21 for analysis. Initially, the neutral and main mood induction was calculated through paired sample t-tests. Then the STERQ items were checked for skew, kurtosis and variance. Trait and state data from both studies was analysed separately, initially for factor reliability (Cronbach's alpha) followed by structural equation modelling to confirm model fit using AMOS via SPSS 21. If these models were found to be reliable and pass confirmation tests, it was planned to use the DASS, CERQ, DERS and HPS for convergent validity with Pearson correlations. Finally, provided the models could be confirmed, test the state STERQ's sensitivity to change from the neutral induction and the mood induction.

3.3 Results

3.3.1 Phase One

3.3.1.1 STERQ Positive

3.3.1.1.1 Sample Characteristics

There were 279 valid participants comprising 53 males (19%) and 226 females (81%). Ages ranged between 16 to 65 years old (as shown in Figure 1 below) where the mean age was 24.61 (SD=10.66). The mean age for males (M=26.77; SD=11.85) was not significantly different to females (M=24.35; SD=10.34): t (277) =1.49, p=.137, r=.09.

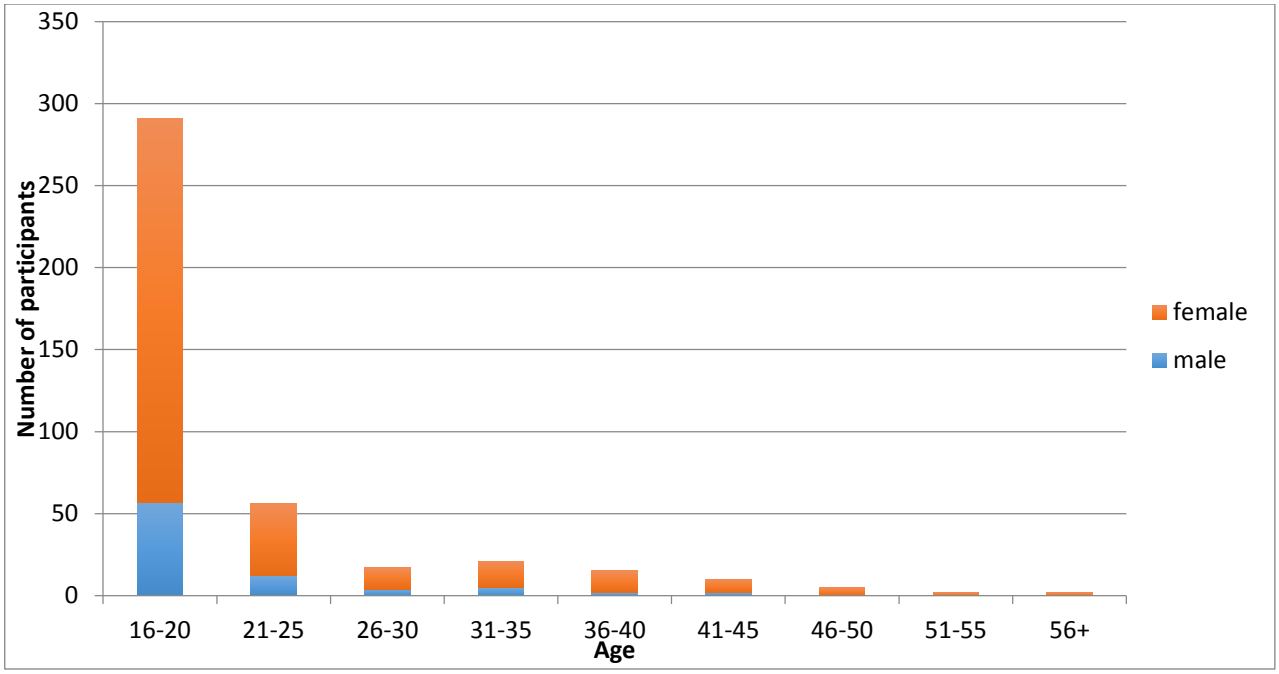

Figure 3.1 Distribution of participants by age and gender. N= 288.

3.3.1.1.2 Mood Induction

To evaluate whether the mood induction was successful, pre-mood induction ratings were compared with post-mood induction ratings through paired t-tests. This will confirm whether STERQ is being tested in the right valance and whether there was a significant mood change to test the scale. There was a significant increase in positive mood: t (278) =-4.62, p<.001, r=.26. As well as a significant decrease in negative mood: t (278) =10.33, p<.001, r=.53, which suggests an appropriate context for STERQ Positive. Further information is contained in Table 3.3 below:

Table 3.3 means and standard deviations of pre- and post-mood induction scores. N=288.

	Pre-mood induction M (SD)	Post-mood induction M (SD)
Positive mood	4.91 (2.90)	5.63 (2.82)
Negative mood	2.28 (2.36)	1.13 (1.70)

3.3.1.1.3 Item Variance

All items from both trait and state positive contained responses across the full five-point scale.

3.3.1.1.4 Exploratory Principal Components Analysis

Trait positive items were then entered a principal component analysis (PCA). A promax rotation was applied since it was assumed that underlying factors may be related, in part due to the atheoretical approach. Initial analysis supported this data's sample size suitability for PCA with a Keiser-Meyer-Oklin (KMO) value of .860, which is considered 'great' (Hutcheson & Sofroniou, 1999). Additionally, Bartlett's Test of Sphericity was highly significant ($p < .001$) also confirming the data's suitability for PCA. The number of factors selected from the initial factor analysis is usually based on the inflection point of the scree plot (Figure 3.2), which suggests a four-factor solution. However, the alternative method of using factors with eigenvalues greater than one suggests a ten-factor solution. The inflection point at four factors is generally more reliable (Costello & Osborne, 2005), although due to later integration with other scales the full 10 factor solution was used to allow for increased flexibility. The four-factor solution indicates 45% of the variance is explained where the 10-factor solution explains 62% (see Appendix 20) and the pattern matrix depicting factor structure is presented in Appendix 21.

The same PCA was then applied to the state positive items, finding a KMO value of .793, which is considered 'good' (Hutcheson & Sofroniou, 1999) and Bartlett's Test of Sphericity was highly significant ($p<.001$). A six-factor solution was indicated by the point of inflection on the scree chart (Figure 3.3) explaining 54% of the variance where the eigenvalue solution indicated an eight-factor solution explaining 60% of the variance (see Appendix 22). The eigenvalue solution was again selected to allow for more flexibility during integration. The pattern matrix of factor structure is presented in Appendix 23.

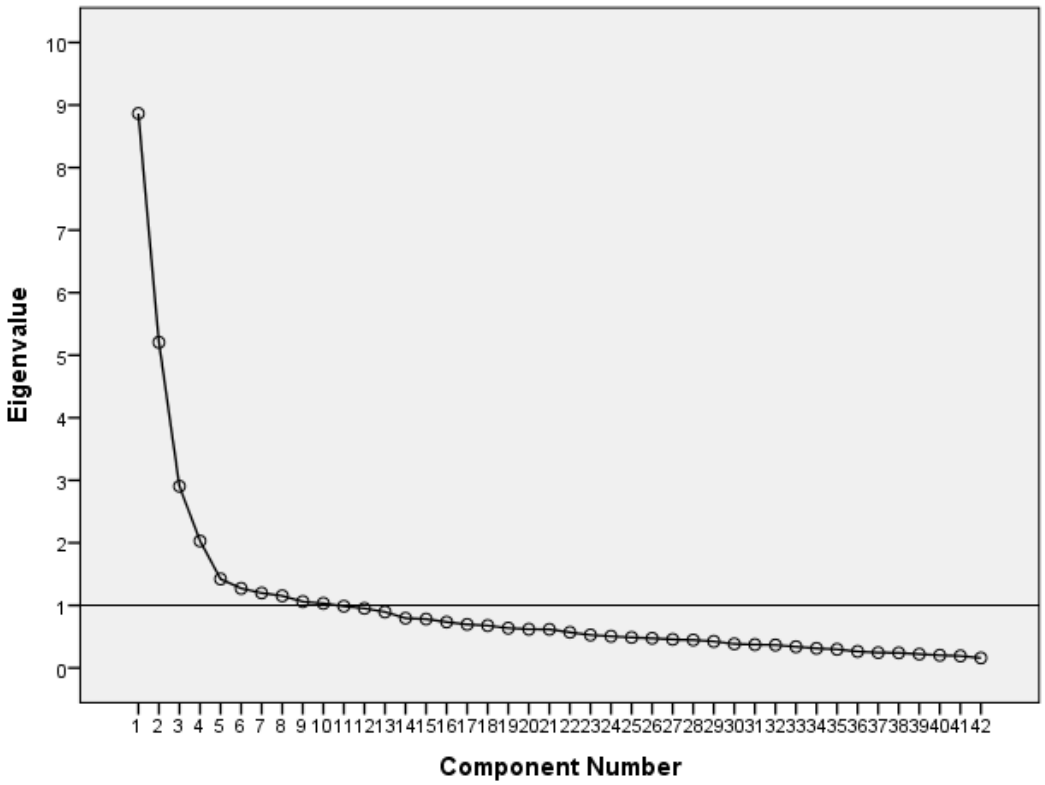

Figure 3.2 A scree plot displaying the eigenvalues for differing numbers of factors for the trait positive scale. N=288.

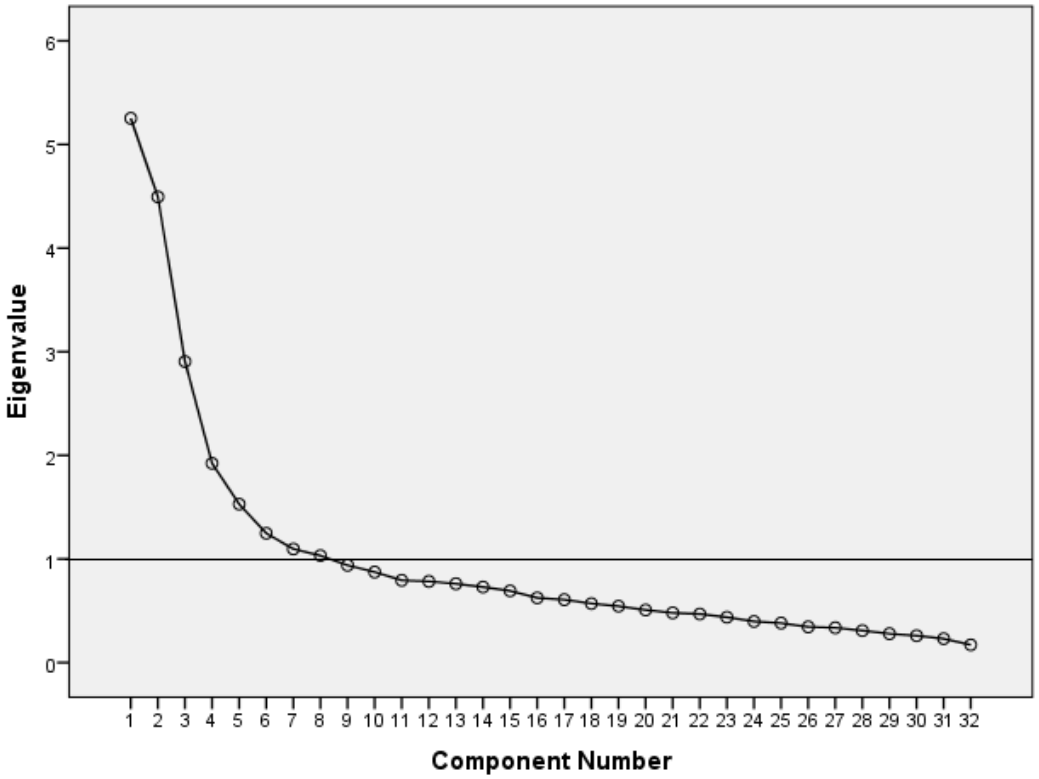

Figure 3.3 A scree plot displaying the eigenvalues for differing numbers of factors for the state positive scale. N=288.

3.3.1.2 STERQ Negative

3.3.1.2.1 Sample Characteristics

There were 417 valid participants comprising 82 males (20%) and 335 females (80%). Ages ranged between 16 to 69 years old (as shown in Figure 3.4 below) where the mean age was 21.90 (SD=7.73). The mean age for males (M=21.22; SD=6.04) was not significantly different to females (M=22.07; SD=8.09): t (413) =-0.88, p=.379, r=.04.

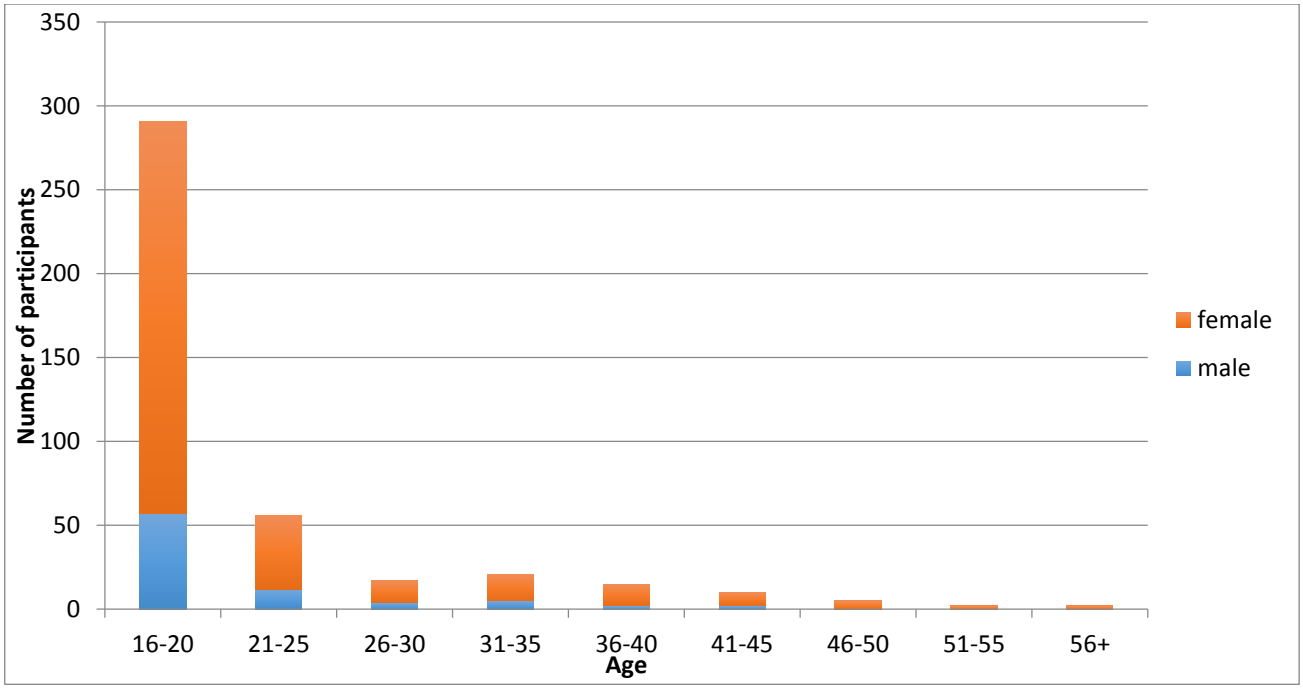

Figure 3.4 Distribution of participants by age and gender. N=418.

3.3.1.2.2 Mood Induction

To evaluate whether the mood induction was successful pre-mood induction ratings were compared with post-mood induction ratings through paired t-tests. This will ensure whether STERQ is being tested against a meaningful mood change. There was a significant increase in positive mood: t (414) =21.74, p<.001, r=.73. As well as a significant decrease in negative mood: t (414) =-14.94, p<.001, r=.59. Further information is contained in Table 3.4 below:

Table 3.4 means and standard deviations of pre- and post-mood induction scores. N=418.

	Pre-mood induction M (SD)	Post-mood induction M (SD)
Positive mood	4.54 (2.90)	1.68 (2.13)
Negative mood	2.74 (2.58)	4.67 (2.82)

3.3.1.2.3 Item Variance

All items from both trait and state negative contained responses across the full five-point scale.

3.3.1.2.4 Exploratory Principal Components Analysis

Trait negative items were entered a PCA with promax rotation with the same process applied above for positive trait and state results. Initial analysis supported this data's sample size suitability for PCA with a KMO value of .872, which is considered 'great' (Hutcheson & Sofroniou, 1999) and Bartlett's Test of Sphericity was highly significant ($p<.001$). The scree plot (Figure 3.5) inflection point suggests a three-factor solution, which only explains 38% of the variance where eigenvalues suggest a ten-factor solution suggesting 58% of the variance is explained (see Appendix 24) and the pattern matrix depicting factor structure is presented in Appendix 25. Again, for flexibility the eigenvalue ten factor solution was selected for its greater number of factors.

The PCA was then repeated for state negative items, finding a 'great' KMO value of .867 and Bartlett's Test of Sphericity was highly significant ($p<.001$). An approximately five factor solution was suggested by the inflection point of the scree chart (Figure 3.6) explaining 52% of the variance where eigenvalues greater than one suggested a seven-factor solution (see Appendix 26) and the pattern matrix of the factor structure is presented in Appendix 27. Again, the seven-factor solution was chosen for greater flexibility during integration.

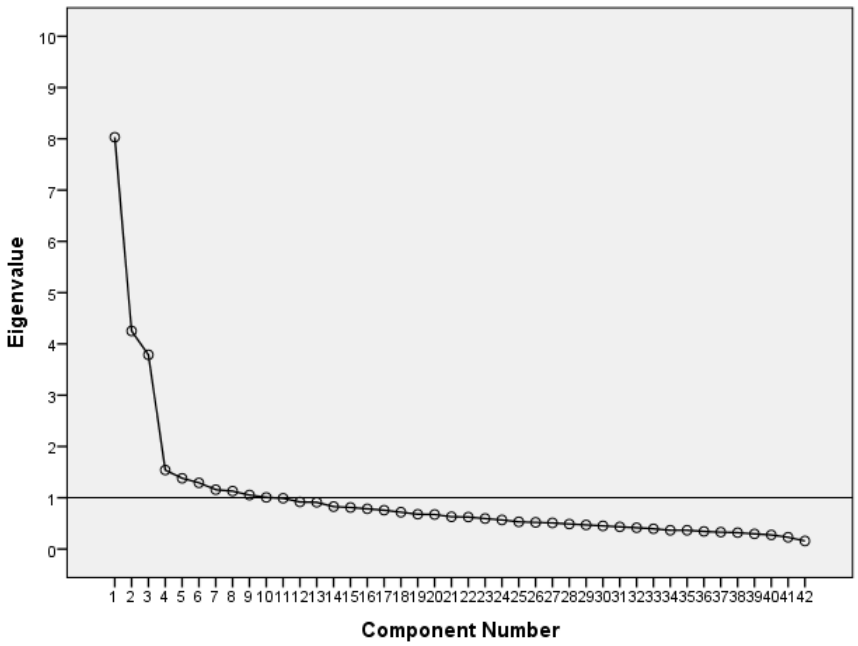

Figure 3.5 A scree plot displaying the eigenvalues for differing numbers of factors for the trait negative scale. N=418.

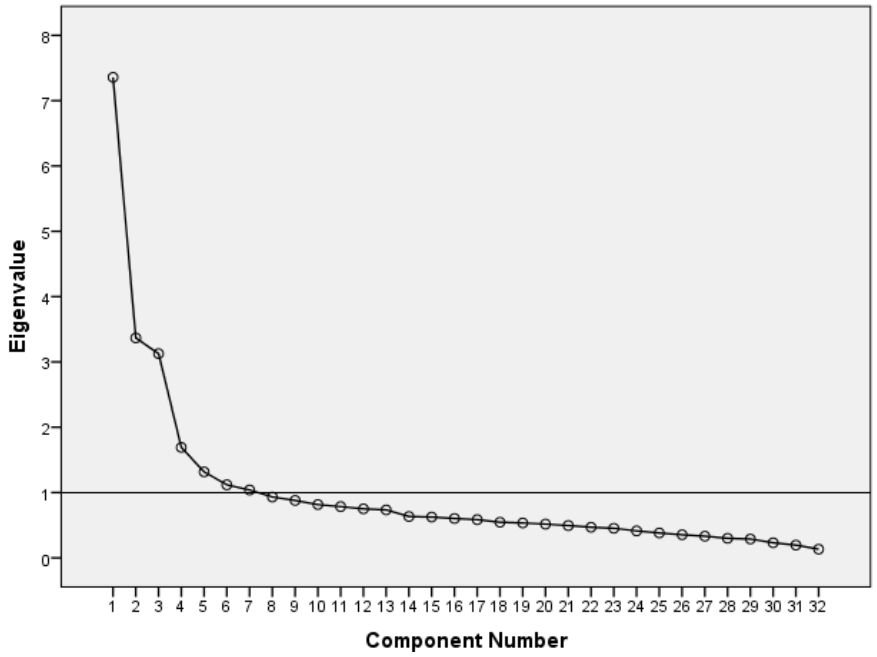

Figure 3.6 A scree plot displaying the eigenvalues for differing numbers of factors for the state negative scale. N=418.

3.3.1.3 STERQ Integration

Initially, the factors from each analysis were labelled and their validity tested through Cronbach's alpha (trait positive, Appendix 28; state positive, Appendix 29; trait negative, Appendix 30; state negative, Appendix 31). The factors from the four initial exploratory factor analyses were given labels to represent each factor. Factors with the same labels across questionnaires were matched and items from those factors items were selected based on two prerequisites, reliability and whether they appeared across measures in all identically labelled factors. This method was chosen to maintain maximum reliability and inter-questionnaire consistency. Furthermore, while this involves four factor analyses, the positive and negative state subscales will be merged for it to not be valence specific. This requires more compromise as both state factor analyses need to be symmetrical. The selected items in the remaining factors were then checked through Cronbach's Alpha, as shown below:

Table 3.5 Reliability and inter-item correlations for Trait Positive Factors Post Item Reduction. N=288.

Subscale	Items	Cronbach's Alpha (α)	Inter-item correlation (r min- r max)
Avoidance	I want to avoid the situation by trying to escape I think about ways in which I can change the experience I avoid the experience because I know it will be emotional	.744	.441-.586
Emotion Focus	My feelings were out of control My feelings made it difficult to concentrate It is difficult for me to make sense of what I am feeling, whilst I am feeling it	.637	.273-.460
Harnessing	I could use my feelings about the experience to my advantage I can hold on to the emotions I felt in the situation I feel that something good will come of it	.679	.372-.478
Mindfulness	I experience emotion but am not aware of it until sometime later I do not generally pay much attention to how I feel	.470	.309
Reappraisal	I seek out information related to the event to understand or change how I am feeling I analyse the experience to try to understand why I feel the way I did I change the way I think about the experience to alter how I am feeling	.711	.436-.476
Suppression	I control my feelings by not showing them I try to hide how I was feeling It is easy for me to show my feelings	.799	.521-.650

Table 3.6 Reliability for State Positive Factors Post item Reduction. N=288.

Subscale	Items	Cronbach's Alpha (α)	Inter-item correlation (r min- r max)
Avoidance	I wanted to avoid the situation by closing my eyes or looking away The situation had such an effect I wished it would just go away	.679	.527
Emotion Focus	I felt like my emotions were out of control My feelings make it difficult to concentrate It was difficult for me to make sense of my feelings at the time	.416	.167-.206
Harnessing	I felt like I could use what I was feeling to my advantage I tried to see the funny side of the situation I could hold on to the feelings evoked by the situation I felt something good would come of the situation	.722	.328-.500
Mindfulness	I was aware of my feelings I could accept my feelings about the situation I was aware of my feelings	.681	.321-.490
Reappraisal	I changed the way I thought about the situation to alter how I was feeling I reminded myself that I was not part of the situation I reminded myself that the situation was not real	.706	.296-.609
Resilience	I was able to manage the emotions I was feeling I could accept my feelings about the situation I felt like the situation would not last I felt like I could stay calm and not be affected by the situation	.574	.157-.415
Rumination	My feelings made it hard to focus on other things I felt like the same things were going round and round in my head It was difficult to get the situation out of my mind	.781	.379-.759
Suppression	I controlled my feelings by not showing them I tried to hide what I was feeling	.607	.502

Table 3.7 Reliability for Trait Negative Factors Post item Reduction. N=418.

Subscale	Items	Cronbach's Alpha (α)	Inter-item correlation (r min- r max)
Avoidance	I want to avoid the situation by trying to escape The situation had such a big impact on me I wished it would just go away I avoid the experience because I know it will be emotional	.714	.441-.483
Emotion Focus	My feelings were out of control My feelings made it difficult to concentrate It is difficult for me to make sense of what I am feeling, whilst I am feeling it	.683	.319-.506
Intrusion	It is difficult to get the experience out of my mind I feel like the same things were going round and round in my head	.669	.503
Mindfulness	I experience emotion but am not aware of it until sometime later I do not generally pay much attention to how I feel	.316	.188
Reappraisal	I seek out information related to the event to understand or change how I am feeling I analyse the experience to try to understand why I feel the way I did I change the way I think about the experience to alter how I am feeling	.629	.308-.451
Resilience	I could use my feelings about the experience to my advantage I can stay calm and not be affected by the situation When I know in advance about the experience, I can choose to stay calm I feel like this is not going to last It was easy to manage what I was feeling	.614	.214-.408
Suppression	I control my feelings by not showing them It is easy for me to show my feelings I try to hide how I was feeling	.718	.410-.486

Table 3.8 Reliability for State Negative Factors Post item Reduction. N=418.

Subscale	Items	Cronbach's Alpha (α)	Inter-item correlation (r min- r max)
Avoidance	The situation had such an effect I wished it would just go away I wanted to avoid the situation by closing my eyes or looking away	.699	.538
Emotion Focus	It was difficult for me to make sense of my feelings at the time I felt like my emotions were out of control My feelings make it difficult to concentrate	.749	.442-.601
Harnessing	I tried to see the funny side of the situation I felt like I could use what I was feeling to my advantage I could hold on to the feelings evoked by the situation I felt something good would come of the situation	.399	.003-.272
Mindfulness	I paid attention to my feelings I was aware of my feelings I could accept my feelings about the situation	.658	.327-.373
Reappraisal	I reminded myself that I was not part of the situation I reminded myself that the situation was not real I changed the way I thought about the situation to alter how I was feeling	.689	.388-.508
Resilience	I could accept my feelings about the situation I felt like I could stay calm and not be affected by the situation I was able to manage the emotions I was feeling I felt like the situation would not last	.617	.207-.494
Rumination	I felt like the same things were going round and round in my head My feelings made it hard to focus on other things It was difficult to get the situation out of my mind	.864	.574-.846
Suppression	I controlled my feelings by not showing them I tried to hide what I was feeling	.738	.589

While the some of the subscales achieved acceptable levels greater than .7, many more were found at the .6 level. This is often considered to be questionable reliability, however this could be partly due to a lack of items in the subscale rather than a genuine lack of reliability (Tavakol & Dennick, 2011). Therefore, these borderline cases were maintained to be validated on their performance in the second phase of this study. Additionally, some subscales demonstrated unacceptable Cronbach's alpha, such as trait mindfulness in both positive and negative subscales (.470 and .316 respectively). This is because this subscale was artificially created to mirror the state subscales as an item that should have been in the trait

questionnaire, which was in the state scale, was omitted. Therefore, phase 2 will retest this subscale with the additional item.

The second source of reliability issues below .6 are created by the compromise of keeping identical scales between state positive and negative. This is because some emotion regulation subscales appear to be valence specific, which are emotion focus (state positive alpha=.416), resilience (state positive alpha=.574) and harnessing (state negative alpha=.399). A result of this will be that it is likely these subscales will only be reliable when testing either positive or negative valences and will need to be interpreted more carefully.

3.3.2 Phase Two

3.3.2.1 Positive

3.3.2.1.1 Sample Characteristics

There were 139 valid participants comprising 22 males (16%) and 117 females (84%). Ages ranged between 17 to 65 years old (as shown in Figure 3.7 below) where the mean age was 24.09 (SD=9.84). The mean age for males (M=30.32; SD=14.16) was significantly different to females where equal variances were not assumed (M=22.91; SD=9.37): t(23.83)=2.375, p=.026, r=.44.

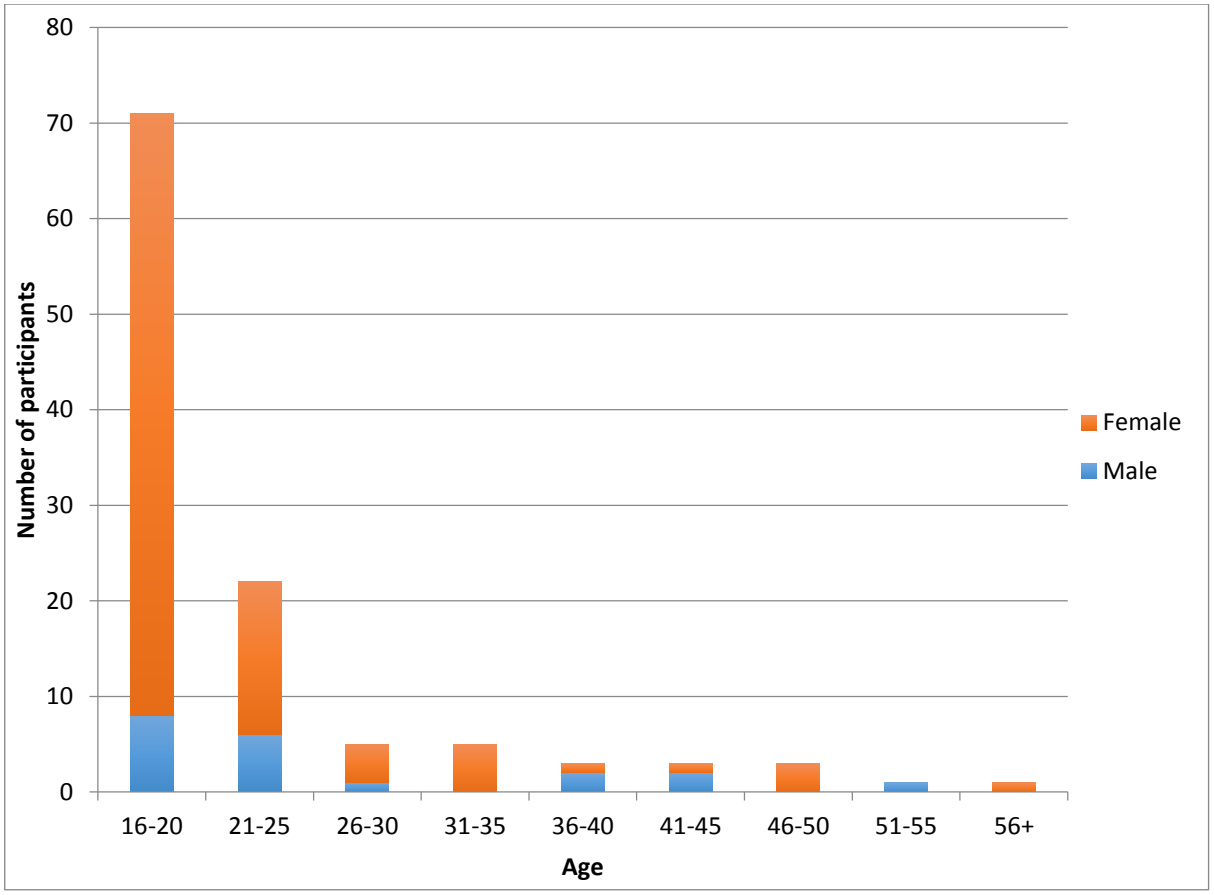

Figure 3.7 Distribution of participants by age and gender. N=139.

3.3.2.1.2 Mood Induction

To evaluate whether the mood induction was successful pre-mood induction ratings were compared with post-mood induction ratings through paired t-tests. This was done for both the neutral video and positive video. For the neutral video, there was a significant increase in positive mood (t (138) =12.315, p<.001, r=.72) and a significant decrease in negative mood (t (138) =6.313, p<.001, r=.47). For the positive video, there was a significant increase in positive mood: (t (138) =10.383, p<.001, r=.66). As well as a significant decrease in negative mood: (t (138) =5.465, p<.001, r=.42). Additionally, the positive baseline for the neutral induction was not significantly different to the positive induction baseline (t (138) =-.980, p=N.S, r=.08) but baseline for the positive video was significantly lower than the neutral induction (t (138) =3.198, p<.01, r=.26). Further information is contained in Table 3.9 below:

Table 3.9 means and standard deviations of pre- and post-mood induction scores. N=139.

	Pre-neutral induction M (SD)	Post-neutral induction M (SD)	Pre-positive induction M (SD)	Post-positive induction M (SD)
Positive mood	1.30 (0.89)	2.04 (0.89)	1.35 (0.84)	2.00 (0.91)
Negative mood	0.65 (0.76)	0.37 (0.55)	0.53 (0.66)	0.28 (0.53)

3.3.2.1.3 Item Variance

All items from both trait and state positive contained responses across the full five-point scale.

3.3.2.1.4 Trait Subscale reliability

The confirmatory factor analysis and reliability statistics were calculated using the positive mood induction video, as the neutral video was only included to detect the SERQ's sensitivity to change. Reliability was calculated through Cronbach's alpha to test the subscales identified in the first phase, shown in Table 8 below. Whilst most subscales demonstrated an acceptable level of reliability (>.6), both mindfulness and harnessing failed to do so. There were also some items that failed to meet acceptable inter-item correlations (>.5).

Table 3.10 Reliability for Trait Positive Factors. N=139.

Subscale	Items	Cronbach's Alpha (α)	Inter-item correlation (r min- r max)
Avoidance	I want to avoid the situation by trying to escape I think about ways in which I can change the experience I avoid the experience because I know it will be emotional	.814	.612-.710
Emotion Focus	My feelings were out of control My feelings made it difficult to concentrate It is difficult for me to make sense of what I am feeling, whilst I am feeling it	.650	.342-.583
Harnessing	I could use my feelings about the experience to my advantage I can hold on to the emotions I felt in the situation I feel that something good will come of it	.585	.290-.473
Mindfulness	I experience emotion but am not aware of it until sometime later I do not generally pay much attention to how I feel I generally accept my feelings about the situation	.567	.277-.442

Reappraisal	I seek out information related to the event to understand or change how I am feeling I analyse the experience to try to understand why I feel the way I did I change the way I think about the experience to alter how I am feeling	.691	.410 -.586
Suppression	I control my feelings by not showing them I try to hide how I was feeling It is easy for me to show my feelings	.685	.362-.617

3.3.2.1.5 Trait Confirmatory factor analysis

A confirmatory factor analysis was conducted to investigate how well the six-factor model fitted to the data. Chi-square tests of the model were found to be highly significant ($\chi^2(124, n = 139) = 322.79, p < .001$), which can indicate a poor model fit, however this can also be a result of a large sample size. However, the competitive fit index (CFI) was well below the acceptable range (>.9; Byrne, 1994) at .76. Due to the failure of this model to suitably fit the data no further analysis of convergent validity would be meaningful.

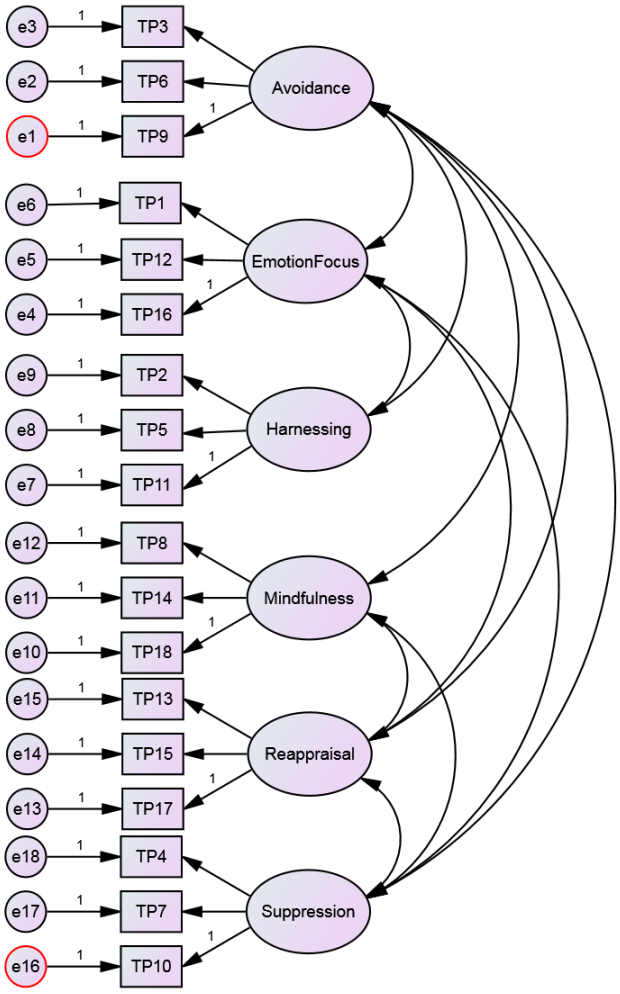

Figure 3.8 Structural equation model of the trait positive items and factors. N=139.

3.3.2.1.6 State Subscale reliability

The confirmatory factor analysis and reliability statistics were calculated using the positive mood induction video, as the neutral video was only included to detect the SERQ's sensitivity to change. Reliability was calculated through Cronbach's alpha to test the subscales identified in the first phase, shown in Table 3.11 below. Whilst most subscales demonstrated an acceptable level of reliability (>.6), resilience failed to do so. There were also three factors containing items that failed to meet acceptable inter-item correlations (>.5).

Table 3.11 Reliability for State Positive Factors. N=139.

Subscale	Items	Cronbach's Alpha (α)	Inter-item correlation (r min- r max)
Avoidance	I wanted to avoid the situation by closing my eyes or looking away The situation had such an effect I wished it would just go away	.787	.686
Emotion Focus	I felt like my emotions were out of control My feelings make it difficult to concentrate It was difficult for me to make sense of my feelings at the time	.717	.435-653
Harnessing	I felt like I could use what I was feeling to my advantage I tried to see the funny side of the situation I could hold on to the feelings evoked by the situation I felt something good would come of the situation	.790	.536-.687
Mindfulness	I was aware of my feelings I could accept my feelings about the situation I was aware of my feelings	.698	.427-.641
Reappraisal	I changed the way I thought about the situation to alter how I was feeling I reminded myself that I was not part of the situation I reminded myself that the situation was not real	.719	.505-.577
Resilience	I was able to manage the emotions I was feeling I could accept my feelings about the situation I felt like the situation would not last I felt like I could stay calm and not be affected by the situation	.418	.130-.326
Rumination	My feelings made it hard to focus on other things I felt like the same things were going round and round in my head It was difficult to get the situation out of my mind	.734	.469-.634
Suppression	I controlled my feelings by not showing them I tried to hide what I was feeling	.789	.654

3.3.2.1.7 State confirmatory factor analysis

A confirmatory factor analysis was conducted to investigate how well the eight-factor state model fitted to the data. Chi-square tests of the model were found to be highly significant ($\chi^2(213, n = 139) = 496.76, p < .001$), which can indicate a poor model fit, however this can also be a result of a larger sample size. However, the competitive fit index (CFI) was well below the acceptable range (>.9; Byrne, 1994) at .81. Due to the failure of this model to suitably fit the data no further analysis of convergent validity or state sensitivity to change would be meaningful.

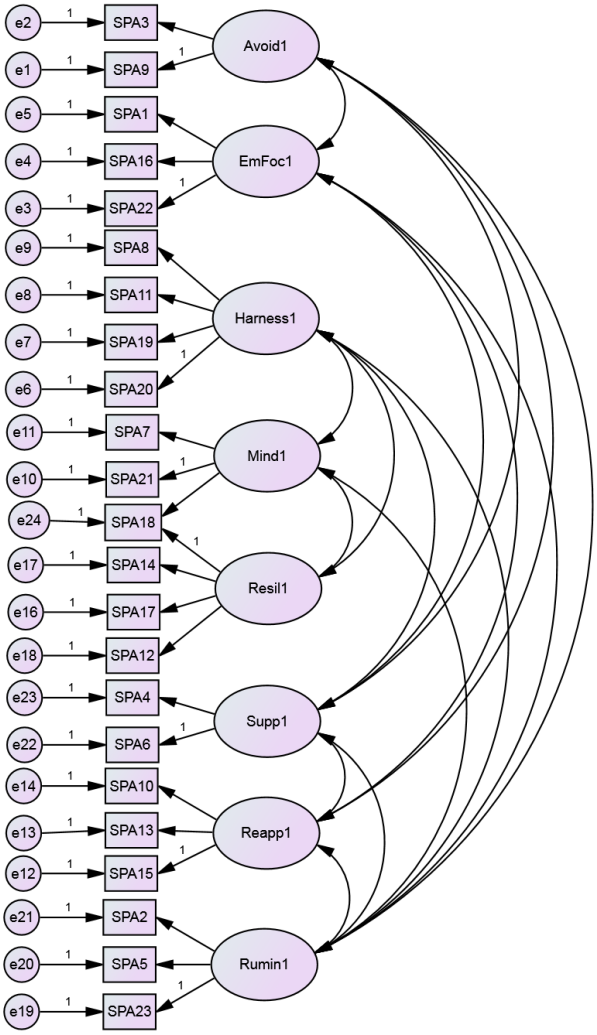

Figure 3.9 Structural equation model of the state positive items and factors. N=139.

3.3.2.2 Negative

3.3.2.2.1 Sample Characteristics

There were 114 valid participants comprising 20 males (18%) and 94 females (82%). Ages ranged between 17 to 65 years old (as shown in Figure 3.10 below) where the mean age was 23.25 (SD=8.65). The mean age for males (M=2.60; SD=10.92) was not significantly different to females where equal variances were not assumed (M=22.53; SD=7,97): t (23.49) =-1.579, p=N.S, r=.31.

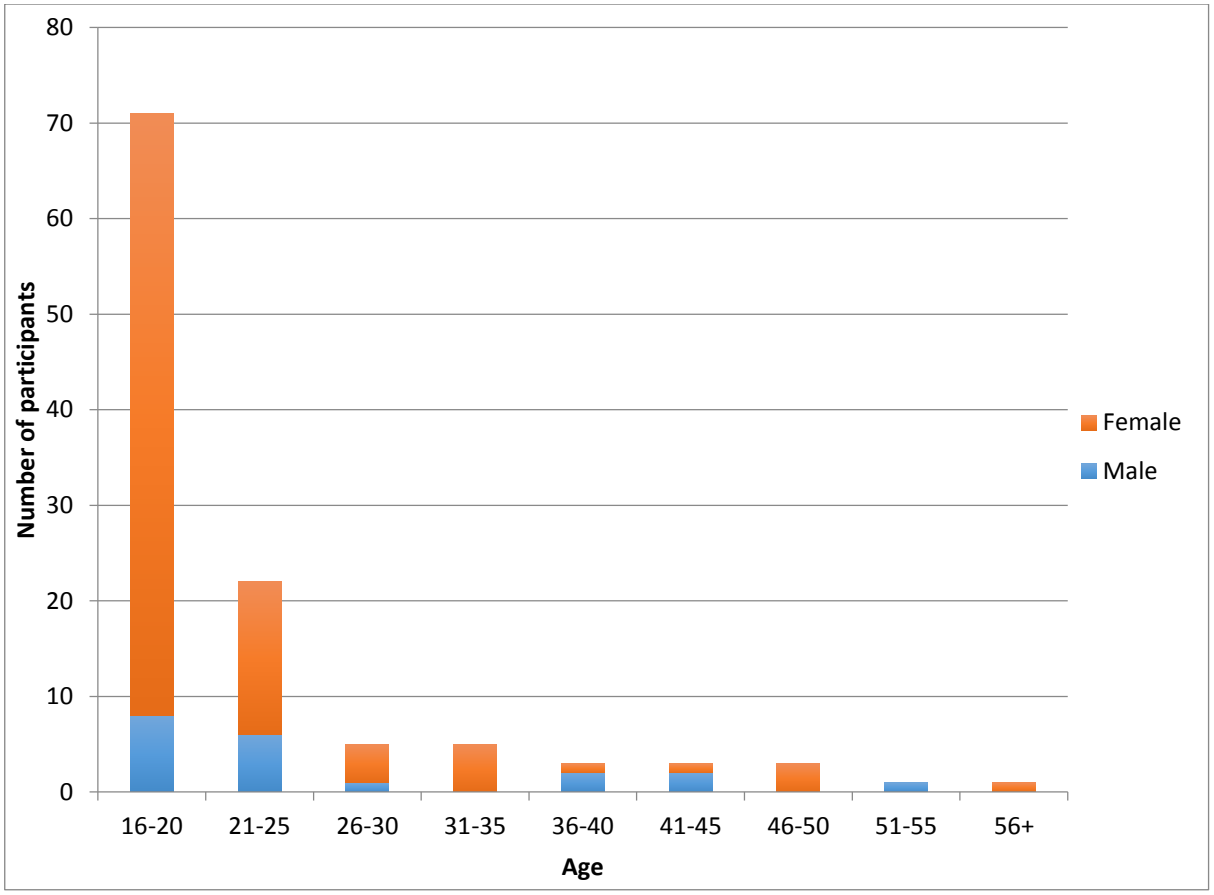

Figure 3.10 Distribution of participants by age and gender. N=114.

3.3.2.2.2 Mood Induction

To evaluate whether the mood induction was successful pre-mood induction ratings were compared with post-mood induction ratings through paired t-tests. This was done for both the neutral video and negative video. For the neutral video there was no significant change in positive mood (t (113) =.675, p=N.S, r=.06) and no significant change in negative mood (t (113) =1.444, p=N.S, r=.13). For the negative video, there was no significant decrease in positive mood: (t (113) =1.224, p=N.S, r=.11). But did significantly increase negative mood: (t (113) =4.399, p<.001, r=.38). Additionally, the positive baseline for the neutral induction was significantly different to the negative induction positive baseline (t (113) =7.408, p<.001, r=.57) but the negative mood baselines were not significantly different (t(113)=0.867, p=N.S, r=.08). Further information is contained in Table 3.12 below:

Table 3.12 means and standard deviations of pre- and post-mood induction scores. N=114.

	Pre-neutral induction M (SD)	Post-neutral induction M (SD)	Pre-negative induction M (SD)	Post-negative induction M (SD)
Positive mood	1.26 (0.98)	1.30 (0.96)	0.83 (0.90)	0.73 (0.87)
Negative mood	0.76 (0.83)	0.67 (0.72)	0.71 (0.87)	1.09 (0.77)

3.3.2.2.3 Item Variance

All items from both trait and state positive contained responses across the full five point scale.

3.3.2.2.4 Trait Subscale reliability

The confirmatory factor analysis and reliability statistics were calculated using the negative mood induction video. Reliability was calculated through Cronbach's alpha to test the subscales identified in the first phase, shown in Table 11 below. Whilst most subscales demonstrated an acceptable level of reliability (>.6), mindfulness failed to do so. Also, only two factors contained no items that failed to meet acceptable inter-item correlations (>.5).

Table 3.13 Reliability for Trait Negative Factors. N=114.

Subscale	Items	Cronbach's Alpha (α)	Inter-item correlation (r min- r max)
Avoidance	I want to avoid the situation by trying to escape The situation had such a big impact on me I wished it would just go away I avoid the experience because I know it will be emotional	.830	.612-.759
Emotion Focus	My feelings were out of control My feelings made it difficult to concentrate It is difficult for me to make sense of what I am feeling, whilst I am feeling it	.717	.475-.611
Intrusion	It is difficult to get the experience out of my mind I feel like the same things were going round and round in my head	.813	.686
Mindfulness	I experience emotion but am not aware of it until sometime later I do not generally pay much attention to how I feel	.305	.120-.220
Reappraisal	I seek out information related to the event to understand or change how I am feeling I analyse the experience to try to understand why I feel the way I did I change the way I think about the experience to alter how I am feeling	.683	.333-.604
Resilience	I could use my feelings about the experience to my advantage I can stay calm and not be affected by the situation When I know in advance about the experience, I can choose to stay calm I feel like this is not going to last It was easy to manage what I was feeling	.656	.098-.643
Suppression	I control my feelings by not showing them It is easy for me to show my feelings I try to hide how I was feeling	.715	.315-.679

3.3.2.2.5 Trait Confirmatory factor analysis

A confirmatory factor analysis was conducted to investigate how well the seven factor model fitted to the data. Chi-square tests of the model were found to be highly significant ($\chi^2(197, n = 114) = 418.05, p < .001$), which can indicate a poor model fit, however this can also be a result of a large sample size. However, the competitive fit index (CFI) was well below the acceptable range (>.9; Byrne, 1994) at .79. Due to the failure of this model to suitably fit the data no further analysis of convergent validity would be meaningful.

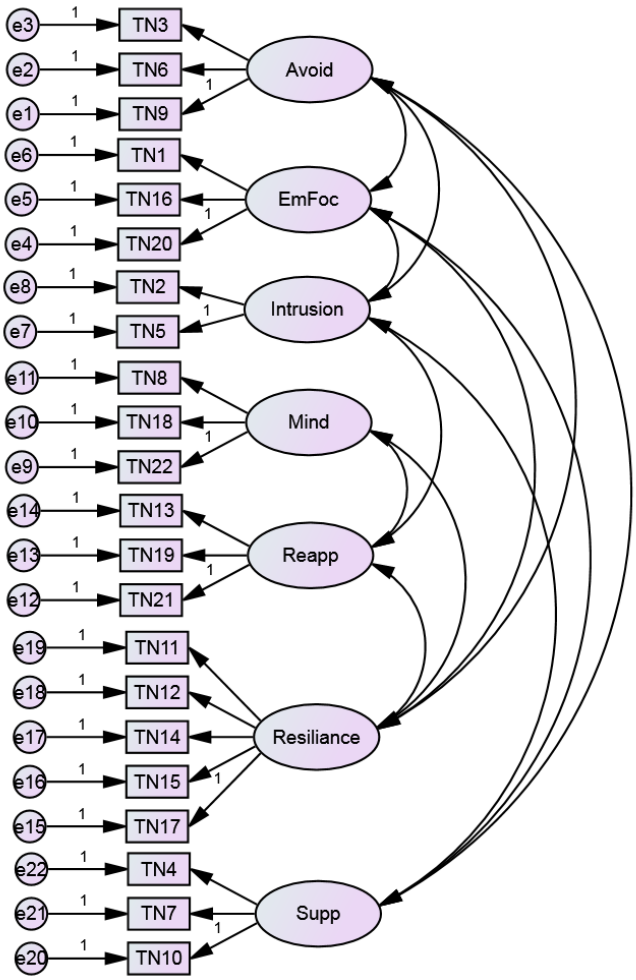

Figure 3.11 Structural equation model of the trait negative items and factors. N=114.

3.3.2.2.6 State Subscale reliability

The confirmatory factor analysis and reliability statistics were calculated using the positive mood induction video, as the neutral video was only included to detect the SERQ's sensitivity to change. Reliability was calculated through Cronbach's alpha to test the subscales identified in the first phase, shown in Table 12 below. Whilst all subscales demonstrated an acceptable level of reliability (>.6) there were also four factors that failed to meet acceptable inter-item correlations (>.5).

Table 3.14 Reliability for State Negative Factors. N=114.

Subscale	Items	Cronbach's Alpha (α)	Inter-item correlation (r min- r max)
Avoidance	The situation had such an effect I wished it would just go away I wanted to avoid the situation by closing my eyes or looking away	.715	.562
Emotion Focus	It was difficult for me to make sense of my feelings at the time I felt like my emotions were out of control My feelings make it difficult to concentrate	.629	.320-.528
Harnessing	I tried to see the funny side of the situation I felt like I could use what I was feeling to my advantage I could hold on to the feelings evoked by the situation I felt something good would come of the situation	.636	.270-.529
Mindfulness	I paid attention to my feelings I was aware of my feelings I could accept my feelings about the situation	.793	.592-.687
Reappraisal	I reminded myself that I was not part of the situation I reminded myself that the situation was not real I changed the way I thought about the situation to alter how I was feeling	.664	.322-.630
Resilience	I could accept my feelings about the situation I felt like I could stay calm and not be affected by the situation I was able to manage the emotions I was feeling I felt like the situation would not last	.674	.381-.502
Rumination	I felt like the same things were going round and round in my head My feelings made it hard to focus on other things It was difficult to get the situation out of my mind	.796	.551-.709
Suppression	I controlled my feelings by not showing them I tried to hide what I was feeling	.816	.694

3.3.2.2.7 State Confirmatory factor analysis

A confirmatory factor analysis was conducted to investigate how well the seven factor model fitted to the data. Chi-square tests of the model were found to be highly significant ($\chi^2(209, n = 114) = 442.54, p < .001$), which can indicate a poor model fit, however this can also be a result of a large sample size. However, the competitive fit index (CFI) was well below the acceptable range (>.9; Byrne, 1994) at .78. Due to the failure of this model to suitably fit the data no further analysis of convergent validity or state sensitivity to change would be meaningful.

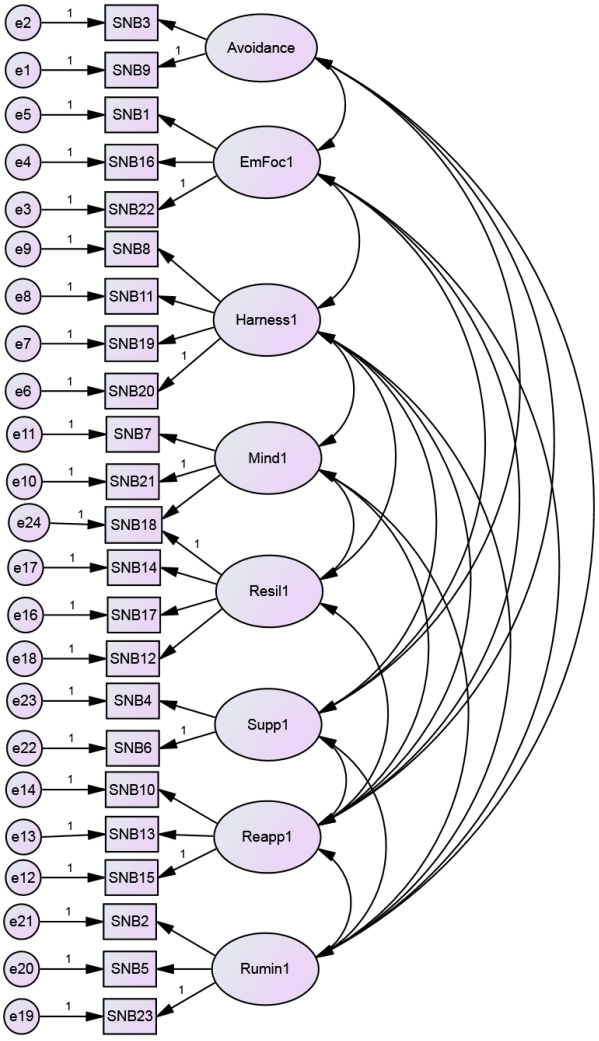

Figure 3.12 Structural equation model of the state negative items and factors. N=114.

3.3.2.2.8 Results Summary

As a result of confirmatory testing, each model was found to be inadequate (trait positive CFI=.76; state positive CFI=.81; trait negative CFI=.79; state negative CFI=.78), in addition to this only the state negative confirmation found each factor to have at least acceptable reliability. No scale was found to have all acceptable inter-item correlations. With these considerations any further analysis of these models would not be meaningful and therefore they will not be conducted.

3.4 Discussion

These studies aimed to create a set of questionnaires to fit three gaps within the literature, an atheoretical approach, state/trait measure and inclusive of positive emotion. While phase one was successful, phase two failed to validate, halting its development. There are many potential contributing factors to this result. These may not be confined to the design or testing process of the study, but potentially they might have contributed to its underlying approach.

While an atheoretical approach is novel and would be experimentally valuable, it is at great risk of disorderly data. This risk comes from the base items, where many of the items could easily group with other items making factor structure vulnerable to, rather than flexible with, context. Many of the items were also too distinct from each other, questioning subscale face validity. These two issues may seem opposite to one another. However, emotion regulation strategies tend to be somewhat related, even when conceptually distinct. In hindsight, two methods could be applied to attend to this issue. The first would be distinct groups of items created in item generation, which was attempted to a limited degree. However, this was not originally pursued to avoid undermining the atheoretical aspect. A second approach applied in the data analysis of phase one would have been a strict controlling for collinearity between items as this underlying collinearity was most likely responsible for unreproducible factors.

Another major issue in phase two's failure to replicate were the sacrifices in reliability made by the ambitious demands of (broadly) symmetrical state/trait and positive/negative scales. To make these scales symmetrical, mathematically ideal factor sizes and structures suggested by the scree plot were overruled by less conservative eigenvalues. This was a necessary part of the design, so that the strategies would have 4 equivalents for potential translation across scales. Without this demand, the factor structures may have been

considerably more reliable. Again, in hindsight, it is questionable that even symmetrical scales, while providing 'face symmetry', may not be symmetrical in function as positive and negative emotion are conceptually distinct (Fredrickson et al., 2008). Therefore, a future development from the same pool of items could prioritise symmetry within positive state/trait and negative state/trait separately. This would minimise reliability compromises and maintain translational ability between state and trait scales. However, this minimisation still has potential issues. Previous state/trait inventories, such as the State Trait Anxiety Inventory (Speilberger, 1983) found that items functioned differently between state and trait, resulting in different item sets for each measure. This limitation was not explored by Speilberger and understanding why these differences between state and trait can occur is an area that needs more exploring. It is possible that generalisation focuses on reactions to general temperament instead of specific reactions, where emotion regulation may act differently.

Both samples were recruited and tested online, many of these were undergraduate students. However, the population was demographically varied with the majority from phase one from the UK (~80%) and in phase two the majority were from the USA (~ 65%). While this would be a strength of a successfully validated study, it may actually be a potential cause of the unreliable factor structure.

Another limitation of the study, though perhaps not contributing to the result of phase two, was the mood induction situations. STERQ was designed to potentially assess emotion regulation in a variety of contexts beyond video clip based mood induction. Although the study was already tackling many different aspects, it was only used in one positive/negative context. Therefore, if the STERQ had validated, it would have seen future verification within other contexts such as experience sampling (such as chapter 6) and other emotions. However, the mood inductions were broadly successful with good effect sizes with the one exception that the neutral video clips were found to be generally positive. The positivity of the neutral

video clips is not a major limitation of this study as they were used to test sensitivity to change, which relied upon the confirmation of factor structure.

3.4.1 Future Studies

There are several ways that this methodology could inform or be carried into future studies. The main issue behind many of the limitations of this study is its atheoretical breadth. Trying to account for state and trait while simultaneously accounting for positive and negative emotion spreads the questionnaire very thinly. In addition, the necessity of symmetry across scales weakens reliability further. If this experiment were to be repeated, it is likely to be most effective to remove either positive or negative emotion. This is because STERQ was designed to be an experimental tool and a state/trait comparison will probably be more frequently experimentally useful than a cross valence measure. On the other hand, a cross valence measure would still be useful due to the sparse number of existing measures that can cover both positive and negative emotion. This straight replication without one dimension will increase the reliability of the scales identified in the exploratory analysis.

Another way that this approach could be replicated to better effect would be to focus on a particular emotion regulation strategy that is well known to be relevant in positive and negative situations. For example, suppression has been shown to have strong impacts in both negative (e.g. ERQ; Gross, 1998) and positive emotion (e.g. Gruber, Harvey, & Gross, 2012). Items would be sourced from a variety of emotion regulation questionnaires that cover suppression, such as the positive and negative versions of the suppression ERQ scale. If necessary, additional items could be created by participants asked to describe ways they have suppressed their emotion and how they might describe suppression. This measure of state/trait, positive and negative emotion suppression would provide potential for a considerably deeper understanding of the strategy that cannot yet be measured. The depth that could be reached by applying a STERQ approach to one emotion regulation strategy also

highlights the potential value of the original STERQ as well as demonstrating how it became overstretched by the demands placed upon the methodology.

3.4.2 Conclusion

In general, the initial exploratory analysis of phase one lacked the strict regulation it needed to become a fully functioning questionnaire. This should have been controlled by identifying collinearity as well as both internal reliability and intra subscale correlations to question or exclude subscales. This may have led to a more stable questionnaire, still able to retain some of its ambitious goals, potentially at the cost of inter-questionnaire symmetry.

Chapter Four: Inducing Catastrophising

4.1 Introduction

The second chapter of this thesis found associations between catastrophising and depression, anxiety and stress. This chapter will build on this understanding by manipulating catastrophising and measuring mood in a laboratory setting. If participants are instructed to catastrophise and mood decreases; this would support the hypothesis that catastrophising has a causal effect on mood. Supporting the wider assumption that catastrophising's associations with depression, anxiety and stress are through its effect on mood, highlighting it as a psychopathological risk factor. Catastrophising was defined by Ellis (1962, p. 442) as focusing on how terrible a situation appears to be. This concept was later refined by Beck, Rush, Shaw, & Emery (1979, p.425) as a cognitive error in anxiety and depression, where catastrophising was dwelling on the worst possible outcome of a situation. This was also posited by Abramson, Metalsky, & Alloy (1989) as a specific risk factor for depression. However, there are a limited range of studies investigating depression, anxiety and stress with catastrophising (e.g. Abela, 2001; Hiller, Lovato, Gradisar, Oliver, & Slater, 2014; Noëssl, Francis, Williams-Outerbridge, & Fung, 2012).

Current research on catastrophising in anxiety and depression is largely focused into two domains. One is childhood and adolescence, where catastrophising is treated as a cognitive error and a key risk factor for depression (Abramson et al., 1989) by Abela (2001). Using this theory both Abela (2001) and Abela & Sarin (2002) were able to use catastrophising scores to predict depression over six and ten week periods respectively. Developmental researchers have also found catastrophising to be a strong predictor for a range of anxiety measures in cross-sectional studies (Legerstee, Garnefski, Jellesma, Verhulst, & Utens, 2010; Watts & Weems, 2006; Weems et al., 2001). Studies have also cross-sectionally analysed depression and anxiety with catastrophising simultaneously (Verduin & Kendall, 2010; Zahn-

Waxler, Klimes-Dougan, & Slattery, 2000). Taking these relationships one step further to understand the association between catastrophising and depression Noël et al. (2012) also controlled for anxiety scores. These measures were taken at three developmental time points (8-9, 10-11 and 12-13 years old) and found that only in the youngest age group (8-9 years) depression explained significantly more variance than catastrophising after controlling for anxiety (7%). Garnefski, Legerstee, Kraaij, Van Den Kommer, & Teerds (2002) found differences between adolescents and adults, where adults tend to catastrophise significantly more and their catastrophising scores are much more closely linked with depression and anxiety. However, this effect was not unique to catastrophising as adults reported a greater use of all CERQ emotion regulation strategies but catastrophising showed the strongest association with depression and anxiety.

Another domain of research focusing on catastrophising is in the context of pain, an area primarily consolidated by Sullivan, Bishop, & Pivik (1995). These domains are discussed separately not just due to general difference in age focus and context, but also because there is a one-way interaction from pain catastrophising literature to emotion regulation literature. While some emotion regulation studies may make brief mentions of the literature (e.g. Garnefski et al., 2002), there is little attempt in to bring concepts from pain across to non-pain depression and anxiety.

In cross-sectional pain studies, catastrophising has shown associations with depression (e.g. Richardson et al., 2009; Roth, Lowery, & Hamill, 2004; Sullivan & D'Eon, 1990). Catastrophising has also been shown to predict depression (Turner, Jensen, & Romano, 2000). Although age has also been shown as a factor, where older people with chronic pain are significantly less likely to become depressed than younger people with chronic pain (B. M. Wood et al., 2010). However, studies have still found catastrophising to be a significant predictor of pain, depression and disability in older adults (Corran, Gibson, Farrell, & Helme,

1994; López-López, Montorio, Izal, & Velasco, 2008). A recent study by Wood, Nicholas, Blyth, Asghari, & Gibson (2013) developed these relationships further and found catastrophising to be a significant mediator from pain to depression. However, a conceptual issue with this approach is that mediation analysis requires a causal relationship from reported levels of chronic pain to catastrophising (predictor to mediator, for mediation model see: Hayes, 2013). In this model the proposed relationship is directly opposite to pain literature and theory, where catastrophising is thought to predict pain experience (Sullivan et al., 1995). Therefore, a more conceptually meaningful analysis into catastrophising's role would be a mediation analysis; where pain experience's relationship with depression is mediated by catastrophising, removing a backwards predictor to mediator relationship, where a partial mediation may be most likely. Where catastrophising could lead to depression through pain as well as directly.

While this remains an area for future research, it is outside of the scope of this thesis. However, it demonstrates the more developed approach to catastrophising in pain literature. From the perspective of emotion regulation, pain research considers the context or antecedant of catastrophising in its analysis (pain), which other areas do not. This difference in understanding is also demonstrated in laboratory studies. There are no studies known to the author to test catastrophising through a non-pain or panic based mood induction to identify their effects on mood. Where cross-sectional studies can reveal associations and longitudinal studies provide some predicitive validity, measuring the effect of catastrophising during a relevant task greatly contributes to establishing causality. Therefore, the primary aim of this chapter is to expand upon the results for catastrophising found in chapter one and in previous literature by developing a case for catastrophising's causal role in mood change. Previous pain based mood inductions commonly use a stressor, such as the cold pressor task (e.g. van den Hout et al., 2000) or electric shock (e.g. Sullivan et al., 1995) to create a pain context. To inform the design of a study that follows up on results found in Chapter Two, in pain literature there are often two groups differing in instruction. A catastrophising group to think the worst

and focus on how terrible the situation is and a control group who do not (such as: Severeijns, Van Den Hout, & Vlaeyen, 2005). Transferring this to a depressed or anxious context is conceptually difficult due to the tremendous potential variation within these areas, compared to pain's specificity. However, this experiment will test if catastrophising in response to video clips of unpleasant life events will lower positive mood and increase negative mood as has been shown in pain contexts (for a meta-analysis see: Alabas, Tashani, Tabasam, & Johnson, 2012).

To create a situation best suited to measuring only the effect of catastrophising, the procedure, instructions and video content must be carefully constructed. First, the procedure must avoid creating demand characteristics on affect scores. This can be achieved through initially instructing participants that this task is measuring cognition and memory and that instructions require the participants to pay close attention to the clips and their content. This is then measured at the end of the procedure by asking for their interpretation of the experiment's purpose. As well as creating false demand characteristics the instructions for both groups will require participants to imagine that they are the individuals who experienced the events being discussed. Therefore the mood induced effect of both groups is similarly constrained by individual differences in empathy. The instructions will also have to be as similar as is feasible to demand the same level of attention from the participant. Finally, the video clips must be chosen carefully to elicit as little an emotion response as possible if viewed without instruction. This will best capture the effect of just catastrophising, rather than conflating its effect with the mood of the video. This requirement led the author to use video clips of individuals explaining difficult situations of their lives, which could be catastrophised about but not containing overtly emotional content.

The primary hypothesis of this study has two compoents, one for positive and one for negative mood. The negative affect PANAS scores will increase significantly more in the

catastrophising condition than the control condition and the positive affect PANAS scores will decrease significantly more in the catastrophising condition than the control condition. Therefore, we hypothesise that following mood induction the catastrophising group will have significantly lower positive and higher negative mood compared to the control group. Positive mood is also used as a measure of the effect of catastrophising as it is a strategy that has previously been associated with lower positive as well as higher negative mood (Severeijns, Van Den Hout, & Vlaeyen, 2005). A secondary hypothesis of this study is to replicate the correlations found between CERQ and DASS that originally informed the design of this study. A large correlation is anticipated between catastrophising and DASS measures.

4.2 Method

4.2.1 Participants

Participants were undergraduates recruited through the University of Reading SONAsystem and received course credit for participation. There were 64 participants comprising of 6 males (9%) and 58 (91%) females. Ages ranged from 16 to 57 where the mean age was 21.22 (SD=6.84). The mean age for males was 26.00 (SD=6.22) and females 20.72 (SD=5.36), this was not found to be a significant difference, where t (5.13) =.843, p=.437, r=.349. Group selection was randomised using a random number generator.

4.2.2 Design

This study used “surveygizmo.com” to produce the experiment that would be conducted in a laboratory setting. The study has two independent groups, a concentration and a catastrophising condition. These groups only differed in instructions on how to view the video clip, where mood was measured (via PANAS) before and immediately afterwards to detect group differences.

4.2.3 Measures

4.2.3.1 Positive Affect and Negative Affect Schedule (PANAS)

The PANAS' (Watson, Clark, & Tellegen, 1988) (Appendix 33) positive and negative affect subscales both consist of 10 items. The questions were developed from a PCA of Zevon and Tellegen's (1982) checklist of emotions. The PANAS asks respondents how much they feel a specific emotion on five point Likert scale ranging from 1 (very slightly or not at all) to 5 (very much). This can be used over a number of different time frames but in the current study the timeframe 'at the present moment' was used. While Watson, Clark, & Tellegen (1988) verified the positive and negative factor structure of the PANAS, they did not conduct Cronbach's alpha reliabilities. A later validation by Crawford & Henry (2004) found .89 and .85 Cronbach's alpha scores for the positive and negative affect scales respectively.

4.2.3.2 Cognitive Emotion Regulation Questionnaire (CERQ)

For a review of the CERQ-short and its subscales, see chapter two. However, this study uses the four item catastrophising subscale from the full CERQ (Appendix 8). The CERQ catastrophising subscale was generated a priori and based upon clinical intuition as well as its definition (Garnefski, Kraaij, & Spinhoven, 2001). This is different to the other CERQ subscales that were partially generated from previous coping measures. The four item catastrophising subscale failed to load on the first confirmatory factor analysis but upon item revision loaded in a second confirmatory analysis. The scale was found to have an acceptable Cronbach's alpha reliability (.72). A later re-test by Garnefski & Kraaij (2006) found a similar alpha at .79 for the catastrophising subscale. The CERQ is measured on a five point Likert scale from 1 (almost never) to 5 (almost always).

4.2.3.3 Depression, Anxiety and Stress (DASS-21)

For a review of the DASS-21 and its subscales, see chapter two (Appendix 4). The DASS-21 consists of 21 items, each scored from 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). Each subscale (depression, anxiety and stress) contains seven items that can be added to make final subscale scores.

4.2.3.4 Video Clips

Three video clips were used in this study for the participants to either watch or catastrophise over. These clips were carefully selected from Youtube to depict scenes that the experimenters thought would not significantly impact mood directly, i.e. if watched with no other instruction. They also had to depict scenes that could be catastrophised about if the participant imagined themselves in the scene. The clips were created as approximately three minute segments from the links below. Each of these segments were timed to follow the individual's story of events and not the following positive recovery. These clips were piloted on five individuals and there was no reported mood change.

http://www.youtube.com/watch?v=ei5oy8D3ct8

http://www.youtube.com/watch?v=Hum06iLODwk

http://www.youtube.com/watch?v=rWsYIoLZHYI#t=33

4.2.4 Procedure

Participants were randomly grouped into either the catastrophising or control condition using a random number generator. The information provided explained that the study was looking into 'cognitive processing and memory'. Once participants had provided

informed consent (Appendix 32 & 34) they were taken to the first page of the experiment that asked for demographic information (Appendix 35). Following this, participants of both groups completed the CERQ (Appendix 8) as well as the DASS (Appendix 4). Then immediately before watching the three videos the participants of both groups completed a baseline mood scale (PANAS, Appendix 33).

The control condition was provided with instructions to read (Appendix 3), which simply instruct participants to pay close attention to the three clips. The catastrophising condition's instructions (Appendix 36) instruct participants to pay close attention to the videos and to catastrophise (i.e. thinking the worst that could happen in the situation). The three clips were used in both groups and the order of the clips was counterbalanced. Between each video clip the participants of both groups were given 30 seconds to write out what they were thinking during the clip (Appendix 37).

Immediately following the video clips, participants were asked to complete the PANAS. Once completed the participants were debriefed on the true nature of the study and given a standard sources of support leaflet (Appendix 38).

4.2.5 Statistical Analysis

Initially, the PANAS scores for both groups combined and separate were checked for normality through z-scored skewness and kurtosis. Then data from both groups was combined to check for an overall mood induction result. The pre and post positive PANAS scores were compared using a paired t-test. However, as the negative PANAS scores were found to be non-normal, one repeated sample Wilcoxon test was used. In order to test for between group affect differences two ANCOVAs were conducted. Before hypotheses one and two were tested the baseline positive and negative scores were compared between groups to check for significant differences. As negative scores were found to be non-normal a Mann-Whitney test was applied instead of a between groups t-test.

To test both elements of hypothesis one, between groups ANCOVAs used post-induction scores as the dependent variable and pre-induction as the covariate. However, as negative scores were non-normally distributed and failed all transformations, bootstrapping was applied with 1000 samples (as suggested by Field, 2013).

For the secondary hypothesis spearman correlations were conducted as the CERQ catastrophising subscale and the DASS subscales were found to have non-normal skewness and kurtosis.

4.3 Results

4.3.1 Normality Checks

PANAS scores were checked for normality for each group as well as both groups combined. The skewness and kurtosis scores shown in Table 4.1 below have been converted into z-scores. These conversions were made by dividing the kurtosis or skewness score by its standard error. Therefore, all scores above 1.96 or below -1.96 are considered non-normal.

Table 4.1 Z-scored kurtosis and skewness for PANAS**.** N=64.

	Collapsed Groups		**Catastrophising Condition**		**Control Condition**	
	Skewness	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis
Baseline Positive	0.013	-0.966	-0.630	-0.815	0.588	-0.121
Post Positive	1.864	-0.314	0.892	-0.038	1.730	-0.593
Baseline Negative	7.321*	11.234*	2.445*	0.279	5.605*	7.718*
Post Negative	3.017*	0.917	1.201	-0.455	3.462*	3.844*

* non-normal score

In addition to checking for z-scored skewness and kurtosis, normality was assessed through the Shapiro-Wilk method, where significant results (p<.05) are considered non-normal. These checks replicated non-normality findings in z-scored skewness and kurtosis. This can be found in Table 4.2 below:

Table 4.2 Tests of normality on PANAS scores using Shapiro-Wilk method. N=64.

	Condition	**Statistic**	**Df**
Baseline Positive	Control	.984	34
	Catastrophising	.973	30
Post Positive Score	Control	.955	34
	Catastrophising	.976	30
Baseline Negative	Control	.735**	34
	Catastrophising	.851**	30
Post Negative score	Control	.885*	34
	Catastrophising	.957	30

* significant at p<.05 ** significant at p<.001

4.3.2 Mood Induction

To evaluate whether there was an overall mood induction, pre-mood induction ratings were compared with post-mood induction ratings taken from PANAS scores. A paired t-test found there was a significant decrease in positive mood: $t(63) = 5.28$, $p<.001$, $r=.749$. A Wilcoxon Signed-Ranks Test was conducted and found that a significant decrease in negative mood, $Z=1,581$, $p<.001$. Further information is contained in Table 1 below:

Table 4.3 Average (mean and median) and range (standard deviation and interquartile range) of pre- and post-mood induction scores. N=64

	Baseline Average (range)	**Post-mood induction Average (range)**
Positive mood	Mean = 27.20 (SD =7.47)	Mean = 23.73 (SD =7.37)
Negative mood	Median = 12 (IQR = 4)	Median = 16 (IQR = 6)

4.3.3 Baseline Mood Condition Comparison

Baseline mood measured by positive and negative PANAS scores, and tested through an independent t-test, showed no significant differences between conditions in positive mood baseline $t(62)=1.17$, $p=.245$, $r=.147$. There were also no significant differences between negative mood baseline as found by a Mann-Whitney test $U= 534$, $p= .737$.

Table 4.4: Average (mean and median) and range (standard deviation and interquartile range) of baseline mood scores between conditions. N=64

	Control Baseline Average (range)	Catastrophising Baseline Average (range)
Positive mood	Mean = 26.18 (SD = 7.38)	Mean = 28.37 (SD = 7.53)
Negative mood	Median = 12(IQR = 4)	Median = 12 (IQR = 4)

4.3.4 Catastrophising and Mood Change

Two ANCOVAs were carried out to compare differences between groups for both positive and negative post PANAS scores using baseline scores as a covariate. Initial tests of normality found that only negative PANAS scores were non-normal. As transformations failed to establish normality, bootstrapping was applied with 1000 samples (as suggested by Field, 2013). For negative emotion scores the covariate, baseline negative score, was significantly related $F(1,61)=24.69$, $p<.001$, $r=.29$. There was also a significant effect of condition, where the catastrophizing group reported significantly higher post negative mood $F(1,61)=7.91$, $p<.01$, $d=0.71$ (see Figure 4.1).

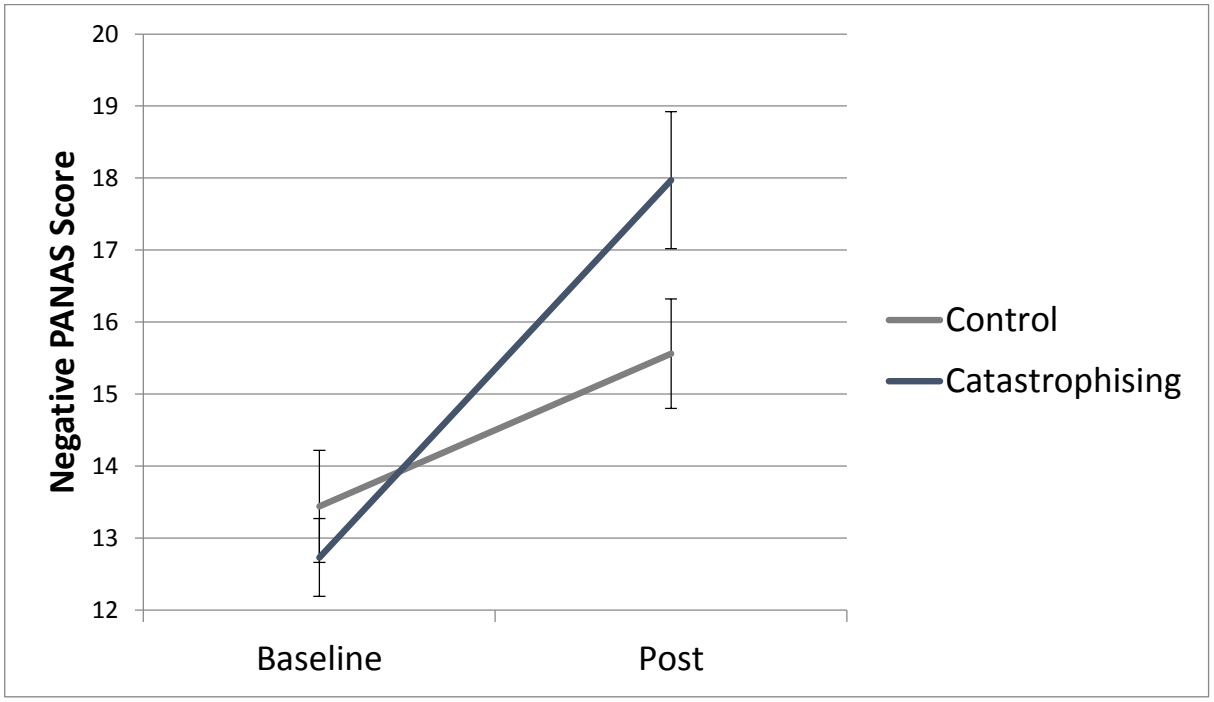

Figure 4.1 Baseline and post negative mood scores between groups. N=64.

For positive emotion scores the covariate, baseline positive score, was significantly related to post positive scores, $F(1,61)=94.23$, $p<.001$, $r=.61$. There was also a significant effect of group, where the catastrophising condition reported a significantly lower positive mood, $F(1,61)=7.91$, $p<.01$, *partial* $d=0.71$ (see Figure 4.2).

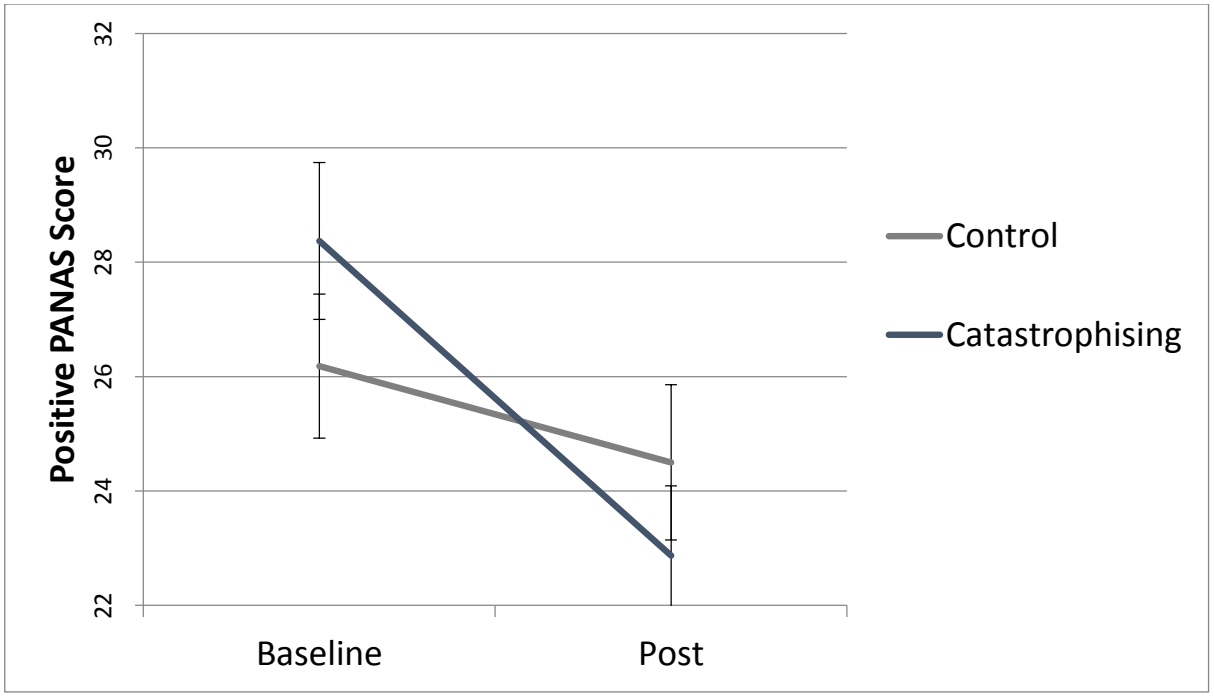

Figure 4.2 Baseline and post positive mood scores between groups. N=64

4.3.5 CERQ Catastrophising and DASS subscales

The CERQ catastrophising subscale and DASS subscales were checked for normality through their normalised skewness, kurtosis scores as well as Shapiro-Wilk scores (see Table 4.5 below). As the data was found to be non-normal, Spearman correlations were conducted for DASS subscales against CERQ Catastrophising (Depression, r=.613 where p< 0.001; Anxiety, r=.487 where p< 0.001; Stress, r=.554 where p< 0.001).

Table 4.4 Z-scored kurtosis and skewness for DASS subscales and CERQ catastrophising. N=64.

	Skewness	Kurtosis	Shapiro Wilk
CERQ Catastrophising	1.76	1.07	.908*
DASS Depression	6.39	5.88	.751*
DASS Anxiety	4.86	2.98	.822*
DASS Stress	3.04	0.39	.915*

* significant at p<.001

4.3.6 Post Experimental Questions and Task Compliance

None of the participants were able to correctly guess the purpose of the study. Over 90% assumed it was a memory task rather than a mood task. Additionally, all participants recorded themselves as catastrophising over various aspects during each clip, suggesting task compliance.

4.4 Discussion

This study instructed participants to use one of two strategies (catastrophising or control) to identify differences in self-reported mood scores following instruction over the course of three video clips. Significantly greater negative affect PANAS scores were found in the catastrophising condition post-induction, supporting the first hypothesis. Additionally, significantly lower positive affect PANAS scores were found in the catastrophising condition post-induction, supporting the second half of the first hypothesis. This tested the larger assumption that catastrophising induces lower mood. This assumption was developed from previous findings in Chapter One, which found strong associations between catastrophising and depression, anxiety and stress. This was replicated in this study, which again found strong associations with these three mental health indicators. These associations had also been found in previous literature (e.g. Garnefski et al., 2001). Studies have also used catastrophising to successfully predict depression scores after six and ten week periods (Abela, 2001; Abela & Sarin, 2002). While these results suggest that catastrophising is responsible for low mood, this methodology was not conclusive alone. Therefore, to triangulate catastrophising's causal role in low mood this experimental manipulation was conducted. The moderate effect sizes between groups for both positive and negative affect ($d>.5$) suggest that catastrophising does cause lower mood.

This contributes to the current understanding of catastrophising in the context of low mood (i.e. depression, anxiety and stress) which further highlights its potential as a target for psychotherapeutic intervention. Currently catastrophising is either not targeted by current emotion regulation therapies (such as ART, ERT) or is indirectly targeted as a cognitive error through therapies, such as CBT. One approach that does directly target catastrophising is Metacognitive Therapy for Anxiety and Depression. This approach towards treating

catastrophising through the use of probabilities was used as one task for the University of Reading: Catastrophising App (UoR:C; see Chapter Six, Measures).

Furthermore, this study also contributes to emotion regulation literature by bringing a deeper and wider understanding of these implications. Currently, the majority of the literature focuses on several main strategies including: suppression and reappraisal (e.g. Gross, 2002); and rumination and distraction (e.g. Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Mindfulness approaches have also generated interest in acceptance (e.g. Liverant, Brown, Barlow, & Roemer, 2008). However, research into catastrophising has remained relatively superficial, despite its repeated clinical implications in previous studies. This study is just one step towards a more thorough understanding.

While this experimental manipulation is novel within this area of the catastrophising literature, the experimental manipulation of catastrophising in pain contexts is not (e.g. Sullivan et al., 1995). In the context of non-pain related depression and anxiety, this study suggests that catastrophic interpretations can directly change an individual's mood in the short term (<10 minutes). Rather than the previous associations with anxiety and depression scores in non-experimental cross-sectional studies (e.g. Chapter Two, Hiller, Lovato, Gradisar, Oliver, & Slater, 2014; Noël, Francis, Williams-Outerbridge, & Fung, 2012).

Due to the limited literature in catastrophising and very limited research into catastrophising's experimental effects, this study is an initial step into this area. One limitation resulting from this aim is the paradigm created to test catastrophising. The novelty of this catastrophising context meant that we did not know the potential effect size being measured. Previous studies into catastrophising found medium to large effects between CERQ's catastrophising subscale and depression or anxiety (e.g. Chapter Two and Garnefski, Kraaij, & Spinhoven, 2001). Previous pain studies, such as Severeijns, Van Den Hout, & Vlaeyen (2005) also found a medium to small effect size in their experimental testing of pain catastrophising.

However, this study found only a small effect size. This could be somewhat addressed in future studies through the same paradigm with a larger sample size, to test the effect's reliability. However, the paradigm could also be improved. Video clips were chosen because they are frequently found to be very effective mood inducers (Westermann, Spies, Stahl & Hesse, 1996). A variety of counterbalanced clips were also chosen to include at least one relatable scenario to most participants. Yet while both groups were required to empathise with the storytellers in each clip to make the groups more comparable, the overall effect sizes were restricted to the empathy of each participant. Therefore, a more effective design might be to reproduce a very similar study using a presentation task instead. Where both groups are required to present some information to a small group and one group is required to generate catastrophic interpretations.

Another method that could be applied to either the video clip or presentation task is using an active alternative as well as, or instead of, a control group. This is a common method applied in emotion regulation, where studies investigating the effectiveness of reappraisal often contrast with expressive suppression (e.g. Gross, 1998). Studies into rumination also use distraction as an adaptive alternative (e.g. Nolen-Hoeksema, Morrow, 2008). Catastrophising experiments could apply minimisation as a generally adaptive alternative, which we would predict to result in a larger difference and effect size. While these methods tend to find more pronounced differences, a control group is still required to identify which of the two alternatives is responsible for the majority of the mood change. Therefore, it is not a complete solution but the difference between two active strategies may provide more ecological validity than comparing the mood difference between a catastrophiser and an individual not actively regulating emotion.

These future studies aim to either increase reliability or further triangulate catastrophising's relationship with mood through a similar approach. Chapter Six continues

this theme with an inverted premise by instead treating catastrophising and measuring the effect of its treatment on mood.

A limitation of this study is the use of self-report measures of mood and the contents of those measures. Self-report measures of mood are highly dependent on an individual's awareness and understanding. Furthermore, the measure of mood, PANAS, represents a very general set of emotions that may not best represent the emotions being manipulated by this task. The use of this measure over a measure specific to this study may also be responsible for a lower effect size than expected. Finally, as the most important aspect of this experiment, the individual catastrophising, is not visible to the experimenter we assume task compliance. This study did attempt to control for task compliance by requiring participants to explain how they catastrophised in each clip and all participants appeared to do so. Finally, no participants were able to correctly guess the purpose of the study and almost all thought it was a cognitive and memory task.

4.4.1 Conclusion

In conclusion, this study is a first step into investigating catastrophising's causal role in mood change. This study replicated previous findings in a pain context (Severeijns, Van Den Hout, & Vlaeyen, 2005) and follows previous cross-sectional studies associating catastrophising with depression and anxiety (e.g. chapter two and Garnefski, Kraaij, & Spinhoven, 2001). However, this area is sparse in research and more studies are required to replicate this study as well as improve its design in different contexts. Furthermore, more testing in contexts with greater personal relevance to the participant (such as presentation tasks) will increase our breadth of understanding of this effect.

Chapter Five: Developing the Catastrophising Questionnaire (CQ)

5.1 Introduction

Questionnaire based assessments of catastrophising are confined to three measures, the Pain Catastrophising Scale (PCS; Sullivan, Bishop, & Pivik, 1995); the Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2001) and the Cognitive Errors Questionnaire (CEQ; Lefebvre, 1981). However, in both the CERQ and CEQ catastrophising is just one subscale. Each of these questionnaires was also developed for different purposes. The CEQ directly applies Beck's (1979) cognitive errors to better understand the onset or maintenance of depression but the CERQ applied previous coping and early emotion regulation literature to better research emotion regulation concepts in a broad array of traits (such as depression and anxiety). The PCS was developed to facilitate research on how catastrophising impacts pain experience, specifically with regard to chronic pain and its psychotherapeutic treatment.

The PCS defines catastrophising as an "exaggerated negative mental set brought to bear during actual or anticipated painful experience" (Sullivan et al., 2001). While this definition is highly specific in context and only focused on negative emotion, the PCS is a broad scale. Out of the three questionnaires reviewed, this definition appears to be the closest to Beck's (1979) emphasis on magnification. The scale has been reliably split into three factors, rumination, magnification and helplessness (for child version see: Crombez et al., 2003; For adult version see: Sullivan et al., 1995). Of the 13 items only three belong to the magnification factor. While catastrophising can reasonably have both ruminative and hopeless elements, the breadth of these elements dominates the questionnaire. Rumination is distinct from catastrophising because it is cyclical thought, rather than catastrophising, which better represents a spiral due to its magnification component. Similarly, hopelessness can involve magnification but does not require it and hopelessness necessitates a maladaptive

acceptance, which catastrophising does not. In sum, only four items (3, 4, 6 and 13) indicate an exaggeration of a negative state, which does not fully align with the magnification factor (6, 7 and 13). However, some other items could represent catastrophising depending on the context of the thought process (such as in response to a paper cut but not a car accident). This suggests that the PCS may be better explained as measuring maladaptive reactions to pain, rather than specifically catastrophising. When creating the CERQ, Garnefski, Kraaij, & Spinhoven (2001) reviewed previous questionnaires with catastrophising items (including the PCS), they claimed "none of the coping measures we consulted, however, include items referring to catastrophic thoughts." This is a stronger opinion than we propose, as some PCS items do specify magnification.

The CERQ alternately defines catastrophising as thoughts that explicitly emphasise the terror of an experience (Garnefski, Kraaij, & Spinhoven, 2001). This different definition may help to explain their stance on the PCS. The standard version of the CERQ contains a 4 item catastrophising subscale. Upon initial validation, this subscale demonstrated acceptable validity (Cronbach's alpha = .72), which was replicated by Garnefski & Kraaij (2006) when creating the short 2-item subscale (Cronbach's alpha =.79; short version Cronbach's alpha =.81). While the CERQ's catastrophising items reflect the author's definition, they are insensitive to specific contexts but strong at generalising.

While the CEQ was created from Beck's (1979) cognitive errors in depression, two versions were initially created, a CEQ for general life experiences and a CEQ for chronic low back pain (LBP CEQ) (Lefebvre, 1981). During validation Lefebvre (1981) found no significant difference in cognitive errors between depressed individuals and depressed individuals with chronic pain. However, at initial validation, each group (depressed/no pain; depressed/pain; non-depressed/no pain; non-depressed/pain) contained no more than 30 participants. This is significantly less than required for modern questionnaire development, where at least 7-10

participants are suggested per item (Field, 2009). The CEQ used 24 items for around 30 participants. A later German translation validation by Pössel (2008) used 796 participants and found that the initial factor structure bordered on acceptable model of fit (CFI=.794, where >.8 is considered acceptable (Hu & Bentler, 1999)).

Unlike the PCS or CERQ, the CEQ measures cognitive errors through a vignette (several sentences describing a scenario) based questionnaire followed by potential interpretations. The CEQ treats catastrophising as anticipation or interpretation of an event as a catastrophe and the subscale contains six items. A vignette based approach is typical method to measure cognitive bias, as biases require specific context. However, when measuring catastrophising from an emotion regulation perspective, both the PCS and CERQ focus more generally on how often they may have specific thoughts in response to negative situations or pain (rather than vignettes). While this approach is at the cost of context, it also theoretically allows much greater generalisation and is less susceptible to specific triggers.

The aim of this study is to create a new catastrophising questionnaire, measuring catastrophising from an emotion regulation perspective. To develop from previous methods this questionnaire will aim to value both context and generalisation. The purpose behind this aim is to create a more robust, comprehensive and effective questionnaire specialised in catastrophising that tends to be normally distributed. This measure was then used in Chapter Six to measure catastrophising better than in previous Chapters. To achieve this, we created items from groups of situations and catastrophic thoughts participants commonly reported. Additionally, to make a catastrophising definition as accessible as possible to laymen, it was defined as generally assuming or seeing the worst. These items also contain examples given by participants to demonstrate catastrophising over general pessimism. To verify the creation of this questionnaire, it was correlated with the CERQ catastrophising and DASS subscales.

5.2 Method

5.2.1 Participants

This study initially collected data from 75 people in the item generation phase to reach a natural saturation point. In the first questionnaire testing phase 143 people were recruited to ensure there were at least 10 participants per item (Field, 2009). Three participants were excluded due to no variety in responses and no participant took more than half an hour to complete the questionnaire, which was another exclusionary measure. In the second phase there were no exclusions and data was collected from 100 people. Participants from both phases were required to be over 16 and have a good understanding of English to participate. As each step of this study was conducted online through www.surveygizmo.com, participants were recruited through a series of websites:

twitter.com/surveygizmo

www.facebook.com/surveygizmo

www.reddit.com/r/samplesize

www.onlinepsychresearch.co.uk

psych.hanover.edu/Research/expnnet.html

5.2.2 Design

The Catastrophising Questionnaire (CQ) was created and validated in three testing phases (item generation, competing model testing and validation). Items were generated through a brief two item questionnaire where participants gave examples of how they catastrophised and in what context they commonly catastrophised. These responses were then grouped into themes and reduced into a 13 item questionnaire to best fit the data. In the

second phase this questionnaire was tested using competing factor models to select the best fit. In the final validation phase, the most successful two factor model was tested for fit and compared with other measures of emotion regulation as well as measures of depression, anxiety and stress for validity.

5.2.3 Measures

5.2.3.1 CQ – Item Generation

Due to a lack of previous trait based measures for catastrophising within the context of emotion regulation items were instead adapted from a small sample of the population. Due to the highly contextual nature of emotion regulation as well as the unique internal elements of catastrophising this was approached from two perspectives. Participants were initially presented with a definition of catastrophising and asked to provide three examples of situations that often was preceded by or resulted in catastrophic thinking to capture the contextual aspect of catastrophising (Appendix 39). Then, to identify the internal elements of catastrophising, participants were asked to provide three examples of thoughts they had when they catastrophised. Once the experimenter felt these responses had reached saturation (n=75) they were grouped into themes for each question. These themes were then combined across responses to both questions (if they were found to match) and formed into items. To make the items more specific and understandable three of the examples given for each theme were used as examples within the question (Appendix 40). Items could be rated from 0 (not at all) to 10 (all of the time).

5.2.4 Convergent Validity

For both competing model testing and model validity testing other measures were also selected to test for convergent validity. The CERQ was chosen for its reliable four item catastrophising scale and its regular use within this thesis as a measure of catastrophising. The

DASS was also selected to test for expected correlations with depression, anxiety and stress, as well as for potential discriminate validity between CQ subscales.

5.2.5 Procedure

5.2.5.1 Item Generation

Participants were initially taken to a page on www.surveygizmo.com providing information on the nature of the study and provide consent. Participants were also given an email address for further inquiry. Following this, participants were provided with a definition of catastrophising and two questions to complete (Appendix 39). Once this was completed, the participants were shown a debrief sheet and thanked for taking part.

5.2.5.2 Competing Models and Validation

Participants were initially taken to a page on www.surveygizmo.com providing information on the nature of the study and provide consent. Participants were also given an email address for further inquiry. The first page of the study presented the questionnaire (Appendix 40). The second page contained the catastrophising scale of the CERQ and the final study page contained the DASS. Once completed the participants were shown a debrief sheet and thanked for taking part.

5.2.6 Statistical Analysis

The Data from the initial questionnaire was downloaded from surveygizmo directly into .csv format, where participant checks and exclusions were made for incomplete responses, time taken and the same response throughout. The remaining data was exported into SPSS 21 to check for item skew, kurtosis and variance. Once found to be normally distributed, an exploratory factor analysis was carried out to identify the factor structure for competing models using eigenvalues greater than one and the scree plot. The identified models were then checked for reliability (Cronbach's alpha) and entered as structural equation

models in AMOS SPSS 21. For the validation stage, following participant checks, items were again checked for skew, kurtosis and variance. The factors were then checked for reliability and tested through structural equation modelling. To assess convergent validity, Pearson's correlations were carried out between CQ total score; CQ subscales; CERQ catastrophising subscale; DASS distress score and DASS subscale scores. To measure divergent validity partial Pearson's correlations were carried out for each CQ subscale with the other measures, controlling for the other CQ subscale.

5.3 Results

5.3.1 Item generation

Participant responses were listed for both questions and then coded into themes (Situations, Appendix 41 & Thoughts, Appendix 42). These themes were then combined across both questions and formulated into items, using three of the participant responses as examples for each new item. The identified themes were health, achievement, control, embarrassment, rhetorical, self-criticism, organisation, helpless, safety, social, finance, confrontation and personal.

5.3.2 Competing models

5.3.2.1 Item checks

All items in the CQ elicited responses across the full range of the 10-point scale suggesting good item variance and sensitivity, with the mean score for each item between 4-5. Normalised Item skew was found to be within an acceptable range (<2, Fabrigar et al., 1999) for all items except for personal (2.64) although skew >3 is considered unacceptable. All items were found to have acceptable normalised kurtosis (<7 Fabrigar et al., 1999) indicating no severe departures from normality (Appendix 43).

5.3.2.2 Identification of Competing Models

All CQ items were entered into a principal components analysis (PCA) with promax rotation to account for anticipated relationships between factors. Initial analysis supported the data's sample size suitability for PCA where Keiser-Meyer-Oklin (KMO) = .880, which is considered 'great' (Hutcheson & Sofroniou, 1999). Additionally, Bartlett's Test of Sphericity was highly significant (p<.001) further indicating suitability for PCA. To select the number of models to be tested against each other, eigenvalues greater than one suggested both one and two factor solutions were acceptable (Appendix 44) where a two factor solution accounted for approximately 10% more of the variance (52%). The factor structure for the two factor solution is also found in Appendix 45. To prepare the two factor model for competing model testing, items with loadings greater than .25 in both subscales were excluded. This led to the removal of items 3 (achievement), 8 (embarrassment) and 13 (helpless).

5.3.2.3 One Factor Model

Reliability was calculated through Cronbach's alpha (.885), which was within the acceptable range (.7-.9, Tavakol & Dennick, 2011). No item exclusions were found to improve this result (Appendix 46). Inter-item correlation was acceptable (>.5) for all items except question 4 (confrontation, .440).

Structural equation modelling was carried out (see Figure 5.1) and initial Chi-square tests of the model were found to be highly significant ($\chi^2(65, n = 143) = 184.119, p < .001$), which can indicate poor model fit, though this effect is directly exacerbated by sample size. The comparative fit index (CFI) for the one factor model was found to be below the acceptable range (>.8 Hu & Bentler, 1999) at .779.

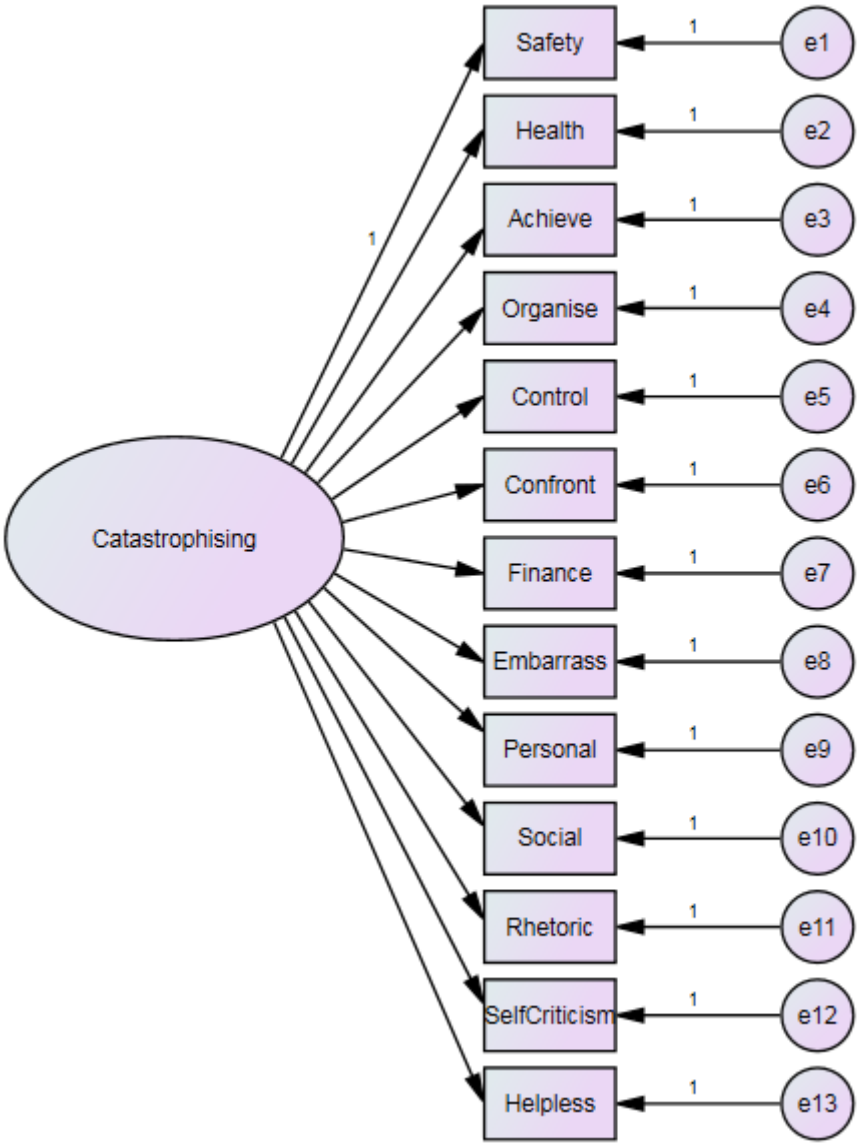

Figure 5.1 Structural equation model of the one factor model. N=143

5.3.2.4 Two Factor Model

The two subscales were named by the items they contained, the three-item subscale was named 'Health and Safety' and the bigger subscale named 'General'. Reliability was calculated through Cronbach's alpha (Health & Safety, .820; General, .814), where both were found to be within the acceptable range (.7-.9, Tavakol & Dennick, 2011). No item exclusions were found to improve this result for the General subscale (Appendix 47). Although, the Health and Safety subscale could be improved by the removal of question 5 (Control), which

was then removed. Inter-item correlation was acceptable (>.5) for all items in the Health and Safety subscale but two items on the General subscale were below (.467 & .456) (Appendix 47).

Structural equation modelling was carried out (see Figure 5.2) and initial Chi-square tests of the model were not significant ($\chi^2(26, n = 143) = 34.940, p = .113$), which indicates a good model fit despite the large sample size. The comparative fit index (CFI) for the two factor model was found to be above the acceptable range and demonstrated good model fit (good >.95 Hu & Bentler, 1999) at .973. This strongly suggests the superiority of a two factor model solution.

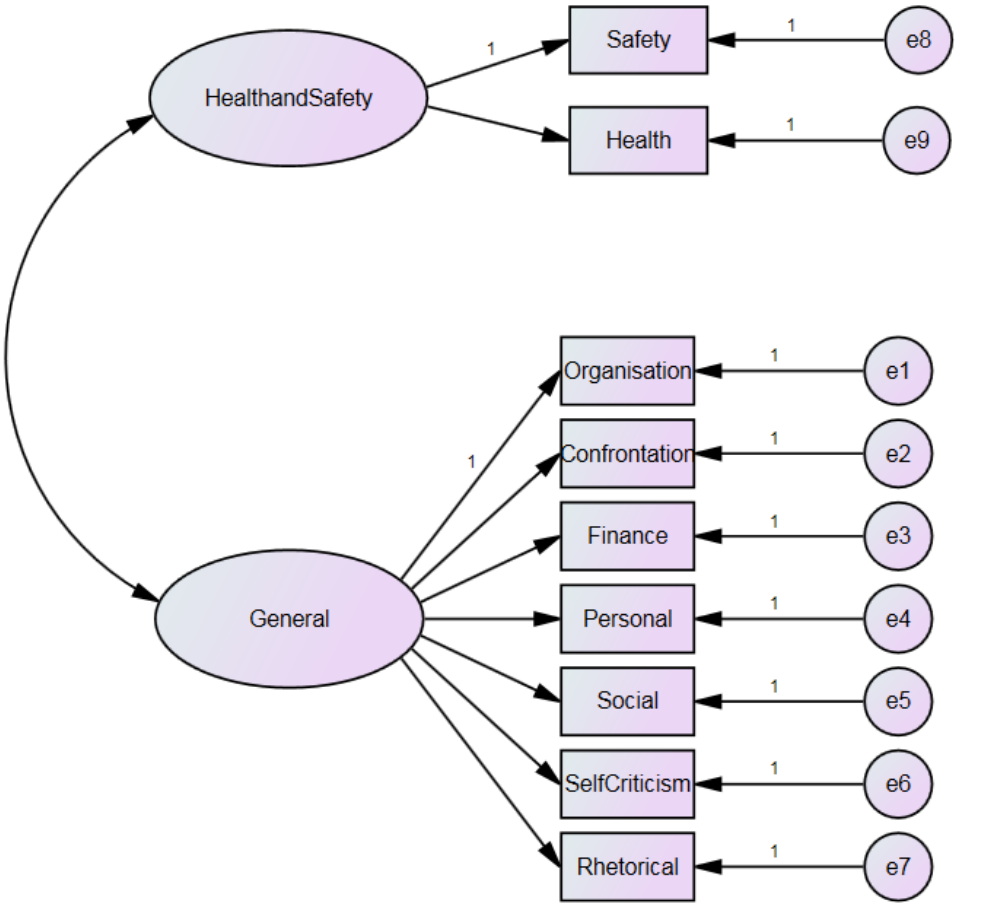

Figure 5.2 Structural equation model of the two factor model. N=143

5.3.3 Two Factor Validation

5.3.3.1 Item Checks

All items in the CQ elicited responses across the full range of the 10 point scale suggesting good item variance and sensitivity, with the mean score for each item at approximately 4. Item skew was found to be within an acceptable range (<2, Fabrigar et al., 1999) for all items. All items were found to have acceptable kurtosis (<7 Fabrigar et al., 1999) indicating no severe departures from normality (Appendix 48). There were 100 participants.

5.3.3.2 Reliability and Structural Equation Modelling

Reliability was calculated through Cronbach's alpha (Health & Safety, .820; General, .832), where both were found to be within the acceptable range (.7-.9, Tavakol & Dennick, 2011). No item exclusions were found to improve this result for the General or Health and Safety subscale (Appendix 49). Inter-item correlation was acceptable (>.5) for all items in the Health and Safety subscale but one item on the General subscale was just below (.460) (Appendix 49).

Structural equation modelling was carried out (see Figure 2) and initial Chi-square tests of the model was significant ($\chi^2(26, n = 100) = 46.600, p < .05$), which can indicate a poor model fit, but is highly sensitive to sample size. The CFI for the two factor model was found to be above the acceptable range (>.8) and just below good (>.95) at .941, which validates the two factor model.

5.3.3.3 Convergent and Divergent Validity

Alongside completing the CQ in both the competing models and validation phase participants completed the 4 item CERQ subscale for catastrophising and the 21 item DASS (n= 244). Both CQ subscales were shown to have good correlations with the CERQ subscale (Health and Safety, .456; General, .475). All measures of catastrophising were found to be

significantly correlated with DASS subscales, where the General subscale showed the strongest correlations. For further analysis on the two subscales for divergent validity both CQ subscales were correlated with the other variables whilst partialing out the other subscale (Table 2), showing that whilst Health and Safety retains some correlation with the CERQ catastrophising scale, it only independently maintains a small correlation with anxiety.

Table 5.1 Pearson Correlations of the CQ (and its subscales) with other scales (n=243)

	CQ Total	**CQ Health & Safety**	**CQ General**	**CERQ Catastrophising**	**DASS Depression**	**DASS Anxiety**	**DASS Stress**	**DASS Total Distress**
CQ Total	1	.722	.968	.521	.568	.494	.558	.617
CQ Health & Safety	.722	1	.526	.456	.356	.372	.328	.386
CQ General	.968	.526	1	.475	.570	.472	.565	.617
CERQ Catastrophising	.521	.456	.475	1	.406	.383	.341	.422

All correlations significant at <.001

Table 5.2 Pearson Partial Correlations of the CQ subscales with other scales (n=243)

	Partial for	**CERQ Catastrophising**	**DASS Depression**	**DASS Anxiety**	**DASS Stress**	**DASS Total Distress**
CQ Health & Safety	CQ General	.273**	.079	.145*	.054	.099
CQ General	CQ Health & Safety	.316**	.481**	.349**	.488**	.529**

** <.001, *<.05

5.4 Discussion

This study generated, tested and verified a two-factor questionnaire measuring catastrophising, where one two-item factor measured health and safety and the other items clustered together in a general factor. The two-factor model showed good to acceptable model fit and a normal distribution in both phases. Inter-item reliability and correlation were also acceptable in both validation and confirmation stages.

The total CQ scores demonstrated a large correlation (>.5; Cohen, 1988) with the CERQ's catastrophising subscale, suggesting construct validity beyond the face validity of the items. Convergent validity was also found between the CQ with the DASS subscales and total scores, where each correlation was large, except for anxiety, which bordered on a large correlation. Also, for the same participants the CERQ found only medium correlation sizes with DASS subscales (>.3; Cohen, 1988). This demonstrates a higher sensitivity in the CQ to mental health indicators, without any symptomatic overlap between the CQ and DASS.

The two CQ subscales were significantly correlated with all measures of the DASS. However, when the correlations were carried out for both subscales partialling out the other subscale, they demonstrated discriminant validity. The general subscale was reduced to moderate correlation sizes with all subscales but maintained a large correlation with the total DASS distress score. However, the health and safety subscale had only one small correlation with DASS subscales (where anxiety was >.1; Cohen, 1988). This suggests that catastrophising about a health and safety issue is less maladaptive in a normal population compared to general catastrophising. It is possible that catastrophising about health and safety issues may have some adaptive aspects in anticipating threats that may be within the individual's locus of control. This would make its use more likely to be adaptive and working as evolutionarily intended (Cosmides & Tooby, 2000). Alternatively, the immediacy of health and safety issues may reduce their impact in long-term mood, resulting in less association with trait measures of depression, anxiety and stress. This may mean that catastrophising regardless of context is equally distressing but health and safety issues lack a long-term component. This could be tested experimentally by creating relevant health and safety issues and measuring their direct impact on mood. If health and safety catastrophising has a similar effect on mood to a general catastrophising group, this would support the hypothesis that catastrophising in both contexts is equally distressing. Therefore, the absent association between catastrophising with depression, stress and to some extent anxiety may be due to differences in duration. Further

study could also test for catastrophising in hypomania, which may find a relationship more conclusively than the CERQ subscale in chapter two.

The items for the CQ were created by grouping catastrophising examples given by participants in the first phase into themes. This data was collected until a saturation point had been reached. As this data was collected from a variety of websites from the United States and the United Kingdom, we predict that this questionnaire should demonstrate reliability in both populations. The items and examples were also chosen to represent a range of examples to avoid cultural specificity. However, if choosing to apply this questionnaire to a different culture it would need to be validated again, and if it failed validation, a repeat of phase one may better highlight themes or examples relevant to that population.

A potential limitation of this questionnaire is that participants may interpret the items to represent general pessimism rather than catastrophising. Although the focus of each item on the worst that could happen and the given examples should reduce any tendency towards general pessimism. The primary difference between pessimism and catastrophising is that while pessimism is expecting something negative, catastrophising is expecting the worst. The definition used by the questionnaire also best resembles Beck, Rush, Shaw, & Emery's (1979) definition as a cognitive error dwelling on the worst possible outcome.

A second limitation of this study, shared by other catastrophising questionnaires is its specificity on the negative aspects of magnification. Further examination of this questionnaire into hypomania in bipolar disorder could untangle the relationship between positive magnification and catastrophising. As there is no questionnaire known to the author that directly measures magnification in hypomania or mania, one could be created with the same methodology as this questionnaire, except with a positive emotion focus and using individuals with high scoring hypomania or diagnosed with bipolar disorder. It would be intuitive to predict that individuals with bipolar who tend to magnify in one direction would tend to do it

in the reverse. This is because emotion regulation strategies can become maladaptive when generalised across many contexts (Gross, 1998) so individuals diagnosed with bipolar would be more likely to generalise this strategy inappropriately. This study could also a take a community population to identify if this relationship is also present there. However, Chapter Two's results regarding hypomania would suggest that this is not the case. If this stands up to replication, then bipolar patients would be identifiable by a generalised use of magnification.

5.4.1 Conclusion

In conclusion, the CQ has demonstrated its validity and subscale reliability ready for use in Chapter Six. One of the key aims of this questionnaire was to keep context as relevant as in the PCS. We feel that we have maintained this by keeping the items context specific to cover the range of catastrophising reported by a representative sample of the population. This simultaneously maintains the strength of the generalisation of how individuals catastrophise that the CERQ subscale demonstrates, but in greater depth than a four item subscale.

Chapter Six: A Catastrophising Intervention

6.1 Introduction

The second chapter of this thesis found significant correlations between catastrophising and depression, anxiety and stress. This result replicated previous findings in the literature (e.g. Garnefski, Kraaij, & Spinhoven, 2001; Garnefski & Kraaij, 2007; Garnefski, Legerstee, Kraaij, Van Den Kommer, & Teerds, 2002). Chapter five generated, tested and validated a new self-report measure of catastrophising for the present chapter and further replicated significant relationships between catastrophising and depression, anxiety and stress. In Chapter Four, actively catastrophising was found to reduce positive emotion and increase negative emotion in an experimental setting, suggesting a causal relationship between catastrophising and emotion experience. This result replicated similar results in pain research, but with a smaller effect size (such as: Severeijns, Van Den Hout, & Vlaeyen, 2005; Sullivan & D'Eon, 1990). The current study continues to test the causal relationship catastrophising has on mood, this time through a smart phone intervention. This was done by training individuals in strategies to counter catastrophising could reduce catastrophising and consequently increase positive emotion as well as decrease negative emotion. This will build upon the evidence in this thesis towards the proposal that catastrophising is closely related to negative emotional states. Furthermore, it will highlight this area for future clinical interest.

The majority of current psychotherapeutic treatments have emotion regulation as a key component, as emotion dysregulation is central to many mental disorders (DSM-5; APA 2013). While therapies such as Cognitive Behavioural Therapy (CBT; Beck, Rush, Shaw, & Emery, 1979) or Dialectical Behaviour Therapy (DBT; Linehan, 1993) at their core teach more adaptive emotion regulation strategies, they were not developed from the emotion regulation literature. Instead these therapies were developed from prior theories that have many consequences for emotion regulation. Affect Regulation Training (ART; Berking et al., 2008),

outlined in Chapter One, is one of the two main emotion regulation therapies that was directly developed from the emotion regulation literature. While the ART model is provided through intensive group sessions, its module based approach to emotion regulation provides a simple and clear structure building from awareness and understanding to more complex strategies such as reappraisal and confronting challenges to meet goals (Berking & Whitley, 2014).

The ART programme is an intensive six week training regimen, which requires practice of the whole ART sequence for approximately 20-30 minutes per day. Furthermore, in their own time clients are required to engage in at least three exercises lasting from three seconds to three minutes. Clients also receive homework, handouts, an information booklet, audio files and 140 text messages to prompt activity or provide information during the training (Berking & Whitley, 2014). The ART structure of specific skill focused modules contrasts with the other primarily emotion regulation based intervention, Emotion Regulation Therapy (ERT; Mennin & Fresco, 2014). ERT was designed as an addition to a normal CBT programme for comorbid depression and anxiety. In addition to completing a CBT course, ERT clients attend extra sessions to cover: the motivational mechanisms behind behaviour; different regulation methods and their emotional consequences in context. Both of these treatments are relatively intensive and train a variety of emotion regulation strategies during these sessions, where this study aims to teach exclusively on catastrophising and its prevention. Therefore, a low intensity approach would better fit the requirements for this intervention than the structures applied by current emotion regulation treatments. Conceptually, this study is investigating at the scale of a module rather than a fully rounded intervention.

6.1.1 Interventions as Smartphone Applications

In recent years many low intensity interventions have begun to use technology as a delivery method (Comer, 2015). Psychological interventions carried out on these devices, which include text message as well as application based interventions, are often described as

‘mHealth’ or ‘eHealth’. mHealth has been defined by Kay, Santos, & Takane (2011) as the use of mobile and wireless methods to attain health objectives. These are widely available to the population. In the first quarter of 2015 66% of British citizens owned a smartphone, where 90% fall within the 16-34 years of age (Ofcom, 2015). Regarding mHealth, there has been a wide discussion in the literature regarding empirical testing in technology-enhanced services (e.g. Jones et al., 2013; Proudfoot et al., 2010; Ritterband, Thorndike, Cox, Kovatchev, & Gonder-Frederick, 2009). However, ongoing developments in mHealth appear to have little regard for these conceptual foundations (Jones et al., 2014).

Many of these applications rely on core aspects of a variety of effective practices, often including features such as mood tracking, scheduling pleasant activities and social strategies training (for more examples see: Luxton, McCann, Bush, Mishkind, & Reger, 2011). However, both Luxton et al., (2011) and Jones et al., (2014) suggest that many developers did not fully comprehend the conceptual underpinnings of these strategies in a mental health context, or the probable real life challenges clients will face. An example used by Jones et al., (2014) is Behavioural Parent Training (BPT), which is a common approach for disruptive behaviour disorders in children (Chorpita et al., 2011) that has been made digital. One component if this training is a ‘time-out’ strategy to create effective consequences for child problem behaviours. This approach deals with challenging behaviour by removing both positive and negative attention to change the parent-child relationship, which results in changed child behaviour. Many mobile applications have been created for parents to use. However, their primary role is often tracking time-out time and how long the child should remain in time-out, based on age. Yet research has found that this does not match the actual challenges of parents, where a child may refuse to go to time-out or escalates problem behaviour while in time-out (Jones et al., 2013). This behaviour often elicits attention from the parent, continuing the problem the intervention is supposed to prevent. These specific and individualised issues can easily be lost when just translating core concepts to mobile

platforms. Therefore, when bringing an emotion regulation intervention onto a mobile platform, it is a high priority to ensure that its content matches its purpose and it functions as intended in context. Additionally, if an intervention is streamlined for smartphone application delivery, it can be at the cost of key complexity.

Although many studies have been conducted using text messaging or basic reminders to assist with therapeutic delivery, such as ART, relatively few have experimentally tested smartphone applications beyond pilot studies or feasibility work (Jones et al., 2014). One pilot study by Rizvi, Dimeff, Skutch, Carroll, & Linehan (2011) developed a DBT coach for women with comorbid borderline personality and substance use disorders (n=22). Progress in DBT is contingent on the client's ability to generalise DBT skills to everyday life. So the DBT coach was developed as a feedback tool for in-vivo skill use and development. The coach also provided help during crisis to avoid dysfunctional behaviour. When activated the DBT coach asked participants to identify the negative emotion they were currently experiencing and if they wished to change the emotion. If the participant responded 'yes' they would be directed to a list of emotion specific opposite action behaviours (for example not shouting at someone when angry but walking away). If the participant selected 'no' the participant was directed to create a list of pros and cons for changing the emotion. They also had the option of calling/ringing the therapist if the pros and cons list was not helpful. Participants used the DBT coach an average of 15 times over an average of 13 days. The study found that the use of the application was associated with decreased emotion intensity, decreased substance urges and decreased distress. Two notable strengths of this application compared to the BPT applications mentioned previously, are its adaptability to the client's needs and the aims of the application match the intervention's conceptual foundations. However, this application was designed to be in parallel with ongoing DBT treatment, rather than the standalone approach intended by this intervention. This allowed the DBT coach to be highly specific and functional, where a standalone app should provide some measure of psychoeducation. This should convey its

purpose and emphasise its proper use, whilst considering context to compensate for the absence of an interactive therapist.

An example of an application that can be used as a standalone or in conjunction with therapy is the PTSD Coach. For a therapeutic application it has seen wide scale use (as of November 2013, 130,000 downloads, see Kuhn et al., 2014). It was developed by the Veteran Association's National Center for PTSD-Dissemination and Training Division (see www.ptsd.va.gov/public/pages/PTSDcoach.asp). The application was created through input from PTSD patients in focus groups (n=78) and clinical staff (n=5). The application contains four components: Learn, Self-Assessment, Manage Symptoms and Find Support. The Learn section provides psychoeducation about PTSD, frequently asked questions and various treatment options with what to expect. Self-Assessment includes a PTSD checklist with feedback, which can be completed multiple times to see progress on a line graph. The Manage Symptoms section provides tools to help cope with acute PTSD symptoms. Where the user can select their problem, rate their distress and are taken to a relevant CBT-based coping tool. Finally, the Find Support option offers users crisis lines and select supportive friends from their contact lists. Although the application is based on effective scientific constructs and is widespread, the only clinical testing of it has been by Kuhn et al., (2014) on a sample of 45 participants. Unlike many mHealth applications this application has a considered structure, which is well derived from the literature. Therefore, the structure of the application and their delivery of psychoeducation was used to inform this study's intervention.

This introduction is only intended to give a brief summary on the current state of smartphone interventions. A very large number of intervention applications have been created. Many of these are based on clinically effective strategies but only a handful have been experimentally tested (Jones et al., 2014). This clear absence of the scientific process in many applications can be expected from a delivery method that is in its first decade. Both

psychological and medical disciplines will take time to create scientifically rigorous applications, resulting in the domination of untested applications in the early market. One risk is that untested applications may not work and cause a loss of confidence in this delivery method. However, more importantly, the complete lack of universal standards of care or ethical considerations in the current market is concerning. These applications target vulnerable people searching for help or to better understand themselves and these people should be protected. Ideally, an existing or new scientific body could create a set of scientific and ethical standards that applications could apply for to demonstrate their safety and effectiveness to customers.

6.1.2 Aim

The aim of this study is to investigate whether individuals who are trained to adaptively reduce and counter catastrophising will be less likely to catastrophise compared to a control group. But primarily, if the intervention successfully reduces catastrophising, the study will observe whether a reduction in catastrophising behaviours and thinking will improve their mood. Both groups will use a mobile platform that has been specifically designed for the current study.

This application has been structured using a similar design to the PTSD coach. However, instead of being divided into four sections, this application is divided into five major sections. These are elaborated on in the Measures section of the Method. The first section provides information about the application and psychoeducation. The second section contains the four main tasks (goals, accepting catastrophising, using probabilities and what if scenarios). The third section contains notifications from the app. The fourth section contains a graph charting daily mood progress (negative and positive) and the final section contains the questionnaires (PANAS, CQ, DASS & final questions).

The first hypothesis is that catastrophising scores measured through the CQ can be significantly reduced through the training in this application compared to the control group. While the techniques applied in this application are drawn from existing therapies, their direct effect on catastrophising has not been tested. Additionally, the techniques have been tailored to this study to specifically target catastrophising. The second hypothesis is conditional on the first, which is provided that catastrophising is reduced, this application will improve symptoms associated with catastrophising (depression, anxiety and stress) compared to the control group. This is because earlier studies in this thesis have linked catastrophising with these traits and we predict that they are, to some extent, caused by catastrophising. Finally, we hypothesise that provided catastrophising is reduced, this application will improve overall mood compared to the control condition (decrease negative and increase positive PANAS scores) as previously demonstrated in reverse in Chapter Four.

6.2 Method

6.2.1 Participants

This study recruited 107 participants, both from the University of Reading Research Panel (SONA) and from a list of websites for recruitment online, which are listed below. The application did not collect data on age or gender. 22 participants dropped out of the study and 27 were excluded for not completing all the questionnaires or duplicated usernames. From the remaining 58 (51 from the University of Reading) participants there were 31 in the experimental condition and 27 in the control group. To achieve a medium effect size (0.3) with a power of 0.8 an a priori power analysis was conducted, which found that a total sample size of 62 participants were necessary.

www.twitter.com

www.reddit.com/r/samplesize

www.onlinepsychresearch.co.uk/

psych.hanover.edu/Research/exponnet.html

www.facebook.com/onlinepsychologyresearch

6.2.2 Design

This study had two groups, the catastrophising group received treatment through the application and the control group also received the application, which also provided the psychoeducation. However, instead of teaching therapeutic strategies, participants were required to download and play mobile games to ensure that both groups are required to spend similar amounts of time on the application. Participants were assigned into the control or catastrophising group using a random number generator hidden in the application. This meant that neither the experimenter or the participant knew which group they had been placed in. The dependant variable to measure between group differences of catastrophising in hypothesis one was the Catastrophising Questionnaire (CQ) developed in Chapter Five. For hypothesis two the dependent variable to measure differences between groups was the Depression, Anxiety and Stress Scale (DASS-21). In hypothesis three, between group mood comparisons were recorded through the Positive and Negative Affect Scale (PANAS).

6.2.3 Materials and Apparatus

6.2.3.1 Catastrophising Questionnaire (CQ)

The CQ was developed in Chapter Five and consists of nine items, each can be scored from 0 (not at all) to 10 (all of the time) (Appendix 45). The final result of the CQ is the sum of these scores. The CQ has two identified subscales, Health and Safety (two items) and General (seven items), which can be totalled for subscale scores. See Chapter Five for more information.

6.2.3.2 Depression, Anxiety and Stress Scale (DASS-21)

For a review of the DASS-21 and its subscales, see chapter two. The DASS-21 consists of 21 items, each scored from 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). Each subscale (depression, anxiety and stress) contains seven items that can be added to make final subscale scores. See Chapter Two for more information (Appendix 4).

6.2.3.3 Positive And Negative Affect Scale (PANAS)

For a review of the PANAS, see chapter four. The PANAS consists of 20 items, each scored on a Likert scale from 1 (Very slightly or Not at all) to 5 (Extremely). The PANAS is comprised of two subscales, positive and negative, each the sum of 10 items. For this experiment the instructions for the PANAS were changed from "Indicate to what extent you feel this way right now, that is, at the present moment" to "Indicate to what extent you have felt this way today." See Chapter Four for more information (Appendix 33).

6.2.3.4 University of Reading: Catastrophising App (UoR:C)

The UoR:C was developed by the experimenter with assistance from FIZIX studios (http://www.fizixstudios.com/) and was only compatible with iTouch, iPhone and iPad software. One priority in the creation of the UoR:C was participant's data security and ease of data collection. Therefore, the application was delivered differently to previous therapeutic applications. To achieve this the UoR:C firstly requires an account with a password to reach its content. Secondly, no passwords, or data beyond application structure, is stored within the UoR:C app but instead stored in a secure private server (http://reading.fizixstudios.com/). This method allowed for one application to be used for both the control and catastrophising conditions. As all content was drawn from the server, a new user would be assigned to a condition based on a random number generator within the server. This also meant that the experimenter had access to all of the data and had full control of the application during the

study. Another consequence of this design choice is that any cloud based system requires internet access to use.

A more advanced module based structure of the PTSD coach (Kuhn et al., 2014) was developed for the UoR:C. The modules of the UoR:C were also required to be focused on catastrophising, so approaches were adapted from a variety of therapeutic sources (as discussed below). The final structure, which was identical for both conditions, consisted of five main sections, shown in Figure 6.1 below (for full application content see Appendix 50):

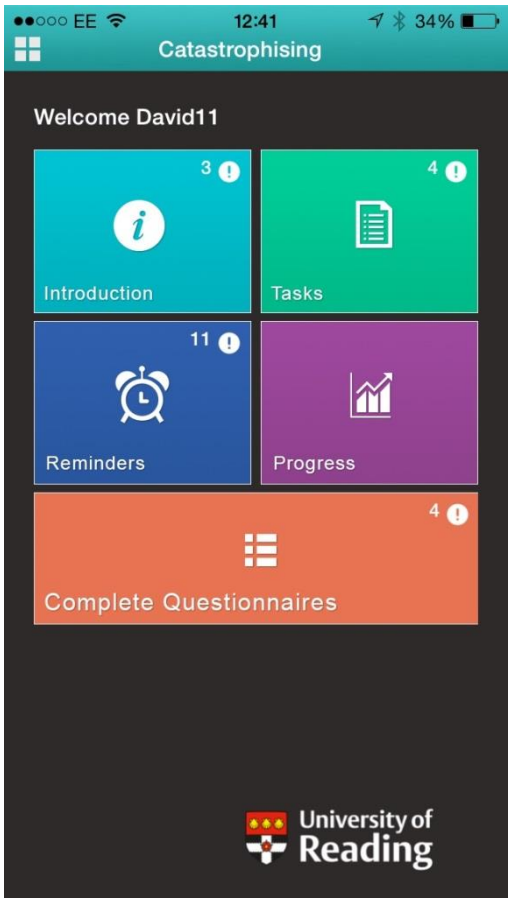

Figure 6.1 Main menu of the UoR:C, where !'s mark items to be completed by the user

Introduction: The introduction section shown in Figure 6.1 and Figure 6.2 was the same across both conditions. The only exception to this was some content within "About This App", which introduced the appropriate control or experimental condition (see Appendix 50

for all Introduction content). The following two sections “What are emotions and how do they work?” were psychoeducation following a similar structure to ART (Berking & Whitley, 2014) but considerably more brief. In section one, there is a lay explanation of the underpinnings of emotion in the hypothalamus, amygdala, prefrontal cortex and hippocampus. Section two covers the evolutionary approach to emotion, explaining how many emotions can be adaptive in the right context. This aims to retrain individuals from seeing emotions as positive or negative to tools that need to be used appropriately to be adaptive. The final section was not directly drawn from pre-existing literature but gives a lay explanation of what catastrophising is, to give participants the foundations to take future steps in tackling it. See the Procedure for how many days into the intervention each section becomes available.

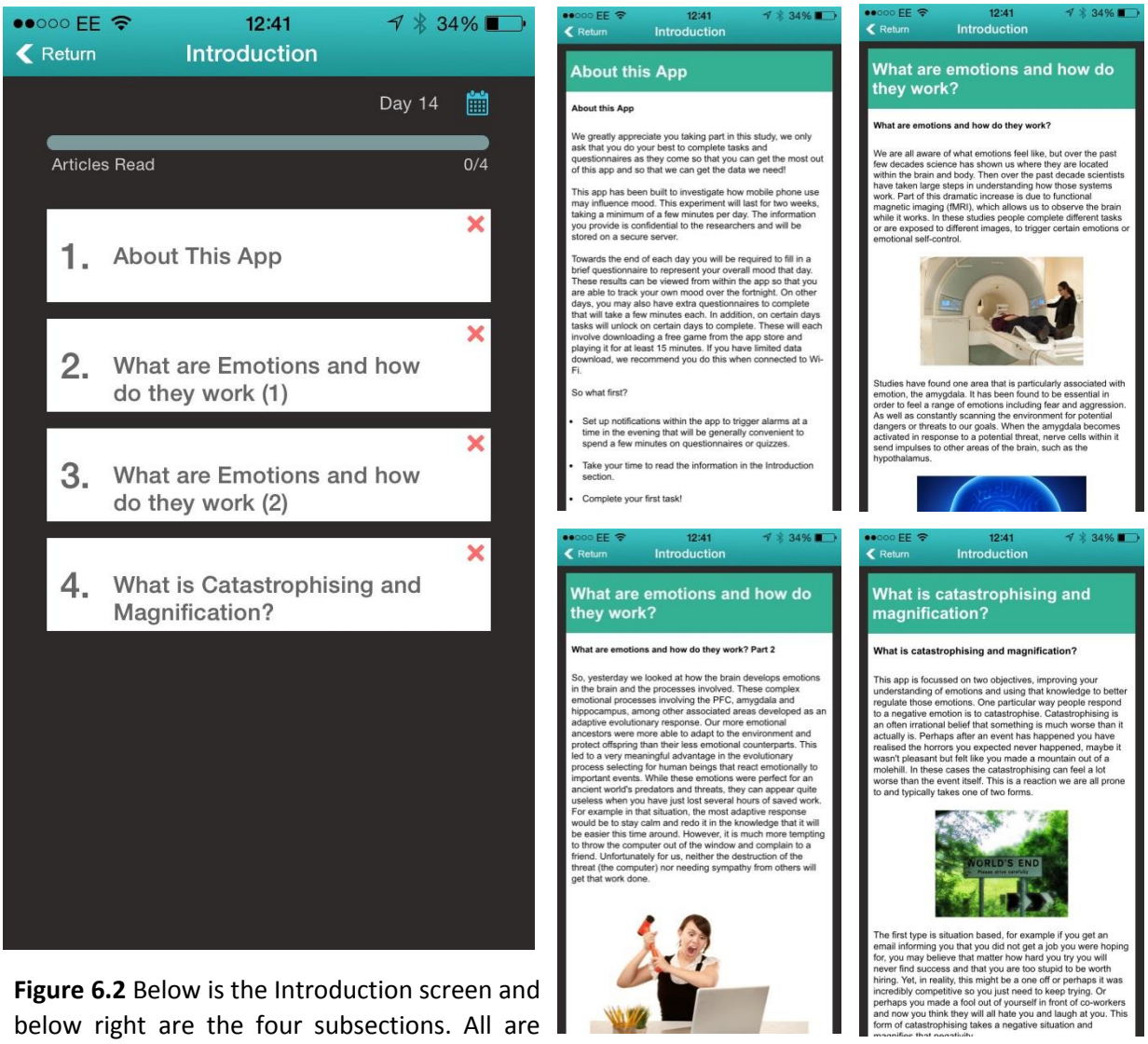

Figure 6.2 Below is the Introduction screen and below right are the four subsections. All are

the same across groups, except for some details in 1 About This App.

Tasks: The Tasks section shown in Figure 6.1 and Figure 6.3 were different between both conditions. Figure 6.3 shows the catastrophising condition, for each section the controls had four subtitles labelled tasks 1-4. Each contained a brief instruction to follow a provided URL and download a game to play for around 10-15 minutes a day until the next task (see Appendix 50 for text and game URLs). In the catastrophising condition the first section begins unlocked. “Developing Goals” was adapted from ART (Berking & Whitley, 2014) so participants will have a measurable, personally important and attainable goal to work towards. Additionally, the goal is to be stated in the positive (attaining something, such as becoming calm or happy) rather than negative (removing something, such as becoming less angry or less sad. Positive goals have been found to be effective and more effective than negative goals (Impett et al., 2010). Furthermore, the participant must set a time to be reminded of their goal each day. Therefore, instead of focusing on reducing catastrophising, participants focused on the positive consequences of reduced catastrophising as their goal.

The second task, “Acceptance” in this form was also developed from ART, with a catastrophising lens (Berking & Whitley, 2014). This exercise teaches participants to become more aware of their tendencies to catastrophise and provides the foundation for later tasks. The task requires the participant to use imagery to accept and distance themselves from their unwanted emotions and catastrophic thoughts. The third task “Using Probabilities” is derived from a task in Metacognitive Therapy for Anxiety and Depression (Wells, 2009) for reducing catastrophising. This section teaches participants how to calculate probabilities that their catastrophic beliefs might come true as a way to overcome the temptation to catastrophise. The final task unlocked is the “What If” task developed from CBT (Beck et al., 1979) where

participants are instructed to work out what might happen if the worst (catastrophic) consequences did happen and work out a plan B if it did happen. This aims to teach individuals to see their situation more objectively, therefore reducing negative emotion experience.

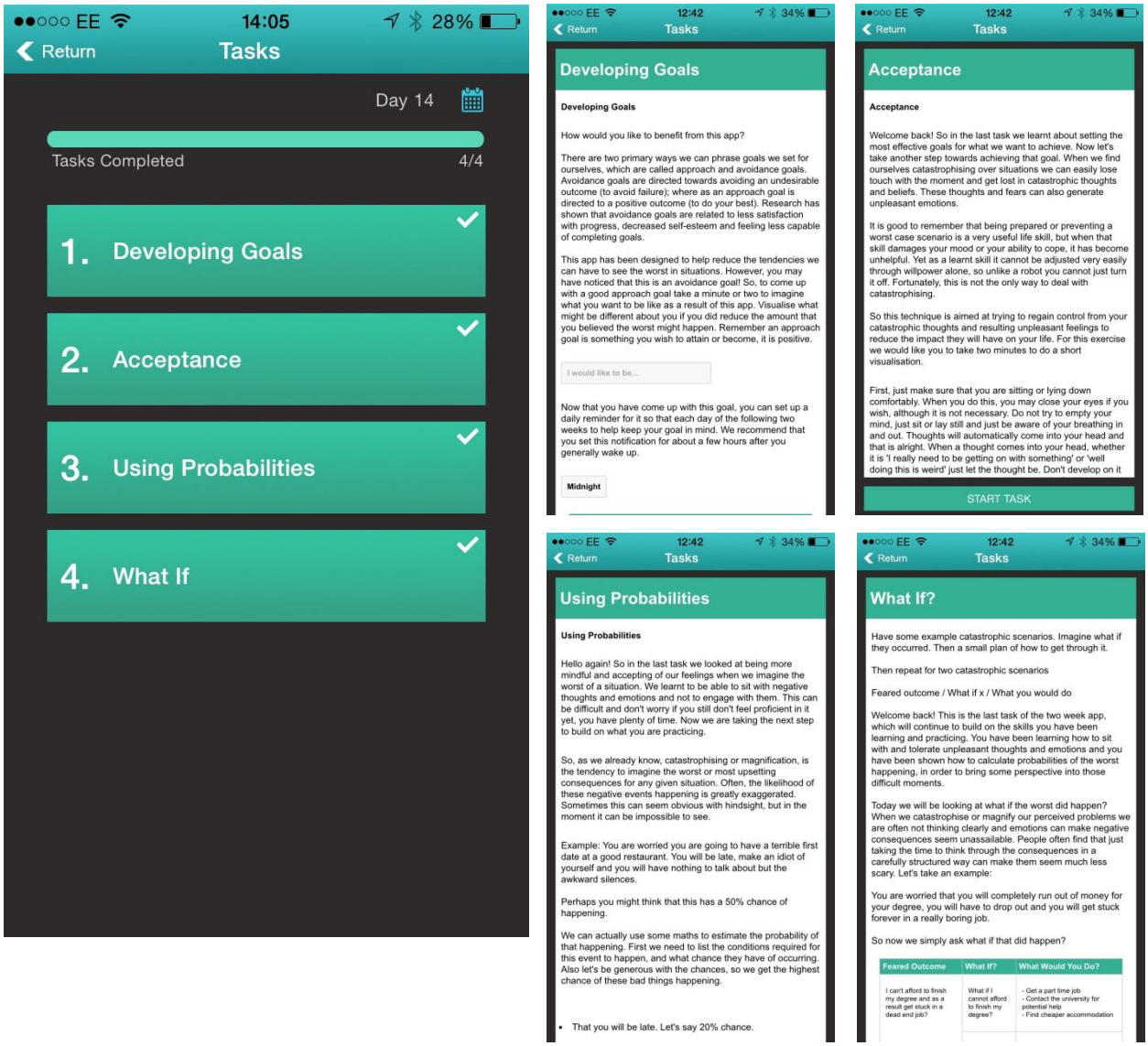

Figure 6.3 Below is the Tasks screen and below right are the four subsections for the catastrophising condition. For the control condition see Appendix 50.

Reminders, Progress & Questionnaires: Reminders, as shown in Figure 6.1 and Appendix 50 are a list of outstanding activities (introduction reading, tasks or questionnaires). Progress shown in Figure 6.1 and in Figure 6.4 show the user's daily PANAS positive and negative affect scores

throughout the intervention. This was designed to give the user instantaneous feedback on their progress. The final section, Questionnaires, contains all the measures described in the above section, which were activated on the relevant days (see Procedure).

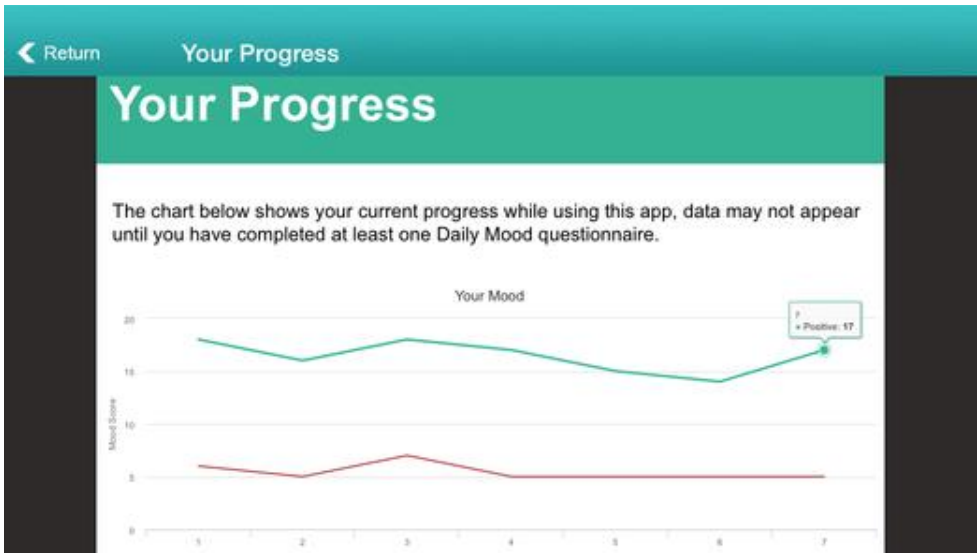

Figure 6.4 Example data on Progress graph of positive and negative affect PANAS scores.

6.2.4 Procedure

This experiment was conducted through the application that could be accessed/downloaded only by using an iTouch, iPhone or iPad already owned by the participants the application could be downloaded for free from the iStore (from https://itunes.apple.com/us/app/university-reading-catastrophising/id1000831997?mt=8). Consent was provided through the sign up process of the application. When signing up, the participants were randomly allocated to either the control or active condition by a random number generator in the server. The participants were unaware of this randomised process and the group they were assigned to until the conclusion of study. Both the control and

experimental groups had a 14 day duration with new information or tasks unlocking as the days progressed.

On day one participants in both groups were able to read the 'About this App' section to gain a greater understanding of its purpose and how best to use it. Both groups also unlocked the first page of psychoeducation on emotion titled 'What are emotions and how do they work? Day 1'. Both groups also had the first task unlocked for day one. The experimental condition unlocked the 'Developing Goals' whereas the control group unlocked their first game to play for 10-15 minutes each day. On day two both groups unlocked the 'What are emotions and how do they work? Day 2'. Then the final page of psychoeducation unlocked on day three which was titled 'What is catastrophising and magnification?'

Following this, new tasks were unlocked for both groups on days four, eight and twelve. For the control group, each new task was a new game to play for at least 10 minutes each day until the next task unlocked. For the experimental group the following tasks were on days four; task titled 'Accepting Catastrophising'; day eight task titled 'Using Probabilities' and day twelve task titled 'What if?'.

In parallel to the psychoeducation and tasks, participants completed a range of questionnaire measures on specific days. The PANAS was completed on each day in the evening. Both the DASS and the Catastrophising Questionnaire were completed on day one, seven and fourteen following completion of the PANAS. On the final day participants were asked to complete some additional questions on how they experienced the app and were debriefed with appropriate support information (Appendix X). However, these final questions did not appear for the participants, which was not known until the experiment had concluded.

6.2.5 Statistical Analysis

The data collected from each participant was securely stored on a private server (http://reading.fizixstudios.com/) where it could be downloaded directly into .csv format. The data from both groups was separated and checked for missing data as well as non-compliance (repetitive responses). Total positive and negative PANAS scores were calculated for each day. Total and sub-scale scores were calculated for both CQ and DASS at each interval. The data was then exported into SPSS 21 to check normality through z-scored skewness and kurtosis in PANAS totals, CQ totals and DASS totals. Baselines for each measure (PANAS, DASS and CQ) were also tested for differences between groups by independent t-tests.

The first hypothesis, that the catastrophising intervention will reduce reported levels of catastrophising more than the control group. This was tested by a between group 2x3 ANOVA of baseline, week one and week two CQ totals. Subsequently, contrasts were conducted for both conditions.

The second hypothesis, that a reduction in catastrophising would reduce depressive, anxious and stress symptoms were tested by a series of between group 2x3 ANOVAs for baseline, week one and week two DASS subscale scores. All ANOVAs for the first and second hypotheses proceeded by a between group t-test of week two scores. This post-hoc test was carried out if there was a significant interaction. This enables the understanding of whether any difference between groups was a product of the intervention.

The third hypothesis is that a reduction in catastrophising would increase positive mood and decrease negative mood. This is assessed through a pair of 2x14 ANOVAs. These are between groups and across all 14 time points for both positive and negative emotion.

6.3 Results

6.3.1 Normality Checks

Skewness and Kurtosis scores were calculated for a range of variables. The between-group daily positive and negative PANAS means (see Appendix 54). The PANAS scores were broadly normal, however 10 of 56 were not. Compared to transformed data, this ratio of normal to non-normal was the best possible ratio of normal to non-normal scores. Additionally, all of the non-normal scores were relatively small, not beyond 3 or -3 z-scored. The weekly total and subscale CQ scores (baseline, week one and week two) and finally DASS subscale scores (baseline, week one and week two) all shown in Table 6.1 below. To prepare the non-normal DASS scores for ANOVA, the results were transformed. Both the square root and logarithmic transformations failed but reciprocal transformation was successful, as shown in Table 6.2. These conversions to z scores were made by dividing the kurtosis or skewness score by its standard error.

Table 6.1 Z-scored kurtosis and skewness for CQ (total and both subscales) and DASS (subscales only). All z-scores between -1.96 and 1.96 are considered normal. N=58.

Measure	Skewness	Kurtosis	Measure	Skewness	Kurtosis
CQ – Baseline total	-0.03	-1.05	**DASS – Baseline Depression**	5.62*	5.42*
CQ – Baseline Health and Safety	0.41	-1.63	**DASS – Baseline Anxiety**	4.70*	3.51*
CQ – Baseline General	0.23	-1.25	**DASS – Baseline Stress**	2.70*	0.63
CQ – Week 1 total	0.31	-0.78	**DASS – Week 1 Depression**	4.46*	3.17*
CQ – Week 1 Health and Safety	0.69	-1.49	**DASS – Week 1 Anxiety**	4.318*	1.83
CQ – Week 1 General	0.48	-0.98	**DASS – Week 1 Stress**	2.72*	-0.52

CQ – Week 2 total	0.89	-0.73	**DASS – Week 2 Depression**	2.89*	0.16
CQ – Week 2 Health and Safety	1.95	0.73	**DASS – Week 2 Anxiety**	8.74*	1.83
CQ – Week 2 General	0.85	-1.03	**DASS – Week 2 Stress**	3.05*	-0.52

*indicates non-normal distribution

Table 6.2 Z-scored kurtosis and skewness for DASS following reciprocal transformation (subscales only). n=58.

Measure	Skewness	Kurtosis	Measure	Skewness	Kurtosis
DASS – Baseline Depression	1.07	-1.27	**DASS – Week 1 Stress**	0.10	-1.84
DASS – Baseline Anxiety	-0.18	-1.71	**DASS – Week 2 Depression**	0.73	-1.05
DASS – Baseline Stress	1.43	-1.38	**DASS – Week 2 Anxiety**	-1.45	-0.24
DASS – Week 1 Depression	-0.87	-1.62	**DASS – Week 2 Stress**	-0.06	-1.62
DASS – Week 1 Anxiety	-1.35	-1.72			

6.3.2 Impact of UoR:C on Catastrophising

6.3.2.1 Baseline Tests

Three between group baseline (day one) t-tests were conducted for total CQ, Health and Safety CQ and General CQ scales. No significant difference in baselines was found. Total CQ: t(55) = -.774, p=.442. Health and Safety: t(55) = -.673, p=.504. General: t(55) =-.901, p=.372.

6.3.2.2 CQ Total Scores between Groups over Time

The data was analysed using a mixed-measures ANOVA, with a within-subjects factor of time (baseline, week one and week two) and between-subject factor of group (condition and control) (see Figure 6.5). Mauchly's test indicated that the assumption of sphericity had not been violated. The main effect of time was significant, $F(2, 110) = 12.59$, $p < .001$, $\eta^2 = .186$. However, the main effect of group was an insignificant trend, $F(2, 110) = 3.95$, $p = .052$, $\eta^2 = .067$. The interaction of time and group was significant where, $F(2, 110) = 3.74$, $p < .05$, $\eta^2 = .064$. A post-hoc between groups t-test for week two scores found a significant difference where, $t(55) = -3.45$, $p<.001$, $d=0.90$.

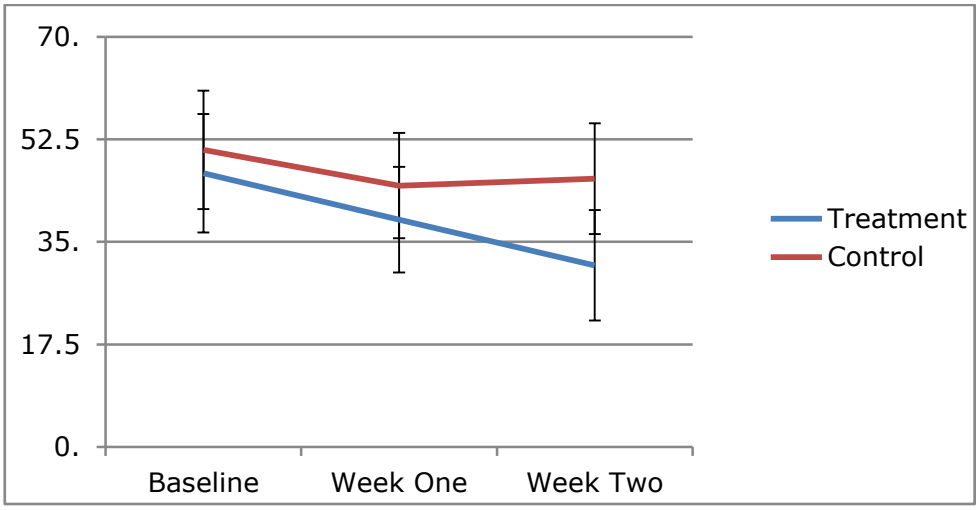

Figure 6.5 Total CQ scores by group and time. N=58.

6.3.2.3 CQ Health & Safety Scores Between Groups over Time

The data was analysed using a mixed-measures ANOVA, with a within-subjects factor of time (baseline, week one and week two) and between-subject factor of group (condition and control) (see Figure 6.6). Mauchly's test was significant at $p=.041$. The main effect of time was significant, $F(1.80, 98.99) = 5.48$, $p < .01$, $\eta^2 = .091$. However, the main effect of group was non-

significant, F(1, 55) = 3.79, p = .057, η^2= .064. The interaction of time and group was also non-significant, F(1.80, 98.99) = 1.01, p = .362, η^2= .018.

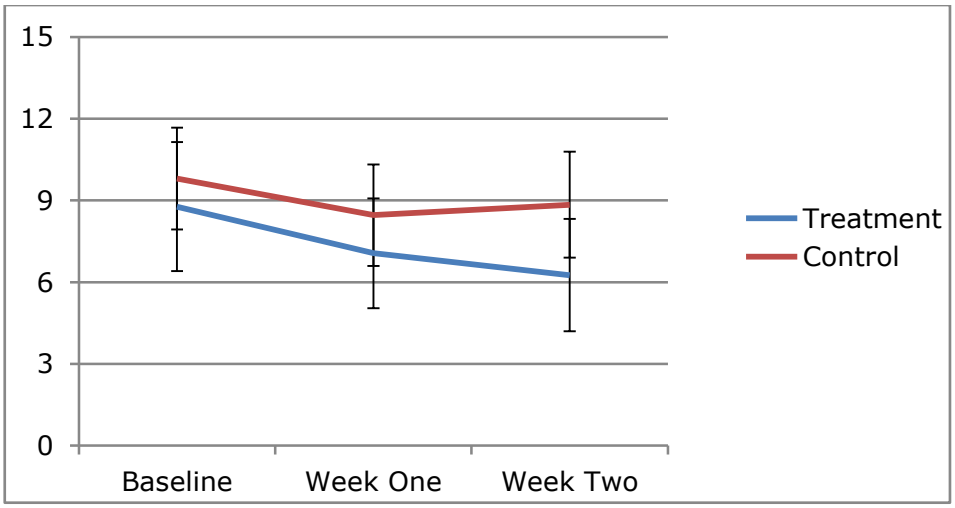

Figure 6.6 CQ Health & Safety scores by group and time. N=58.

6.3.2.4 CQ General Scores Between Groups over Time

The data was analysed using a mixed-measures ANOVA, with a within-subjects factor of time (baseline, week one and week two) and between-subject factor of group (condition and control) (see Figure 6.7). Mauchly's test indicated that the assumption of sphericity had not been violated. The main effect of time was significant; F(2, 110) = 11.88, p < .001, η^2= .178. However, the main effect of group was an not significant, F(1, 55) = 3.51, p = .066, η^2= .060. The interaction of time and group was significant where, F(2, 110) = 3.82, p < .05, η^2= .065. A post-hoc between groups t-test for week two scores found a significant difference where, t(55)= -3.41, p<.001, d=0.89.

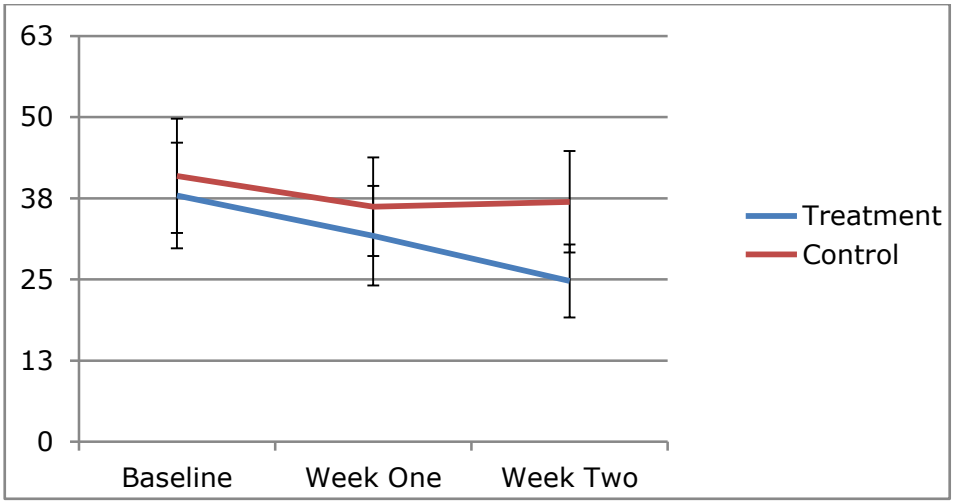

Figure 6.7 CQ General scores by group and time. N=58.

6.3.3 Impact of UoR:C on Depression, Anxiety & Stress Symptoms

6.3.3.1 Baseline Tests

Three between group baseline (day one) t-tests were conducted for each DASS subscale. No significant difference in baselines were found. Depression: t(55) = -1.03, p=.307. Anxiety: t(55) = 1.28, p=.206. Stress: t(55) =-1.84, p=.072.

6.3.3.2 DASS Depression Scores Between Groups over Time

The data was analysed using a mixed-measures ANOVA, with a within-subjects factor of time (baseline, week one and week two) and between-subject factor of group (condition and control) (see Figure 6.8). Mauchly's test indicated that the assumption of sphericity had been violated (p<.02), so Greenhouse-Geisser correction was applied. The main effect of time was not significant, F(1.76, 96.95) = 1.66, p= .198, η^2= .029. However, the main effect of group was significant, F(1, 55) = 5.10, p<.05, η^2= .085. The interaction of time and group was significant where, F(2, 110) = 8.71, p < .01, η^2= .137. A post-hoc between groups t-test for week two scores found a significant difference where, t(55)= -3.79, p<.001, d=1.00.

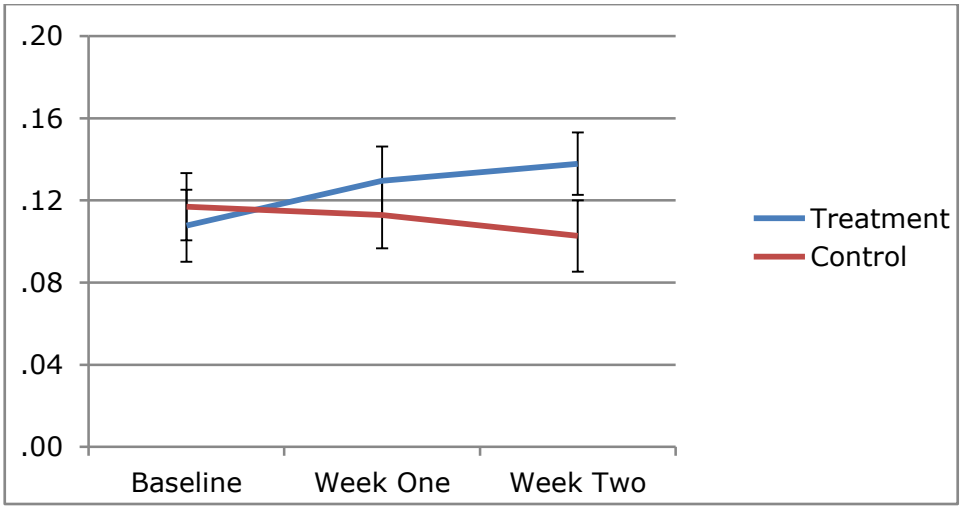

Figure 6.8 DASS depression scores by group and time following reciprocal transformation (y-axis), where higher scores indicate a lower initial DASS score. N=58.

6.3.3.3 DASS Anxiety Scores Between Groups over Time

The data was analysed using a mixed-measures ANOVA, with a within-subjects factor of time (baseline, week one and week two) and between-subject factor of group (condition and control) (see Figure 6.9). Mauchly's test indicated that the assumption of sphericity had been met. The main effect of time was significant, $F(2, 110) = 3.12$, $p<.05$, $\eta^2= .054$. However, the main effect of group was not significant, $F(1, 55) = 0.25$, $p=.621$, $\eta^2= .004$. The interaction of time and group was significant where, $F(2, 110) = 4.23$, $p < .05$, $\eta^2= .071$. A post-hoc between groups t-test for week two scores found no significant difference where, $t(33.24)= -1.89$, $p=.085$.

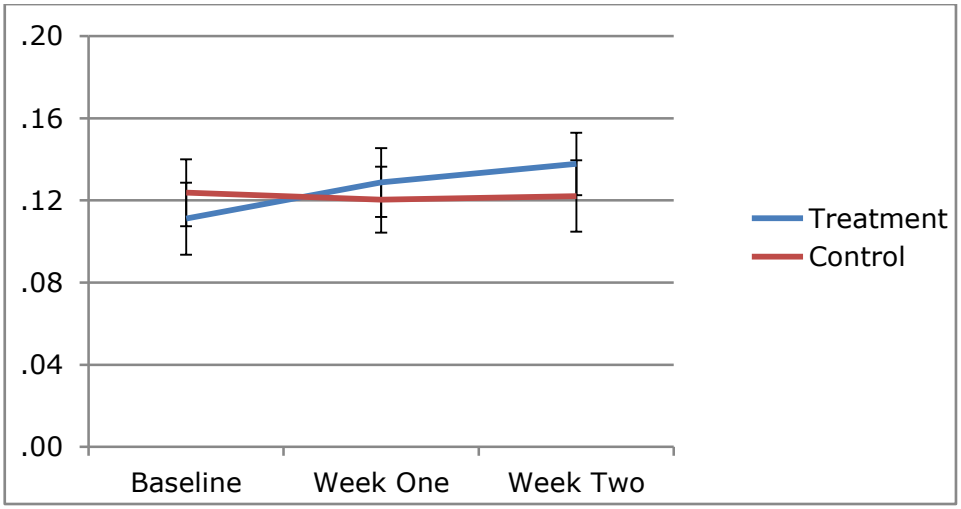

Figure 6.9 DASS anxiety scores by group and time following reciprocal transformation, where higher scores indicate a lower initial DASS score. N=58.

6.3.4 DASS Stress Scores Between Groups over Time

The data was analysed using a mixed-measures ANOVA, with a within-subjects factor of time (baseline, week one and week two) and between-subject factor of group (condition and control) (see Figure 6.10). Mauchly's test indicated that the assumption of sphericity had been met. The main effect of time was significant, $F(2, 110) = 5.37$, $p<.01$, $\eta^2= .089$. However, the main effect of group was not significant, $F(1, 55) = 0.50$, $p=.485$, $\eta^2= .009$. The interaction of time and group was significant where, $F(2, 110) = 7.67$, $p < .001$, $\eta^2= .122$. A post-hoc between groups t-test for week two scores found a significant difference where, $t(38.46)= -3.07$, $p<.01$, $d=0.84$.

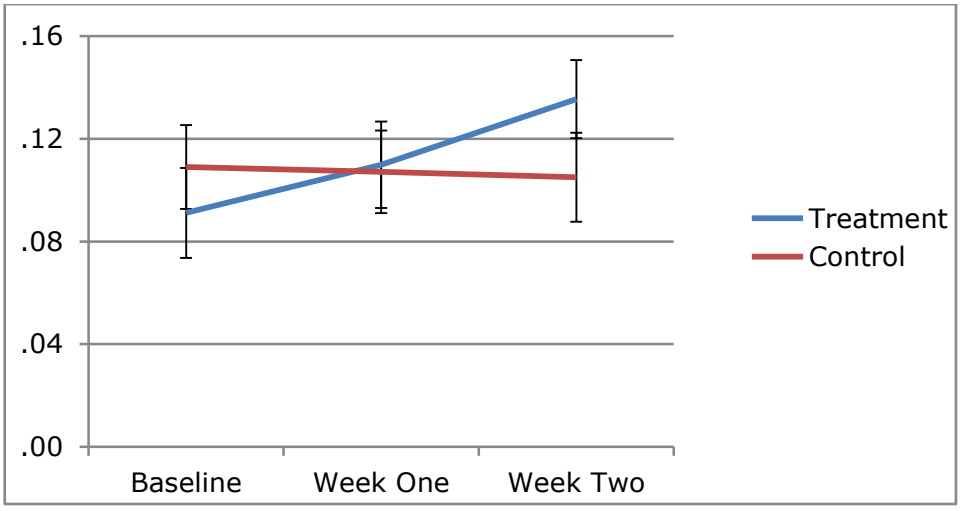

Figure 6.10 DASS stress scores by group and time following reciprocal transformation, where higher scores indicate a lower initial DASS score. N=58.

6.3.5 Impact of UoR:C on Mood

The PANAS positive data was analysed using a mixed-measures ANOVA, with a within-subjects factor of time (each of the 14 days) and between-subject factor of group (condition and control) (see Figure 6.11). Mauchly's test indicated that the assumption of sphericity had been met. The main effect of time was not significant, $F(13,728) = 1.17$, $p=.300$, $\eta^2= .020$. However, the main effect of group was significant, $F(1, 56) = 47.13$, $p<.001$, $\eta^2= .457$. The interaction of time and group was also significant where, $F(13, 728) = 3.28$, $p < .001$, $\eta^2= .0.55$.

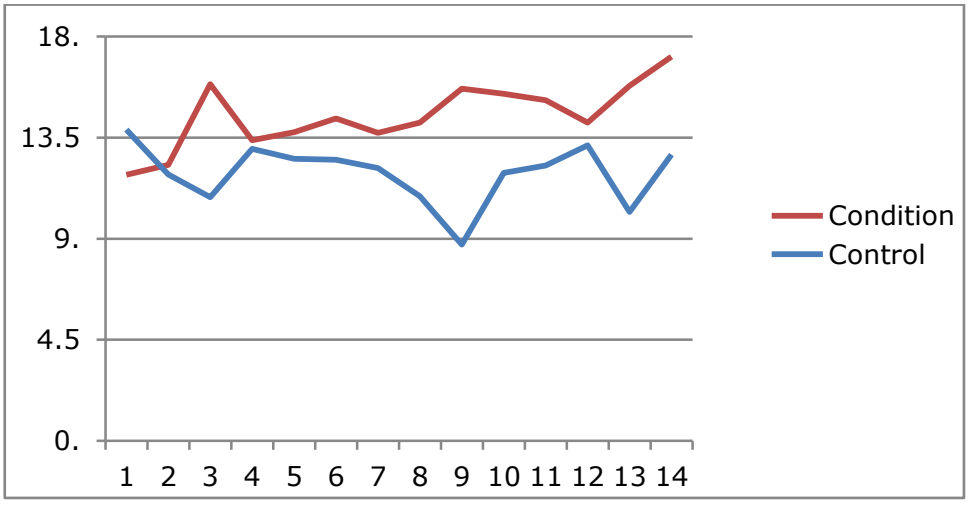

Figure 6.11 Mean positive PANAS scores per day. N=58.

The PANAS negative data was analysed using a mixed-measures ANOVA, with a within-subjects factor of time (each of the 14 days) and between-subject factor of group (condition and control) (see Figure 6.11). Mauchly's test indicated that the assumption of sphericity had been met. The main effect of time was significant, $F(13,728) = 2.78$, $p<.01$, $\eta^2= .047$. The main effect of group was also significant where, $F(1, 56) = 10.47$, $p<.01$, $\eta^2= .157$. The interaction of time and group significant where, $F(13, 728) = 5.37$, $p < .001$, $\eta^2= .087$.

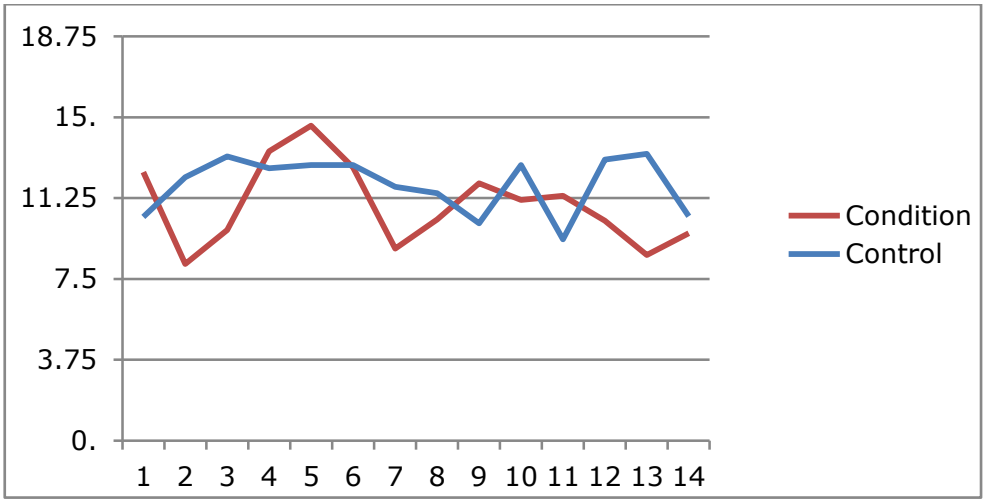

Figure 6.12 Mean negative PANAS scores per day. N=58.

6.4 Discussion

The UoR:C was created to test whether a community sample, trained to reduce and prevent catastrophising, would experience reduced levels of catastrophising, increased mood and less distress than a control group. The interaction between time and group established the effectiveness of the treatment between groups and over time. There was a significant interaction between groups and over time for total catastrophizing scores. The post-hoc tests for CQ total scores demonstrated a significant difference between groups at week two. These results support the first hypothesis, that the application would reduce the rate of catastrophising. Once the CQ was broken down into its two subscales, the General Catastrophising subscale retained a significant interaction. However, the Health and Safety subscale did not. This difference validates the original distinction made between subscales in Chapter Five. It also suggests that the application targeted General Catastrophising.

As the first hypothesis was confirmed (the UoR:C would significantly reduce catastrophising), further analysis into distress and mood was conducted. The interactions for each subscale (depression, anxiety and stress) were significant. However, the post-hoc tests at week 2 were only significant for depression and stress, not anxiety. These results indicate that training individuals in ways to dealing with catastrophising reduced general distress. Causality can be strongly indicated but not explicitly proven by self-reported scores that do not perfectly represent 'true' values. However, the results suggest that the application did cause a general reduction in depression, anxiety and stress scores as predicted. A measurable impact of the application at week two for depression and stress but anxiety was not expected. As there was a significant interaction for all three subscales, it would appear that the application had a smaller impact on anxiety scores. However, at this stage it is not possible to decipher if this is due to peculiarities in the sample, specificity of the application or a feature in the relationship

between anxiety, depression and stress concerning catastrophising. To ensure that this non-significance is worth consideration, it should first be replicated by a future study.

The third hypothesis, that the intervention would increase positive mood and decrease negative mood was upheld. Interestingly, the between group main effect for positive mood is very pronounced. However, for negative mood, participants in the condition only narrowly outperformed their control counterparts. Additionally, positive mood appears to be considerably more stable over time than negative mood. This suggests that the effect for positive mood will be easier to replicate and more indicative of a true effect. In the Broaden and Build Theory proposed by Fredrickson (2004) negative emotions are specific action tendencies, as they prime specific behaviours (e.g. escape, expel or attack). In threatening situations, these specific action tendencies narrow thought-action repertoires to promote quick and decisive action. Therefore, negative emotions are reactionary and specific. However, positive emotions rarely occur in threatening situations, which means that positive emotions do not need to narrow an individual's thought-action repertoire for quick and decisive action. Instead positive emotions increase an individual's thought-action repertoire, such as encouraging play and curiosity. The consequence of this is that positive emotions frequently build upon one another, whereas negative emotions are more situation specific. This effect is one possible explanation of the highly variable daily negative emotion, compared to the relatively stable positive emotion scores.

6.4.1 Limitations

While this study sought to develop upon previous interventions developed as mobile applications, it is not without limitations. One such limitation is the absence of data on how frequently individuals accessed the application. This includes, which aspects were most frequently accessed. While this is unlikely to invalidate the results of the study, it is likely to be its largest weakness for two reasons. Firstly, beyond completing questionnaires, it is unknown

whether participants read or applied any of the information or tasks provided. This may have had a dampening effect on the strength of the findings, particularly in distinguishing between groups. As undergraduates, completing the application for course credit, may have sought to do the minimum. However, it is equally likely that as participants knew the application was collecting data, they engaged with the application to ensure course credit. This problem cannot be answered, except that in future studies some measure of use would prevent it occurring again. This also reveals the potential of technology, if fully exploited.

A second issue to arise is if the application was engaged in constructively, there is no record of what aspects individuals found most helpful. The application was designed to measure this as part of the exit questionnaire. But due to technical limitations these questions did not appear, and this did not come to the attention of the experimenter until the completion of the study. As a consequence, it is difficult to bring these results back to the wider literature in regards of what is the best way to tackle catastrophising. This application drew various aspects from a variety of interventions and theories. But without self-report measures on what was useful (and not useful) it is not possible to relate the findings to specific literature. However, this did not undermine the main aim, which was a test of whether catastrophising training is beneficial.

The sample of the study was confined in two ways. The majority of participants that completed the study were undergraduates and the application was limited to Apple devices. As shown in Chapter Two, the undergraduate population demonstrated abnormally high levels of depression. Secondly, Apple users tend to represent higher socioeconomic status. For example, during December 2013 Android users spent an average of $48.10 per order compared to $93.94 by Apple users (Yarow, 2013). The sample for this experiment was restricted to Apple users due to time constraints. This is because Android applications have no standardisation (such as screen size) and consequently require more testing. However, a

future study could build on this application and include Android and Windows users as well. A simpler method of widening the sample would be to allow considerably more time for the experiment to be downloaded by a greater number of the public until they form a pre-specified proportion of the sample.

Another restriction imposed by the design of this study is the absence of any measure of long-term change for the participants. It is impossible to determine if the improvements demonstrated by the condition group are enduring. As the concept, has now been tested, future studies could simply prompt users (who still have the application installed) after one and then six months to complete the DASS and CQ measures. Based on the findings of the current study it could be predicted that after one month and six months the effects will be maintained but somewhat reduced over time. However, there is likely to be a high dropout rate, based upon the rate within the sample and from users uninstalling the application.

While the aim of this experiment was to test the potential of catastrophising in a therapeutic setting, it is also testing the potential effectiveness of application-based treatment. This study intended to develop upon the weaknesses of previous application based interventions. Potentially, these lessons facilitated UoR:C's effectiveness. And in reflection I make some key recommendations, which could further benefit future therapeutic interventions. Applications are unlike standard psychological experiments or psychological interventions. As with almost all psychology experiments UoR:C was designed from a *psychology first* perspective, where the concept was developed and the technology followed it like a script. This one-way influence had two repercussions. Firstly, the programming lacked ambition, as it was simply following a pre-set structure. However, if the technological aspect was explored for its own sake, and allowed to build upon the theory, its potential would drastically increase. Secondly, in a *psychology first* perspective the implication is that one is designed followed by the other. This results in poor project management issues never

normally encountered or considered in developing psychological tools. These include a variety technical issues that were not foreseen and a lack of product testing due to the mind-set of following a concrete programming script. Both results in delays and a less effective product. Any application based psychological intervention should have their theory and programing developed in tandem. From a software industry perspective, this would be using an agile project management style, where the application is gradually developed and continuously tested over different phases (alpha, beta and release). This flexibility should never compromise psychological validity, but focus on exploiting it.

6.4.2 Future Study

Once these limitations can be accounted for, a future study could be more ambitious and include a third group. This condition would be another generally maladaptive emotion regulation strategy. The most prudent choices would be either rumination or suppression, due to the considerable research interest in those areas that could inform the application. Just as the control and catastrophising conditions functioned through the same application, so would the additional condition. The UoR:C was designed with a rigid structure, but whose components are easily edited. This will ensure that the new condition will not significantly differ in structure. Beyond replicating this study's results, it would aim to establish the relative impacts made by focusing on catastrophising and another maladaptive strategy. To do this an additional emotion regulation measure for the new condition will also be required to be used for each group. As a secondary benefit, this would test a key assumption made by this study, that the catastrophising training is catastrophising specific. From a somewhat simplistic perspective, we would hypothesise that if the catastrophising training is specific, then there should be no measurable effect on other emotion regulation strategies. However, provided that any emotion regulation intervention is sufficiently successful in improving an individual's mood there is likely to be some impact on other maladaptive strategies as they will not be

applied as frequently as a coping mechanism if the treatment for catastrophising was successful. Additionally, when comparing two strategies such as rumination and catastrophising there may be an interaction where the treatment for either could be simultaneously tackling the cyclical component present in both catastrophising and rumination or it could even be incidental. For example, an individual with a better mood from the reduced impact of catastrophising may be more resilient to negative situations (Tugade, Fredrickson & Barrett, 2004) and less likely to employ suppression. Therefore, if either intervention is successful and specific it is still likely to have a small but potentially measurable effect on other emotion regulation measures. However, if the effect is the same or larger on a different emotion regulation scale the treatment is unlikely to be specific.

Taking this plan to a future vision, further studies could add treatments for many more commonly maladaptive strategies. Once developed, an application could be created that started with a series of questionnaires, one for each emotion regulation strategy as generated in Chapter Five. This would then generate a course based on the previous interventions to cover all the relevant modules for each emotion regulation strategy they scored highly in.

6.4.3 Conclusion

This application is an early step in many respects. There are a limited number of mental health applications available through this medium and a very small number of psychologically grounded emotion regulation applications. The lack of experience in dealing with this medium, both individually and across the discipline, goes some way in explaining the issues discussed above. While the UoR:C had a variety of limitations, participants in the catastrophising condition reported significantly better moods and lower catastrophising than the control condition. This provides some idea of the scale of the benefits this medium can have on therapeutic interventions. It also drastically increases the reach of informed psychological treatments to those that need them in a way that is highly cost effective. This

study also demonstrates the potential of an emotion regulation focus to therapeutic interventions. Many therapeutic approaches indirectly tackle emotion regulation but do not apply specific methods for specific emotion regulation issues, if it even considers emotion regulation to begin with.

Chapter Seven: General Discussion

7.1 The origin of this thesis

While catastrophising features in four of five of the experimental chapters in this thesis, it is central to only three. The first two experimental chapters (chapters two and three) instead focused on using an atheoretical approach towards a broad range of emotion regulation strategies. The second chapter began by using a questionnaire battery containing a wide range of emotion regulation strategies and relevant mental health indicators. This data was used to create a series of emotion regulation profiles to predict depression, anxiety and hypomania. This experiment expanded on previous literature that largely focused on establishing correlations between emotion regulation strategies and mental health (N Garnefski et al., 2001). One unexpected finding was when creating emotion regulation profiles, many of the previously significant correlations with emotion regulation strategies were explained better by the variance with other mental health indicators. One of the exceptions to this was catastrophising.

Chapter three took a similarly atheoretical approach to emotion regulation, instead to construct a questionnaire. The items from this questionnaire were developed from a range of existing measures. This varied list was then tested in a community population to identify naturally occurring subscales. The aim of this study was to create a questionnaire to capture the breadth of emotion regulation by using naturally occurring variation instead of specific theories. However, this questionnaire failed to replicate its subscale structure. In reflection, this was likely due to the ambitious nature of the project. An atheoretical questionnaire seeking to scope emotion regulation in its true breadth would require a phenomenal number of items. Additionally, it would require a considerably higher sample size to account for the variation. It is possible that such broad measures are not suited to questionnaire design without becoming so long they are overbearing. Despite STERQ's many challenges I learned a

tremendous amount from the study and it was the fundamental learning experience that allowed the creation of the CQ in chapter five.

Another theme that was common across the first two studies was adolescent development. One of the original aims of the first study was to map development in emotion regulation across adolescence. However, due to recruitment challenges the age distribution in the sample made any age based analysis impractical. The second study, STERQ, aimed to create a questionnaire that would be valid across all age groups from adolescent to adult. This meant that if the questionnaire had replicated its structure, further validation would have explored an adolescent sample.

7.2 Understanding catastrophizing

The bulk of this thesis explores catastrophising through its relationships with depression, anxiety, stress and mood. This was done through a cluster of approaches to triangulate how catastrophising interacts with these variables. The second chapter used a cross-sectional analysis and found catastrophising was correlated with depression, anxiety, stress and hypomania. Research into these findings revealed they were not unique, but previously identified within the literature (e.g. Garnefski et al., 2001). Despite this, catastrophising had not been selected for further investigation within the field of emotion regulation. An understandable lapse of a field barely two decades old, if this was an obscure emotion regulation strategy. However, catastrophising is one of the key thought errors outlined in CBT (Beck et al., 1979). Additionally, catastrophising is also highly considered in the pain literature, where its associations with health outcomes are widely known (established by Sullivan, Bishop, & Pivik, 1995). Consequently, the understanding of catastrophising from an emotion regulation perspective was limited to a combination of understanding based on correlations and clinical intuition. Intuition suggested that catastrophising's correlations with depressive and anxious symptoms were explained by catastrophising's causal impact on mood.

This was built upon by the second approach in chapter four. This study instructed participants to catastrophise and compared their mood to a control group. As predicted, the participants who catastrophised reported lower mood (lower positive and higher negative) than their pre-test baseline and to the post-test control group. While this appears to confirm a causal relationship of catastrophising on mood, there are caveats. One such caveat, drawn from intuition, is that the incitement of a negative mood would also make an individual more likely to catastrophise. This introduces a mutual causality that is equally likely to be present in all traditionally maladaptive emotion regulation strategies. A scientific understanding of the strength of this relationship of mood to catastrophising is, yet, unknown. This study was also limited to its impact on mood, and not its effect on the symptoms: depression, anxiety and stress. To test this relationship with a similar design, participants would be required to catastrophise over considerably greater periods of time to record meaningful trait changes.

To progress understanding of the relationship between catastrophising and DASS symptoms and mood, Chapter Six sought to reduce, rather than increase, catastrophising practiced by its participants. These changes were then monitored over a two-week period. This approach confirmed our predictions and supported the proposed causal relationship from catastrophizing to low mood and DASS symptoms. However, it had its own caveats and unique opportunities. One caveat was that the training could have been generalised across maladaptive tendencies to improve other emotion regulation strategies. Therefore, if the training works, but is not specific, the results could still be similar to those found in Chapter Six. Or if the training was generalised across different maladaptive strategies the effect found in Chapter Six could be inflated. Additionally, it is likely that a positive mood brought about by tackling catastrophising would make other maladaptive strategies less likely to occur, thus reducing them indirectly. This is an inevitable issue in unpicking the individual effects of any emotion regulation strategy longitudinally or ecologically as they are deeply intertwined

through mood, emotion and situation. A unique opportunity from this approach was an insight into the clinical potential of catastrophising reduction, which is discussed later.

While each of these studies have individual aims and implications explored in the discussions of each chapter, taken together they contribute to triangulating how catastrophising interacts with mental health. The next step towards a more complete understanding is moving from correlation to causation. Chapter Four found that catastrophising resulted in a lower mood than a watching condition. This identifies one causal link, but alone it only implies that catastrophising can cause a low mood, not necessarily pose a risk to mental health. Study Six found that training individuals not to catastrophise improved mood more than those in a control condition. This reaffirms that catastrophising does have a causal role in mood. This is an important link and it strongly implies that catastrophising has a role in mental health. However, it is not a direct link. Further studies would be required to identify how catastrophising influences mental health. This relationship could be directly from catastrophising to mental health. But based on the results of this thesis and the literature it is likely that catastrophising's influence on mental health is mediated through its effect on mood.

Another link that remains unexplored is the potential for causality is the impact of mood on catastrophising that could also explain some of the relationships found in this thesis. Emotion regulation strategies can generate or enhance emotion but they are more commonly known as a response or regulation to mood and emotion. Therefore, it follows that an induced negative or even a positive mood would promote catastrophising in individuals that tend to use it. This cyclical propensity is another area to explore to increase our understanding of catastrophising but also to control for when testing for causality.

Bringing these relationships into the bigger picture requires understanding the strengths of all of the potentially bi-directional relationships as shown in Figure 7.1 below. This

can be conducted in two ways depending on overall objectives. Either a specific mental health trait could be selected such as depression, or a general distress score. If a specific trait is selected, other relevant traits should be used as covariates to better isolate specific links. This can also be visualised as a series of individual causal relationships to be tested separately, or taken as one mediation model. The evidence in this thesis suggests that catastrophising directly impacts mood, which would appear to be the likely path for catastrophising to influence mental health traits. Therefore, a full or partial mediation is likely.

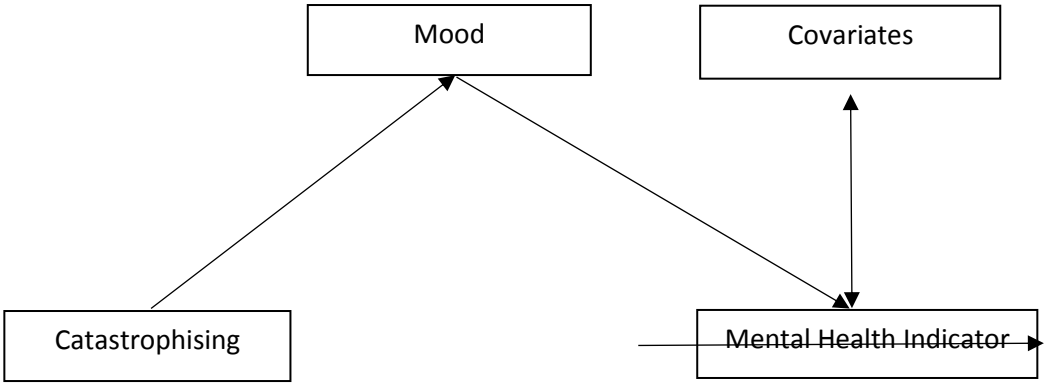

Figure 7.1 Proposed mediated model for catastrophising's effect on mental health indicators

This model is intuitive as catastrophising is an emotion regulation strategy, making its influence on mental health likely to be due to its impact on mood. The direct relationship from catastrophising to a mental health indicator however may vary between anxiety and depression. Intuitively catastrophising may have greatest impact on depression through its impact on mood. However, in anxiety it is possible that as well as the mediation through mood, the thought process itself may have a direct effect on anxious indicators. Research to identify these relationships will significantly tighten understanding of how catastrophising influences mental health. It may also inform further understanding of other emotion regulation strategies, which could replace catastrophising in the above figure. Understanding

to what extent these relationships are unique between catastrophising and mental health or generalizable to other maladaptive or even adaptive strategies.

The proposed model in Figure 7.1 captures the core aspects of emotion regulation at a different level to Gross' (1998) process model of emotion regulation. In this case the proposed model seeks to test some of the key assumptions made by the process model. The process model assumes that emotion regulation strategies are only relevant to mental health to the degree that they can deliver emotions and that there is no direct relationship between a strategy and mental health indicators (a full mediation in Figure 7.1). The modal model also assumes that this relationship is only altered by what stage the strategy is enacted in the model (for example at the appraisal stage or once the emotion has been generated. The challenge of the model in Figure 7.1 is when focusing on such fundamentals, tautology must be avoided. Keeping the strategy, mood and mental health separate requires that the definition and measure used for each does not overlap the others. Testing this model could either confirm the current assumptions highlighted in the modal model (that emotion regulation strategies only effect emotion depending on the stage of emotion generation) or open new ways to investigate emotion regulation through their indicator's individual relationships with emotion.

7.2.1 Limitations

A limitation found across each of these studies is a dependence on student populations. The main method used to try and balance this bias was ensuring that where possible studies could be completed online to allow for greater diversity of recruitment. Although this would have reduced the bias to the student population, this medium still generally recruited younger individuals. Secondly, where online advertising was used for studies, there was still only very limited uptake. While this limitation should cause some scepticism on how well these results generalise to other populations, it does not infringe on

the conclusions made throughout this thesis. This limitation is best interpreted as highlighting the need to test older populations in future studies and that replications should also account for age. Additionally, other diversity measures were not taken to account for race, culture and socioeconomic background. This means that the data may not be fully representative of the diversity in the United Kingdom. Further studies may benefit from taking these measures or intentionally balancing sample diversity to more representatively match the United Kingdom. For questionnaire or online studies this could be tackled through random digit sampling used in political polling, where the recruiter randomly draws from an extensive list of phone numbers and then can apply weights to the sample to match recent census data for sex, age, race and geographical locations for the British public (Lambert, Langer, & McMenemy, 2010). The primary drawback to this approach is the extensive time taken to recruit and experiment.

Another impact of diversity worth discussing separately is caused by primarily relying on Psychology undergraduates where there tends to be a gender imbalance leaning towards females. There is literature that suggests males tend to use different emotion regulation strategies to females, which are just as effective (Nolen-hoeksema, 2012). These differences may lead to different relationships between mental health indicators and emotion regulation. However, there is no current research to suggest that these different methods would result in structurally different relationships between mental health and emotion regulation. Again, this limitation should not undermine the work in this thesis, but instead prompt replications in different samples.

The undergraduate participants were motivated to volunteer and complete the experiments to gain course credit. This means that they may not have approached the study in the same way as a volunteer and therefore may not be as engaged with the process. Alternatively, they may also be more engaged with more taxing studies to attain their credits where many volunteers would be lost due to attrition. Chapter Six provides one example of

this where the attrition for online participants was considerably higher than undergraduates completing it for course credit.

These studies all targeted emotion regulation and its relationship with mental health, but these experiments were all conducted on community samples. Ultimately, understanding the relationship between mental health and catastrophising, or any emotion regulation strategy will require some studies drawing from clinical populations.

In many emotion regulation studies, demand characteristics have significant potential to undermine the results. While it would have been difficult for a participant to work out that Chapter Two was considering emotion regulation profiles, or where Chapter Four successfully disguised the intentions of the catastrophising induction; participants may have assumed their own purpose for the study and acted to either promote or frustrate that intention.

Another limitation across the studies in this thesis is that the methodology was confined to self-report measures. These measures are limited by the level of personal insight of the participants and many of these studies would benefit from some physiological measures or measures of facial expression to help triangulate emotion changes and therefore increase the reliability of the methodology in this thesis. Also, other points of reference, which are not necessarily deliberate or conscious can facilitate spotting inconsistencies that may be due to demand characteristics. However, where studies have used self-report measures alongside physiological measures or facial expression they tend to come to the same conclusions (For example, Gross, 1998 and Gruber, Harvey, & Gross, 2012) suggesting that this is not a major limitation but these methods provides useful evidence of robustness.

This thesis contains a variety of cross-sectional and experimental designs, even though this is generally restricted to self-report measures. Although, Chapter Six had a minor longitudinal component as the experiment took place at three points over a two-week period. However, this did not capture more the long-term effects of emotion regulation. Previous

studies such as Berking, Orth, Wupperman, Meier, & Caspar, (2008); Kassel et al. (2007) and McLaughlin et al. (2011) who used emotion regulation strategies to predict future mental health issues over long time periods. If catastrophising was found to be a significant predictor of mental health issues, this would add considerably more weight to the hypothesis that catastrophising causes mental health issues.

7.2.2 Further Studies

To counter some of the limitations of the studies in this thesis, further studies could apply a greater variety of methods to record data, such as vagal tone (Porges, 1994), skin conductivity (as conducted in Gross, 1998) and facial expressions (Ekman & Friesen, 1978). Due to the nature of these procedures this suggests laboratory studies that could target inducing and reducing catastrophising and measure the effects with greater rigor. To generate emotion, participants would be presented with a difficult reaction time task where each wrong answer immediately elicits a small electric shock. The first group would be instructed to minimise their emotions and the second group would be instructed to catastrophise, much like in Chapter Four. The third group would be a control group instructed just to focus on the task to function as a means of comparison against the two experimental groups. The control group would also be required to report the methods they used to regulate their emotions, where participants could be excluded if the experimenter felt they had reported applying successful strategies. This would further establish the causal connection between catastrophising and mood.

Each of the studies in this thesis focused on indicators such as depression, anxiety and stress, which are closely related to clinical mental health issues. Next steps to better understand the causal relationship between catastrophising and mental health would be through testing in clinical populations. A replication of Chapter Four, the catastrophising induction, could identify the strength of the effect in clinical samples. This could be replicated

in a very similar manner for Chapter Six, where the intervention and its modules could be tested for their effectiveness in a clinical group.

A further study that could build on Berking, Orth, Wupperman, Meier, & Caspar's (2008) study to instead use catastrophizing scores to predict the causal relationship of catastrophising on mental health indicators. This would be a longitudinal study that would need to take monthly measurements of measure mental health indicators (DASS), catastrophising (through the CQ) and whether the individual has received a clinical diagnosis. This will test how well catastrophising can predict both clinical and subclinical mental health outcomes over time. This could be conducted in a population of undergraduates over the duration of their course.

Developing an understanding of how the fundamentals of emotion regulation interact is not the only way to deepen our understanding. For example, another new area would be exploring the boundary where generally maladaptive emotion regulation strategies can become adaptive and vice versa. These examples are often provided by the many incarnations of Gross' modal model (e.g. Gross, 1998; Gross & Jazaieri, 2014; Gross, Sheppes, & Urry, 2011; Gross & Thompson, 2006) such as a surgeon who has received particularly bad personal news but uses suppression to be able to focus on an important surgery. These boundaries between adaptive and maladaptive can also occur in the literature, for example in the creation of CERQ (N Garnefski et al., 2001) where a scale was designed to capture the adaptive aspects of acceptance but instead captured either the maladaptive or a combination.

Exploring the varying features of emotion regulation strategies where applied adaptively or maladaptively is rarely examined by the literature. Subsequently, very little is known on how adaptiveness may vary in cognitive load, strength and valence of mood change and other strategy specific side effects. Taking catastrophising as an example, it could be adaptive in situations where the resulting emotion focuses on a credible threat that requires attention. This boundary between adaptive and maladaptive could also be key to

psychopathological development, where generally maladaptive strategies originally may have been used adaptively and become reinforced and applied out of context.

Drawing from Gross' (1998) modal model of emotion regulation there are three main components in defining adaptability. The first is how effectively the strategy can alter the emotion state and the second is the stage in the emotion generation process that the strategy intervenes. The latter is also proposed to determine the cognitive demand of the strategy, which further moderates the effectiveness of the strategy. Therefore, per Gross' model, response focused strategies such as acceptance and suppression will always be more cognitively demanding than cognitive reappraisal. The third component is the context of the strategy, which is defined by how well it facilitates an individual achieving their goals. For example, an individual finds themselves in a burning building. They could use cognitive reappraisal to think that the fire is not there or pleasantly warm, which is more maladaptive than applying avoidance.

A further study could serve as a proof of concept on whether there are differences in cognitive load, mood change and task accuracy based on the adaptiveness of an emotion regulation strategy. The experiment would have three counterbalanced within-subject's groups: control, maladaptive catastrophising and adaptive catastrophising. These groups all perform the same reaction time task, but with different instructions. Participants focus on a cross in the centre of the screen, which is replaced by an image from one of two categories (plant or animal) for 200ms. Each time the participant sees a plant they must press one button and each time they see an animal they must press another. The maladaptive catastrophising condition would receive instructions to focus on how terrible it would be to get an answer wrong and how much worse they would be than other participants. The adaptive catastrophising condition would be instructed to focus on how terrible and horrible the category is; this would be an adaptive use of catastrophising to help focus on the target. The

control condition is then just instructed to complete the task. Across all three conditions heartrate monitors could be used to measure vagal tone (Porges, 1994), a video camera will measure pupil dilation and facial expressions and micro-expressions (Ekman & Friesen, 1978) to detect emotional arousal.

The first hypothesis for this experiment is that adaptive catastrophising will result in significantly faster reaction times than the control condition and that maladaptive catastrophising will react significantly slower than the control. This would suggest that when used adaptively, catastrophising is not as effortful. The second hypothesis is that adaptive catastrophising will result in significantly higher accuracy than the control and maladaptive conditions, demonstrating its adaptiveness in this context. The third hypothesis will predict that both catastrophising conditions will demonstrate greater arousal than the control condition. Crucially, the third hypothesis will predict that the adaptive condition will demonstrate less negative and more positive emotion than the maladaptive condition. This is because the catastrophising is focusing the individual, which will negate the negative mood. Should these occur it would suggest there are differences in the effects of emotion regulation strategies are somewhat based on their adaptiveness and not just based on when they are applied in the emotion generation process (in this case the adaptive and maladaptive groups focus on the appraisal stage of emotion generation). However, the most significant contribution this experiment would make to the literature is opening an entirely new avenue of research focusing on how various emotion regulation strategies have different effects in adaptive or maladaptive situations. Further experiments could also be made into associated areas such as decision making. The results could also be used to inform clinical interventions by identifying the unique effects of different emotion regulation strategies.

7.2.3 Clinical potential

Much of the clinical potential of this thesis is reviewed in the discussion of Chapter Six and in other chapters where individual studies could be replicated in clinical samples or tackle more clinical questions. There is also a great deal of potential discussed in Chapter Five on the use of the Catastrophising Questionnaire. This thesis contributes to the literature by expanding our understanding of catastrophising. Currently, research is progressing across many different emotion regulation strategies and this information must be used to build onto the bigger picture. While there is still a considerable journey remaining, the literature has accumulated a tremendous amount of knowledge across a range of emotion regulation strategies.

As emotion dysregulation is a significant factor in many mental health disorders (DSM V) using emotion regulation literature to develop interventions is the best clinical use of this knowledge. One example use of this data is developing a more nuanced understanding of the emotional dysregulation presented by a client where a wide range of emotion regulation strategies are considered separately. This could be using tools such as the CQ or clinical intuition to diagnose specific emotion regulation issues. This focuses the intervention onto problem areas and harness a symptom based modular structure to treat clients. This could be implemented as an extension of CBT in a similar but more flexible way than ERT (Mennin & Fresco, 2014) or as its own discrete intervention, somewhat like ART (Berking, 2008). However, to develop ART or a similar emotion regulation focused therapy does not imply reactively fixing emotion regulation difficulties, but a proactive and educational journey towards extinguishing maladaptive strategies and replacing them with predetermined adaptive counterparts.

Where the literature can provide tremendous help to those suffering from clinical mental health problems, the potential of the emotion regulation literature does not stop there. The nature of emotion regulation lends itself well to low intensity interventions and

across many strategies even education alone could help employees deal with stress, anxiety and depression.

The amount of time it has taken the discipline of Psychology to focus on emotion regulation strategies is reflected on the lack of understanding by members of the public of their own emotion regulation. How we deal with our emotions is generally not deliberately considered (Gross & Thompson, 2006) and therefore challenging this way of life is just a small step that could have large positive effects. Additionally, this form of therapy lends itself towards automation through apps or websites. This gives it the potential to affordably reach any individual who needs it that also owns a smartphone or has internet access.

7.2.4 Final Summary

The literature on catastrophising as an emotion regulation strategy is little more than several handfuls of papers. Many of these do not place catastrophising at the centre of the discussion. This thesis has strived to gain a deeper understanding of how this emotion regulation strategy could be key to depression, anxiety and stress. Hopefully, this thesis has also highlighted the need to fill this gap in the literature and has demonstrated that the approaches applied could also benefit the understanding of other strategies. There is still a great deal of research to be done to complete our picture of catastrophising and other strategies. However, it is important not to dwell on the limits of our current understanding but instead see the incredible potential of this relatively new field. After all, it's not the end of the world.

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Appendix

9.1 Appendix 1

Supervisor: Dr Craig Steel

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Phone: 0118 378 7550

Experimenter: David Angell

Email: D.J.Angell@pgr.reading.ac.uk

Thank you very much for choosing to complete our study!

Participation will take approximately 15-25 minutes, during which time you will complete a series of questionnaires on emotion, anxiety and mood.

Your data will be kept confidential and securely stored, with only an anonymous number identifying it. Information linking that number to your name will be stored securely and separately from the data you provide us. All information collected for the project will be destroyed when possession of the data is no longer deemed necessary and the project is complete.

Taking part in this study is completely voluntary; you may withdraw at any time without having to give any reason. If you have any questions about this study, please email David Angell on the email provided above.

This application has been reviewed by the University Research Ethics Committee and has been given a favourable ethical opinion for conduct.

Thank you kindly for your help.

David Angell

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1. Consent Form

1. I understand that my participation in this study is voluntary and that I may withdraw any time without giving any reason.

2. I have read the information about this study and the method of the study has been explained to me.

3. I have read the information above.

4. I have been given the opportunity to ask any questions by email and that these have been answered to my satisfaction.

***This question is required.**

- ☐ I have read the information and give my consent for this study.

Thank you for taking part in our study! This first section will just ask a series of questions about yourself. This should take no more than half an hour.
2. Gender: ***This question is required.**

- male
- female

3. Age: *This question is required.

4. Race: *This question is required.

5. Would you say that you grew up in a single parent family? *This question is required.

6. How many close friends do you have at the moment? *This question is required.

7. Would you like us to contact you again when we repeat this study in one year's time? If so, please enter the email address you would like to be contacted on.

8. If you are taking part through the University of Reading SONA and want credit for completing this survey, please enter your username:

9.2 Appendix 2

Please read the following statements and score how much you believe in each one. To make your rating click on the slider and drag it. These range from 0% (you do not believe in that statement at all) to 100% (you believe it completely). Try not to think too much about each question, there are no right or wrong answers.

9. When I have a lot of energy, I still need some support from other people or things:

10. When I feel restless, the world becomes full of unlimited opportunities for me:

11. When I feel more active I realise that I am a very important person

12. I have all my best ideas when I feel extremely good about myself:

13. If I feel agitated and restlessness, it does not affect me a great deal:

14. When I feel full of energy I am extremely funny and witty:

15. When I get very agitated about something I still have control over my behaviour:

16. I have control over whether I get excited when something good happens to me:

17. I need to be the centre of attention to enjoy myself:

18. When I feel really good, people still understand me:

19. When I try hard to get what I want, other people try to stop me:

20. I need to have complete control over my moods in order to prevent myself from having a breakdown:

21. When I feel restless, what happens to other people is at least as important as what happens to me:

22. If I am very special to everyone around me then all my problems will disappear:

23. When I get excited about something I still have some control over my thoughts:

24. When I feel excited, my fears and worries are no longer real:

25. My feelings need to be very intense to feel real to me:

26. When I am with other people it is most important that they admire me:

27. When my mood reaches a certain extreme, I still have responsibility over dealing with it:

28. When I feel good, I know that whatever I do, I could do no wrong:

29. When I feel good, I am sure that everything will work out perfectly:

30. What things are like in a few days time is more important to me than what happens right now:

31. When I get new ideas I must tell people at once and at length so that they admire me:

32. If I notice something new when I am feeling good, I must make every effort to think about how it connects with everything else:

33. It is OK to occasionally have a bad night's sleep:

9.3 Appendix 3

HAPPI Questionnaire

Please answer whether the following descriptions are true of you or not:

107. A hundred years after I'm dead, my achievements will probably have been forgotten.

108. I am so good at controlling others that sometimes it scares me.

109. I am frequently in such high spirits that I can't concentrate on any one thing for too long.

110. I am considered to be a kind of 'Hyper' person.

111. I often have moods where I feel so energetic and optimistic that I feel I could out-perform almost anyone at anything.

112. In unfamiliar surroundings I am often so assertive and sociable that I surprise myself.

113. I like to have others think of me as a normal kind of person.

114. I am usually in an average sort of mood, not too high and not too low.

115. I often get into moods where I feel like many of the rules of life don't apply to me.

116. I very frequently get into moods where I wish I could be everywhere and do everything at once.

117. I have often felt happy and irritable at the same time.

118. Sometimes ideas and insights come to me so fast I cannot express them all.

119. I seem to have an uncommon ability to persuade and inspire others.

120. I frequently find that my thoughts are racing.

121. There are times when I am so restless that it impossible for me to sit still.

122. When I feel an emotion, I usually feel it with extreme intensity.

123. Many people would consider me to be amusing but kind of eccentric.

124. I seem to be a person whose mood goes up and down easily.

125. I often feel excited and happy for no apparent reason.

126. I do most of my work during brief periods of intense inspiration.

9.4 Appendix 4

Depression Anxiety and Stress Scale (DASS-21)

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all

1 Applied to me to some degree, or some of the time

2 Applied to me to a considerable degree, or a good part of time

3 Applied to me very much, or most of the time

1 I found it hard to wind down	0 1 2 3

2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

9.5 Appendix 5

Center for Epidemiological Studies Depression Scale for Children (CES-DC)

Below is a list of the ways you might have felt or acted. Please check how much you have felt this way during the past week

1. I was bothered by things that usually don't bother me.

2. I did not feel like eating, I wasn't very hungry.

3. I wasn't able to feel happy, even when my family or friends tried to help me feel better.

4. I felt like I was just as good as other kids.

5. I felt like I couldn't pay attention to what I was doing.

6. I felt down and unhappy.

7. I felt like I was too tired to do things.

8. I felt like something good was going to happen.

9. I felt like things I did before didn't work out right.

10. I felt scared.

11. I didn't sleep as well as I usually sleep.

12. I was happy.

13. I was more quiet than usual.

14. I felt lonely, like I didn't have any friends.

15. I felt like kids I know were not friendly or that they didn't want to be with me.

16. I had a good time.

17. I felt like crying.

18. I felt sad.

19. I felt people didn't like me.

20. It was hard to get started doing things.

9.6 Appendix 6

BIS 15

1 I plan tasks carefully

2 I do things without thinking.

3 I make-up my mind quickly.

4 I am happy-go-lucky.

5 I don't "pay attention."

6 I have "racing" thoughts.

7 I plan trips well ahead of time.

8 I am self controlled.

9 I concentrate easily.

10 I save regularly.

11 I “squirm” at plays or lectures.

12 I am a careful thinker.

13 I plan for job security.

14 I say things without thinking

15 I like to think about complex problems.

9.7 Appendix 7

NMR

For the last 30 questions please answer how much you agree or disagree with these statements:

127. I can usually find a way to cheer myself up:

128. I can do something to feel better:

129. Worrying about it is all I can do:

130. I’ll feel okay if I think about more pleasant times:

131. Being with other people will be a drag:

132. I can feel better by treating myself to something I like:

133. I’ll feel better when I understand why I feel bad:

134. I won’t be able to get myself to do anything about it:

135. I won’t feel much better by trying to feel some good about the situation:

136. It won’t be long before I can calm myself down:

137. It will be hard to find someone who really understands:

138. Telling myself it will pass will help me calm down:

139. Doing something nice for someone else will cheer me up:

140. I'll end up feeling really depressed:

141. Planning how I'll deal with things will help:

142. I can forget about what's upsetting me pretty easily:

143. Catching up with my work will help calm me down:

144. The advice friends give me won't help me feel better:

145. I won't be able to enjoy things I usually enjoy:

146. I can find a way to relax:

147. Trying to work the problem out in my head will only make it seem worse:

148. Seeing a movie won't help me feel better:

149. Going out with friends will help:

150. I'll be upset for a long time:

151. I won't be able to put it out of my mind:

152. I can feel better by doing something creative:

153. I'll start to feel really down about myself:

154. Thinking that things will eventually be better won't help me feel any better:

155. I can find some humour in the situation and feel better:

156. If I'm with a group of people, I'll feel "alone in a crowd":

9.8 Appendix 8

CERQ

how often you have felt this way over the past week:

34. I feel that I am the one who is responsible for what has happened
35. I think that I have to accept that this has happened:
36. I think of pleasant things that have nothing to do with it:
37. I think that I have to accept the situation:
38. I think that basically the cause must lie within myself:
39. I often think about how I feel about what I have experienced:
40. I am distracted by what I think and feel about what I have experienced:
41. I think about how to change the situation:
42. I think about a plan of what I can do best:
43. I think of something nice instead of what has happened
44. I continually think how horrible the situation has been:
45. I think I can learn something from the situation:

46. I think that I can become a stronger person because of what has happened:

47. I think that it hasn't been too bad compared to other things:

48. I tell myself that there are worse things in life

49. I keep thinking about how terrible it is what I have experienced:

Additional Catastrophizing Questions

I often think that what I have experienced is much worse than what others have experienced

I keep thinking about how terrible it is what I have experienced

I often think that what I have experienced is the worst that can happen to a person

I continually think how horrible the situation has been

9.9 Appendix 9

ART-Q

Answer each of these questions from a scale of 1(never/not well) to 10 (all of the time/very well).

98. How often are you aware of the emotions you may be experiencing?

99. To what extent do you think you are able to correctly work out what emotion you are feeling, while you are feeling it?

100. To what extent are you able to work out the emotion you are having by noticing how you are feeling in your body? (For example a 'sinking feeling', feeling 'tense' or energetic).

101. To what extent do your emotions make it difficult to work out what you want to do or how you want to act?

102. How well can you make yourself feel better when you are feeling bad?

103. If you are experiencing something that makes you feel bad, how good are you at thinking about it differently, so that you feel a bit better?

104. When you have an emotion, to what extent do you just let it happen, without thinking about it too much?

105. When you are feeling negative emotions, how well can you at carry on as normal?

106. To what extent are you able to just carry on and get on with your plans, even if it is making you upset?

9.10 Appendix 10

STERQ Phase 1 Trait Items

When you have a POSITIVE/NEGATIVE emotional experience, to what extent do the following apply to you? Please use the following answer key:

1=Not at all or very little

2=A little

3=Somewhat

4=Quite a lot

5=Very Much

	1	2	3	4	5
I could use my feelings about the experience to my advantage					
I want to avoid the situation by trying to escape					
I think about ways in which I can change the experience					
The situation had such a big impact on me I wished it would just go away					
I can stay calm and not be affected by the situation					
It is difficult to get the experience out of my mind					
I avoid the experience because I know it will be emotional					
I try to change the situation so I can change how I feel					
When I know in advance about the experience, I can choose to stay calm					
I feel like this is not going to last					
I use substances (e.g. alcohol or drugs) to change how I am feeling					
My feelings interfere with my ability to carry on with daily life					
I try to see the funny side of the experience					
I can hold on to the emotions I felt in the situation					
I control my feelings by not showing them					
I experience emotion but am not aware of it until sometime later					
I feel like the same things were going round and round in my head					
I seek out information related to the event to understand or change how I am feeling					

It is easy for me to show my feelings					
I do not generally pay much attention to how I feel					
I think about something different to change how I am feeling					
I try to avoid feeling anything					
I feel that I am responsible for what has happened					
Sharing the experience with someone I trust changes the intensity of the experience					
My feelings were out of control					
My feelings impacted on how I interpreted the situation					
I find it easy to describe how I'm feeling					
My faith influenced how I felt about the experience					
I analyse the experience to try to understand why I feel the way I did					
	1	2	3	4	5
I find it easy to talk to other people about the experience					
I seek out the experience because I know it will be emotional					
The experience had a big impact on my mood					
My feelings were overwhelming					
I am tempted to use extreme behaviours to change the intensity of what I'm feeling					
I change the way I think about the experience to alter how I am feeling					
I try to hide how I was feeling					
My feelings made it difficult to concentrate					

It is difficult for me to make sense of what I am feeling, whilst I am feeling it					
It was easy to manage what I was feeling					
I find that my feelings make it difficult to focus on other things					
I feel that something good will come of it					
I believe the cause of the experience is outside of my control					

9.11 Appendix 11

STERQ Phase 1 State Items

Whilst you were in the situation, to what extent did the following statements apply to you?

1=Not at all or very little

2=A little

3=Somewhat

4=Quite a lot

	1	2	3	4	5
I reminded myself that I was not part of the situation					
I changed the way I thought about the situation to alter how I was feeling					
I felt like my emotions were out of control					
My feelings make it difficult to concentrate					
I reminded myself that the situation was not real					
I wanted to avoid the situation by closing my eyes or looking away					
I felt that my emotions were overwhelming					
It was easy for me to show my feelings					
It was difficult for me to make sense of my feelings at the time					
I could accept my feelings about the situation					
The situation had such an effect I wished it would just go away					
I paid attention to my feelings					
I felt like I could stay calm and not be affected by the situation					
I thought about something different to change how I was feeling					
I felt like I could use what I was feeling to my advantage					
I was able to manage the emotions I was feeling					
It was easy to describe how I was feeling					
I tried to see the funny side of the situation					
I analysed the situation to try to understand why I was feeling the way I was					
I felt like the situation would not last					
I was aware of my feelings					

I tried to avoid feeling anything					
My feelings affected how I interpreted the situation					
I controlled my feelings by not showing them					
I felt something good would come of the situation					
The situation had a big impact on my mood					
I tried to hide what I was feeling					
	1	2	3	4	5

After you were in the situation to what extent did the following statements apply to you?

1=Not at all or very little

2=A little

3=Somewhat

4=Quite a lot

5=Very Much

I could hold on to the feelings evoked by the situation					
I felt like the same things were going round and round in my head					
My feelings made it hard to focus on other things					
It was difficult to get the situation out of my mind					

9.12 Appendix 12

Mood ratings conducted before and after the mood induction video and video memory questions

Mood Ratings:

To what extent do you currently feel the following?

	Not at all	A little	Somewhat	Quite a lot	Very much
Happy					
Amused					
Sad					
Anxious					
Excited					
Angry					

Memory Questions:

In the film clip you have just viewed, you watched the main character, Mr Bean, encounter a range of situations. Please answer the following questions about the film clip:

1. What comic did he want to read?

a) Superman

b) Spiderman

c) Batman

d) Ironman

2. Who did he visit?

a) A friend

b) A dentist

c) A doctor

d) An optician

3. What does he go looking for in his attic?

a) Christmas decorations

b) Antiques

c) Comics

d) A coat

4. What does he try to cook?

a) A lobster

b) A turkey

c) A fish

d) Some mince

9.13 Appendix 13

DERS

Please indicate how often the following 36 statements apply to you by writing the appropriate number from the scale above (1 – 5) in the box alongside each item.

1 I am clear about my feelings (R)

2 I pay attention to how I feel (R)

3 I experience my emotions as overwhelming and out of control

4 I have no idea how I am feeling

5 I have difficulty making sense out of my feelings

6 I am attentive to my feelings (R)

7 I know exactly how I am feeling (R)

8 I care about what I am feeling (R)

9 I am confused about how I feel

10 When I'm upset, I acknowledge my emotions (R)

11 When I'm upset, I become angry with myself for feeling that way

12 When I'm upset, I become embarrassed for feeling that

13 When I'm upset, I have difficulty getting work done

14 When I'm upset, I become out of control

15 When I'm upset, I believe that I will remain that way for a long time

16 When I'm upset, I believe that I'll end up feeling very depressed

17 When I'm upset, I believe that my feelings are valid and important (R)

18 When I'm upset, I have difficulty focusing on other things

19 When I'm upset, I feel out of control

20 When I'm upset, I can still get things done (R)

21 When I'm upset, I feel ashamed with myself for feeling that way

22 When I'm upset, I know that I can find a way to eventually feel better (R)

23 When I’m upset, I feel like I am weak

24 When I’m upset, I feel like I can remain in control of my behaviours (R)

25 When I’m upset, I feel guilty for feeling that way

26 When I’m upset, I have difficulty concentrating

27 When I’m upset, I have difficulty controlling my behaviours

28 When I’m upset, I believe that there is nothing I can do to make myself feel better

29 When I’m upset, I become irritated with myself for feeling that way

30 When I’m upset, I start to feel very bad about myself

31 When I’m upset, I believe that wallowing in it is all I can do

32 When I’m upset, I lose control over my behaviours

33 When I’m upset, I have difficulty thinking about anything else

34 When I’m upset, I take time to figure out what I’m really feeling (R)

35 When I’m upset, it takes me a long time to feel better

36 When I’m upset, my emotions feel overwhelming

9.14 Appendix 14

Information

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Thank you very much for choosing to complete our study!

Participation will take approximately 15-25 minutes, during which time you will complete a series of questionnaires on emotion, anxiety and mood.

Your data will be kept confidential and securely stored, with only an anonymous number identifying it. Information linking that number to your name will be stored securely and separately from the data you provide us. All information collected for the project will be destroyed when possession of the data is no longer deemed necessary and the project is complete.

Taking part in this study is completely voluntary; you may withdraw at any time without having to give any reason. If you have any questions about this study please email David Angell on the email provided above.

This application has been reviewed by the University Research Ethics Committee and has been given a favourable ethical opinion for conduct.

Thank you kindly for your help.

David Angell

9.15 Appendix 15

Consent Form

1. I understand that my participation in this study is voluntary and that I may withdraw any time without giving any reason.

2. I have read the information about this study and the method of the study has been explained to me.

3. I have read the information above.

4. I have been given the opportunity to ask any questions by email and that these have been answered to my satisfaction.

- ☐ I have read the information and give my consent for this study.

9.16 Appendix 16

STERQ Positive Trait Questionnaire post phase 1

When you have a POSITIVE experience to what extent do the following apply to you?

	Not at All or Very Little	A little	Somewhat	Quite a Lot	Very Much
1. My feelings made it difficult to concentrate					
2. I can hold on to the emotions I felt in the situation					
3. I avoid the situation because I know it will be emotional					
4. I control my feelings by not showing them					
5. I feel that something good will come of it					
6. I want to avoid the situation by trying to escape					
7. I try to hide how I was feeling					
8. I do not generally pay much attention to how I feel					
10. The situation had such a big impact on me I wished it would just go away					
11. It is easy for me to show my feelings					
12. I could use my feelings about the situation to my advantage					
13. It is difficult for me to make sense of what I am feeling, whilst I am feeling it					
14. I change the way I think about the situation to alter how I am feeling					
15. I could accept my feelings about the situation					
16. I analyse the situation to try to understand why I feel the way I did					
17. My feelings were out of control					
18. I seek out information related to the event to understand or					

change how I am feeling					
19. I experience emotion but am not aware of it until sometime later					

Emotion Focus: 1, 12, 15 **Suppression:** 4, 7, 10 **Avoidance:** 3, 6, 9 **Reappraisal and Understanding:** 13, 15, 17 **Harnessing:** 2, 5, 11 **Mindfulness:** 8, 14, 18

9.17 Appendix 17

STERQ Negative Trait Questionnaire post phase 1

When you have a NEGATIVE experience to what extent do the following apply to you?

	Not at All or Very Little	A little	Somewhat	Quite a Lot	Very Much
1. My feelings make it difficult to concentrate					
2. I feel like the same things are going round and round in my head					
3. I avoid the situation because I know it will be emotional					
4. I control my feelings by not showing them					
5. It is difficult to get the situation out of my mind					
6. I want to avoid the situation by trying to escape					
7. I try to hide how I am feeling					
8. I do not generally pay much attention to how I feel					
9. The situation had such a big impact on me I wish it would just go away					
10. It is easy for me to show my feelings					
11. I can use my feelings about the situation to my advantage					
12. I can stay calm and not be affected by the situation					
13. I change the way I think about the situation to alter how I am feeling					
14. It is easy to manage what I am feeling					
15. When I know in advance about the situation, I can choose to stay calm					
16. My feelings are out of control					
17. I feel like this is not going to last					
18. I can accept my feelings about the situation					
19. I analyse the situation to try to understand why I feel the way I do					
20. It is difficult for me to make sense of what I am feeling, whilst I am feeling it					
21. I seek out information related to the event to understand or					

change how I am feeling					
22. I experience emotion but am not aware of it until sometime later					

Emotion Focus: 1, 12, 15 **Suppression:** 4, 7, 10 **Avoidance:** 3, 6, 9 **Reappraisal and Understanding:** 13, 15, 17 **Harnessing:** 2, 5, 11 **Mindfulness:** 8, 14, 18

9.18 Appendix 18

STERQ State Questionnaire post phase 1

STERQ STATE:

Whilst you were in the situation, to what extent did the following statements apply to you?

	Not at all or Very Little	A Little	Somewhat	Quite a Lot	Very Much
1. My feelings made it difficult to concentrate					
2. I felt like the same thoughts were going round and round in my head					
3. I wanted to avoid the situation by closing my eyes or looking away					
4. I controlled my feelings by not showing them					
5. It was difficult to get the situation out of my mind					
6. I tried to hide what I was feeling					
7. I paid attention to my feelings					
8. I could hold on to the feelings evoked by the situation					
9. The situation had such an effect I wished it would just go away					
10. I reminded myself that I was not part of the situation					
11. I felt like I could use what I was feeling to my advantage					
12. I felt like I could stay calm and not be affected by the situation					
13. I changed the way I thought about the situation to alter how I was feeling					
14. I was able to manage the emotions I was feeling					
15. I reminded myself that the situation was not real					
16. I felt like my emotions were out of control					
17. I felt like the situation would not last					
18. I could accept my feelings about the situation					
19. I tried to see the funny side of the situation					
20. I felt something good would come of the situation					
21. I was aware of my feelings					

22. It was difficult for me to make sense of my feelings at the time					
23. My feelings made it hard to focus on other things					

Emotion Focus: 1, 16, 22 **Suppression:** 4, 6 **Resilience:** 12, 14, 17, 18 **Avoidance:** 3, 9 **Reappraisal and Understanding:** 10, 13, 15 **Rumination:** 2, 5, 23 **Harnessing:** 8, 11, 19 20 **Mindfulness:** 7, 18, 21

9.19 Appendix 19

Memory questions phase 2

What was the name of the mini-game? Dirty dancers, Helping hands, Wrestlehypomania, Foot n'mouth

What character was Ryan playing? A drunken Irish chocolatier, An angry German dancer, A claustrophobic Japanese ninja, A lovesick Italian pizza maker

What gimmick was Ryan wearing? A moustache, A ninja outfit,

A booze stained vest, A tutu

What does Ryan use? A screwdriver, a cane, a ladle, a rolling pin

What does Ryan eat at the end of the clip? Parmesan cheese, pickle, pepperoni, pineapple

9.20 Appendix 20

Initial Factor Analysis – Trait Positive Variance

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.712	20.743	20.743	8.712	20.743	20.743	5.395
2	5.221	12.431	33.174	5.221	12.431	33.174	5.759
3	2.870	6.834	40.008	2.870	6.834	40.008	5.866
4	2.071	4.931	44.938	2.071	4.931	44.938	6.388
5	1.419	3.380	48.318	1.419	3.380	48.318	2.089
6	1.253	2.984	51.302	1.253	2.984	51.302	3.918
7	1.209	2.879	54.182	1.209	2.879	54.182	2.060
8	1.154	2.747	56.929	1.154	2.747	56.929	4.247
9	1.074	2.557	59.486	1.074	2.557	59.486	2.628
10	1.025	2.440	61.926	1.025	2.440	61.926	2.098
11	.996	2.372	64.297				
12	.925	2.202	66.499				
13	.902	2.147	68.646				
14	.830	1.977	70.623				
15	.791	1.884	72.507				
16	.730	1.738	74.245				
17	.696	1.656	75.901				
18	.657	1.563	77.464				
19	.646	1.539	79.003				
20	.627	1.492	80.496				
21	.616	1.468	81.964				
22	.573	1.364	83.327				
23	.535	1.275	84.602				
24	.509	1.212	85.814				
25	.494	1.175	86.989				
26	.471	1.120	88.110				
27	.453	1.079	89.189				
28	.446	1.062	90.251				
29	.434	1.034	91.285				
30	.386	.920	92.205				
31	.382	.908	93.113				
32	.371	.884	93.997				
33	.347	.827	94.824				
34	.318	.758	95.582				
35	.306	.728	96.310				
36	.266	.634	96.944				
37	.245	.582	97.526				
38	.240	.571	98.097				
39	.223	.531	98.628				
40	.211	.502	99.130				
41	.199	.473	99.603				
42	.167	.397	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

9.21 Appendix 21

Initial Factor Analysis – Trait Positive Pattern Matrix

Pattern Matrix[a]

	Component									
	1	2	3	4	5	6	7	8	9	10
TP30	.827									
TP19	.824									
TP27	.819									
TP36	-.655									
TP15	-.589									
TP31	.488									
TP22	-.470			.414						
TP40		.875								
TP37		.828								
TP12		.812								
TP42		.653								
TP38		.520								
TP39		-.519								
TP25		.435								
TP17		.426								
TP2			.907							
TP8			.818							
TP4			.807							
TP3			.803							
TP7			.466							
TP29				.947						
TP18				.714						
TP35				.671						
TP26				.510						
TP21				.479						
TP23										
TP14					.802					
TP1					.652					
TP41					.428	.410				
TP32						.772				
TP6						.754				
TP33										
TP5							.698			
TP9							.636			
TP13							.573			
TP20								.906		
TP16								.585		
TP28				.476					-.826	
TP11									.685	
TP34										
TP10										.684
TP24				.439						-.554

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.[a]

a. Rotation converged in 13 iterations.

9.22 Appendix 22

Initial Factor Analysis – State Positive Variance

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.142	16.069	16.069	5.142	16.069	16.069	3.926
2	4.442	13.880	29.948	4.442	13.880	29.948	3.538
3	2.839	8.871	38.820	2.839	8.871	38.820	3.481
4	1.896	5.925	44.745	1.896	5.925	44.745	3.197
5	1.550	4.845	49.589	1.550	4.845	49.589	2.086
6	1.225	3.829	53.418	1.225	3.829	53.418	2.340
7	1.096	3.426	56.844	1.096	3.426	56.844	2.725
8	1.040	3.249	60.093	1.040	3.249	60.093	2.725
9	.943	2.948	63.040				
10	.879	2.748	65.788				
11	.820	2.563	68.351				
12	.786	2.456	70.808				
13	.754	2.357	73.165				
14	.740	2.311	75.476				
15	.691	2.158	77.635				
16	.646	2.019	79.654				
17	.606	1.893	81.546				
18	.584	1.824	83.370				
19	.566	1.768	85.138				
20	.535	1.671	86.809				
21	.492	1.537	88.346				
22	.483	1.511	89.857				
23	.454	1.418	91.274				
24	.412	1.287	92.561				
25	.386	1.207	93.768				
26	.362	1.133	94.901				
27	.353	1.105	96.005				
28	.322	1.006	97.011				
29	.290	.907	97.918				
30	.258	.807	98.726				
31	.232	.726	99.452				
32	.175	.548	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

9.23 Appendix 23

Initial Factor Analysis – State Positive Pattern Matrix

Pattern Matrix[a]

	Component							
	1	2	3	4	5	6	7	8
SP25	.743							
SP26	.733							
SP28	.615							
SP15	.559							
SP18	.557							
SP8	.442							
SP30		.816						
SP29		.785						
SP31		.709						
SP32		.600						
SP4		.577						
SP12			.812					
SP21			.730					
SP10			.707					
SP17			.550					
SP20	-.451		.461					
SP23			.448					
SP1				.921				
SP5				.890				
SP2				.410				

SP11					.751			
SP6					.701			
SP3						.742		
SP13						-.635		
SP16						-.592		
SP7						.485		
SP27							.830	
SP24							.672	
SP9								.705
SP22								.661
SP14					.505			.619
SP19								

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.[a]

a. Rotation converged in 14 iterations.

9.24 Appendix 24

Initial Factor Analysis – Trait Negative Variance

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total
1	8.032	19.124	19.124	7.025
2	4.253	10.125	29.249	3.974
3	3.787	9.018	38.267	3.882
4	1.541	3.668	41.935	4.043
5	1.380	3.287	45.221	3.196
6	1.291	3.074	48.295	4.142
7	1.157	2.756	51.050	2.260
8	1.129	2.687	53.738	2.271
9	1.053	2.506	56.244	2.572
10	1.008	2.399	58.643	1.830
11	.990	2.356	61.000	
12	.918	2.187	63.186	
13	.911	2.168	65.355	
14	.828	1.971	67.325	
15	.810	1.928	69.253	
16	.785	1.869	71.123	
17	.758	1.804	72.927	
18	.718	1.709	74.635	
19	.678	1.613	76.249	
20	.673	1.603	77.852	
21	.628	1.496	79.348	
22	.624	1.485	80.833	
23	.595	1.416	82.249	
24	.568	1.351	83.600	
25	.530	1.262	84.862	
26	.520	1.238	86.100	
27	.509	1.212	87.312	
28	.488	1.162	88.474	
29	.470	1.118	89.592	
30	.451	1.075	90.667	
31	.432	1.028	91.694	
32	.415	.987	92.682	
33	.394	.939	93.620	
34	.366	.871	94.492	
35	.365	.869	95.361	
36	.343	.818	96.179	
37	.329	.783	96.961	
38	.319	.759	97.720	
39	.295	.703	98.424	
40	.276	.656	99.080	
41	.229	.545	99.625	
42	.158	.375	100.000	

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

9.25 Appendix 25

Initial Factor Analysis – Trait Negative Pattern Matrix

Pattern Matrix[a]

	Component									
	1	2	3	4	5	6	7	8	9	10
TN37	.937									
TN40	.871									
TN25	.701									
TN33	.693									
TN26	.672									
TN12	.628									
TN34	.538							.407		
TN32	.493									
TN38	.471									
TN19		-.876								
TN36		.688								
TN15		.685								
TN30		-.654								
TN27		-.648								
TN20		.419								
TN1			.764							
TN9			.695							
TN10			.607							
TN5			.530							
TN39			.410							.405
TN7				.786						
TN8				.659						
TN2				.562						
TN4				.510						
TN18					.824					
TN29					.686					
TN3				.431	.487					
TN35					.416				.412	
TN14						.797				
TN6						.570				
TN17						.512				
TN23										
TN28							.706			
TN42							.662			
TN41							.417			
TN11								.767		
TN22		.401						.462		
TN21									.915	
TN13									.434	
TN24									.408	
TN31										.854
TN16										

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.[a]

a. Rotation converged in 16 iterations.

9.26 Appendix 26

Initial Factor Analysis – State Negative Variance

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total
1	7.358	22.994	22.994	6.465
2	3.367	10.523	33.517	4.681
3	3.126	9.770	43.287	3.239
4	1.691	5.285	48.572	3.545
5	1.317	4.115	52.687	2.753
6	1.119	3.496	56.183	2.267
7	1.039	3.246	59.429	2.818
8	.932	2.912	62.341	
9	.879	2.748	65.089	
10	.815	2.548	67.637	
11	.785	2.453	70.090	
12	.750	2.344	72.434	
13	.735	2.296	74.730	
14	.633	1.978	76.707	
15	.625	1.955	78.662	
16	.602	1.882	80.544	
17	.585	1.827	82.372	
18	.546	1.706	84.078	
19	.534	1.669	85.746	
20	.517	1.615	87.362	
21	.494	1.545	88.907	
22	.469	1.467	90.374	
23	.453	1.417	91.791	
24	.413	1.290	93.080	
25	.381	1.190	94.270	
26	.354	1.106	95.376	
27	.332	1.037	96.413	
28	.299	.934	97.347	
29	.289	.903	98.249	
30	.232	.724	98.973	
31	.196	.612	99.586	
32	.133	.414	100.000	

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

9.27 Appendix 27

Initial Factor Analysis – State Negative Pattern Matrix

Pattern Matrix[a]

	Component						
	1	2	3	4	5	6	7
SN4	.816						
SN3	.796						
SN7	.756						
SN6	.698						
SN9	.663						
SN11	.583						
SN16	-.550						.460
SN26	.407						
SN29		.839					
SN30		.821					
SN31	.436	.607					
SN32		.570					
SN28		.566					
SN21			.815				
SN12			.717				
SN17			.700				
SN10			.553				.462
SN23			.497				
SN24				.841			
SN27				.762			
SN8				-.618			
SN22				.584			
SN14							
SN25					.773		
SN15					.765		
SN18					.557		
SN19					.497		
SN1						.822	
SN5						.754	
SN2						.430	
SN20							.738
SN13							.624

Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.[a]

a. Rotation converged in 10 iterations.

9.28 Appendix 28

Initial Cronbach's Alpha – Trait Positive

Factor label	Cronbach's alpha	Items	Cronbach's alpha if item deleted
Avoidance	.843	TP2	.814
		TP3	.829
		TP4	.811
		TP7	.822
		TP8	.796
		TP21	.835
Emotion Focus	.733	TP12	.664
		TP17	.670
		TP25	.702
		TP37	.654
		TP38	.692
		TP39	.841
		TP40	.650
Suppression	.528	TP15	.388
		TP19R	.314
		TP22	.401
		TP27	.794
		TP30R	.341
		TP31R	.546
		TP36	.336
Reappraisal	.709	TP18	.595

		TP29	.638
		TP35	.625
Harnessing	.681	TP1	.543
		TP14	.648
		TP41	.567
Rumination	.485	TP6	-
		TP32	-
Resilience	.489	TP5	.409
		TP9	.302
		TP13	.454
External Regulation	.262	TP11	-
		TP28	-
Mindfulness	.480	TP16	-
		TP20	-
Pessimism	.076	TP10R	-
		TP24	-

9.29 Appendix 29

Initial Cronbach's Alpha – State Positive

Factor label	Cronbach's alpha	Items	Cronbach's alpha if item deleted
Harnessing	.787	SP8	.770
		SP15	.754
		SP18	.755
		SP25	.740
		SP26	.749
		SP28	.758
Rumination	.785	SP4	.799
		SP29	.710
		SP30	.693
		SP31	.747
		SP32	.756
Mindfulness	.698	SP10	.637
		SP12	.633
		SP17	.665
		SP20	.726
		SP21	.589
		SP23	.685
Reappraisal	.702	SP1	.563
		SP2	.755
		SP5	.443
Avoidance	.703	SP6	.620

		SP11	.540
		SP14	.673
Emotion Focus	.581	SP3	.495
		SP7	.577
		SP13R	.468
		SP16R	.464
Suppression	.618	SP24	-
		SP27	-
Perspective & Avoidance	.545	SP9	.593
		SP14	.283
		SP22	.407

9.30 Appendix 30

Initial Cronbach's Alpha – Trait Negative

Factor label	Cronbach's alpha	Items	Cronbach's alpha if item deleted
Emotion Focus	.881	TN12	.869
		TN25	.863
		TN26	.876
		TN32	.867
		TN33	.858
		TN34	.876
		TN37	.856
		TN38	.428
		TN40	.857
Suppression	.780	TN15	.750
		TN19R	.712
		TN20	.783
		TN27R	.742
		TN30R	.743
		TN36	.742
Resilience	.614	TN1	.571
		TN5	.523
		TN9	.560
		TN10	.592
		TN39	.551
Avoidance	.695	TN2	.601

		TN4	.591
		TN7	.598
		TN8	.714
Reappraisal	.646	TN3	.629
		TN18	.534
		TN29	.524
		TN35	.606
Intrusion	.715	TN6	.617
		TN14	.669
		TN17	.582
External Regulation	.468	TN28	.303
		TN41	.320
		TN42	.464
External Avoidance	.494	TN11	-
		TN22	-
Perspective Taking	.438	TN13	.304
		TN21	.312
		TN24	.410
Harnessing	.327	TN31	-
		TN39	-

9.31 Appendix 31

Initial Cronbach's Alpha – State Negative

Factor label	Cronbach's alpha	Items	Cronbach's alpha if item deleted
Avoidance & Emotion Focus	.859	SN3	.829
		SN4	.841
		SN6	.843
		SN7	.822
		SN9	.861
		SN11	.832
		SN16R	.861
		SN26	.845
Rumination	.852	SN28	.883
		SN29	.792
		SN30	.790
		SN31	.816
		SN32	.813
Mindfulness	.692	SN10	.662
		SN12	.607
		SN17	.619
		SN21	.583
		SN23	.731
Suppression	.694	SN8R	.732
		SN22	.654
		SN24	.533

		SN27	.571
Harnessing	.549	SN15	.433
		SN18	.502
		SN19	.526
		SN25	.446
Reappraisal	.689	SN1	.539
		SN2	.673
		SN5	.553
Resilience	.399	SN13	-
		SN20	-

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Information sheet

Cognitive processing and Memory

Supervisors: Email: Phone:
Dr Craig Steel c.steel@reading.ac.uk 0118 378 7550

Experimenters:
David Angell D.J.Angell@pgr.reading.ac.uk 0118 378 7937

What is the study about?

This is a study to investigate how you process watching video clips and your subsequent memory of this information.

Are there any restrictions on who can take part?

You must be aged 18 or over to participate in this study. You should not participate if you have a current diagnosis of a mental health problem such as anxiety or depression.

What do I have to do?

First you will complete some questions about yourself. Then you will watch a selection of video clips depicting a series of scenarios with specific instructions. Following this, you will complete a few more questions before the experiment is over. There is a chance that you may find watching the videos mildly uncomfortable. However, we do not anticipate any prolonged impact.

How long will it take?

The study will take approximately 30 minutes.

What will happen to my data if I take part?

Your data will be kept confidential and securely stored, and you will only be identifiable by an anonymous number. Information linking that number to your name will be stored securely and separately from the data you provide us.

What if I want to withdraw my consent?

Taking part in this study is completely voluntary; you may withdraw at any time without having to give any reason. Please feel free to ask any questions that you may have about this study at any point.

This application has been reviewed by the University Research Ethics Committee and has been given a favourable ethical opinion for conduct.

9.33 Appendix 33

Positive and Negative Affect Schedule (PANAS)

Worksheet 3.1 The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988)

PANAS Questionnaire

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment *OR* indicate the extent you have felt this way over the past week (circle the instructions you followed when taking this measure)**

1	2	3	4	5
Very Slightly or Not at All	A Little	Moderately	Quite a Bit	Extremely

_____ 1. Interested	_____ 11. Irritable
_____ 2. Distressed	_____ 12. Alert
_____ 3. Excited	_____ 13. Ashamed
_____ 4. Upset	_____ 14. Inspired
_____ 5. Strong	_____ 15. Nervous
_____ 6. Guilty	_____ 16. Determined
_____ 7. Scared	_____ 17. Attentive
_____ 8. Hostile	_____ 18. Jittery
_____ 9. Enthusiastic	_____ 19. Active
_____ 10. Proud	_____ 20. Afraid

Scoring Instructions:

Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10 – 50, with higher scores representing higher levels of positive affect. Mean Scores: Momentary = 29.7 (*SD* = 7.9); Weekly = 33.3 (*SD* = *7.2)*

Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10 – 50, with lower scores representing lower levels of negative affect. Mean Score: Momentary = 14.8 (*SD* = 5.4); Weekly = 17.4 (*SD* = 6.2)

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Research Ethics Committee

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Consent Form

Initials

1. I have read and understood the accompanying Information Sheet relating to the project on Individual differences in emotional response

2. I have had explained to me the purposes of the project and what will be required of me, and any questions I have had have been answered to my satisfaction. I agree to the arrangements described in the Information Sheet in so far as they relate to my participation.

3. I understand that participation is entirely voluntary and that I have the right to withdraw from the project any time, and that this will be without detriment.

4. This project has been reviewed by the University Research Ethics Committee and has been given a favourable ethical opinion for conduct.

5. I have received a copy of this Consent Form and of the accompanying Information Sheet.

6. I do not have any mental health problems, such as anxiety or depression.

Name:
……

Date of birth:
……

Signed:
……

Date:
……

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Demographic Questions and Instructions

Demographic questions:

1) Age:
2) Gender: Male/Female
3) Race: Black/White/Asian/Hispanic/Other
4) Is English your first language?

9.35 Appendix 36

Video Clip Instructions

Catastrophising condition

Next you will be watching a series of video clips and writing about how you have imagined them. We will need you to watch these clips very carefully and focus all of your attention to them. While watching the following video clips you will need to imagine that you are the person facing these situations. When putting yourself into their shoes you will need to imagine that the situation is the absolute worst that it could be. Please focus on how terrible the situation is and that it is happening to you. How horrible it is that you are going through this situation and how it is the worst thing that could have happened. Think about the different aspects of the clip and how they all add up to make the situation even worse. You will be asked questions relating to your memory of these videos at the end of the study.

Watch condition

Next you will be watching a series of video clips and writing a few details about them. We will need you to watch these clips very carefully and focus all of your attention to them. While watching the following clips pay careful attention to what is going on so that you are able to write a few details about the scene. You will be asked questions relating to your memory of these videos at the end of the study.

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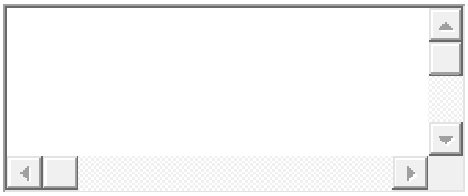
Questions following each video

7. Please fill in some of the thoughts and views you had while watching the video:

8. Please fill in how you were imagining the worst of the situation within the video clips:



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Whiteknights
Reading RG6 6AL

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Sources of Support

Mood and mobile phone use

Project Supervisor: Dr Craig Steel: c.steel@reading.ac.uk

Researcher: David Angell: D.J.Angell@pgr.reading.ac.uk

In this study In this study took part in an intervention, if you feel that you need further support and need to talk to someone, please see the information below for your consideration:

- The University of Reading Counselling Services
  See online at http://www.reading.ac.uk/Counselling/oldindex.htm

  Or send an email to arrange an appointment to: counselling@reading.ac.uk

  Or call in, either at

  The University Counselling Service, First Floor, The Health Centre, 9 Northcourt Avenue, Reading, RG2 7HE (Tel: Tel: (0118) 975 1823)

  OR

  The University Counselling Service Drop-in, First Floor, Carrington Building, Students Services Centre, Whiteknights RG6 6UA (Tel: (0118) 987 5123)

- Your General Practitioner, who will be able to offer support or arrange for you to be referred to a counsellor.

- Your Personal Tutor or the Principal Investigator of the study you have taken part in, either of whom will be able to offer you guidance about other sources of support.

- A national organization, such as the Samaritans. You can call the Samaritans on 08457 90 90 90, or you can call in at the local branch which is located at 59a Cholmeley Road, Reading, RG1 3NB (local branch phone: 0118 926 6333).

- Dr Craig Steel, Clinical Psychologist. Dr Steel is the principal investigator for this study, and is a member of the Psychology Department at the University of Reading. He can provide immediate support and/or guide access to NHS services. He can be contacted on e-mail: c.steel@reading.ac.uk; Phone 0118 378 6668 or in room 2s08.

9.38 Appendix 39

Item generation instructions and questions

When we encounter a situation we perceive as negative there are many different ways we can react to that emotional response. Catastrophising is one of these possibilities. Catastrophising is the tendency to imagine the worst and most dangerous thing that could possibly happen in the situation. Quite often these catastrophic thoughts prove to be unrealistic and afterwards can seem like making a mountain out of a molehill. Some examples of typical catastrophic thoughts are: "this is the worst thing ever", "this is all so terrible", "I have absolutely no chance and will totally fail" and "I will never be able to do any of this".

These questions require quite a lot of thought, so take your time to come up with your answers.

2. Can you give three examples of situations that felt negative at the time, which often result in catastrophic thinking? If you cannot think of three just try to think of as many as you can.

Example	Seeing the orange warning light on a car dashboard.
Situation 1	
Situation 2	
Situation 3	

3. When we catastrophise we often fall into common patterns of thought and find ourselves repeating specific phrases, such as the thoughts given above. If you can think of any common examples of this please enter them below, you may also use the examples if they feel true for you.

Example	Oh my god I'm going to fail.
Thought 1	
Thought 2	
Thought 3	

9.39 Appendix 40

Initial Questionnaire

Catastrophising Questionnaire (CQ)

People react differently to all sorts of situations. We would like you to respond to the following questions which ask you about the kind of thoughts you have when you experience a situation that might seem difficult or challenging in some way. Please read each of the questions below, which describe different situations and a particular kind of response. Indicate the extent to which you respond in that way, ranging from never (0) to 100% of the time (10).

1) When you come across a situation that you see as a threat to your safety, to what extent do you generally assume the worst? *E.g., I'm going to crash on the way home and die, I'm going to get mugged or this plane is going to crash.*

0-10

2) When you come across a situation that you see as a risk to yourself and others, to what extent do you generally assume the worst? *E.g., I am going to have an incurable disease, my pet is never going to recover or when you hear someone close to you has been hospitalised.*

0-10

3) When you come across a situation that you see will affect your ability to achieve personal goals, to what extent do you generally assume the worst? *E.g., I am going to get fired, I'm totally going to fail or no one is ever going to recognise my hard work.*

0-10

4) When you come across a situation where you fear your organisational skills may let you down, to what extent do you generally assume the worst? *E.g., realising a deadline the night before, losing your keys or being late because you missed a train.*

0-10

5) When you come across a situation that you see as negative and out of your control, to what extent do you generally assume the worst? *E.g., your train being cancelled, I am happy therefore something terrible will happen or your computer crashing with unsaved work.*

0-10

6) When you come across a situation that involves confrontation with others, to what extent do you generally assume the worst? *E.g., an argument with a significant other, boss or friend.*

0-10

7) When you come across a situation that you see as negative to your finances, to what extent do you generally assume the worst? *E.g., I am never going to be able to afford to fix that, there is no way I'll be able to support myself or someone has stolen all of my money.*

0-10

8) When you come across a situation that you see as negative and potentially humiliating, to what extent do you generally assume the worst? *E.g., giving a presentation, I am going to look like an idiot in front of everyone or everyone else is laughing at me.*

0-10

9) When you come across an issue between yourself and others, to what extent do you generally assume the worst? *E.g., a partner saying 'we need to talk', that you have offended your friends or when asking for help.*

0-10

10) When you come across a social situation that you see as negative, to what extent do you generally assume the worst? *E.g., everyone is going to hate me, I am going to be alone forever or no-one cares about me.*

0-10

11) When you come across a situation that you see as negative, to what extent do you tend to ask dramatic questions about yourself? *E.g., why is this always happening to me? Why am I so useless? Or what did I ever do to deserve this?*

0-10

12) When you come across a situation that you see as negative, to what extent do you generally criticise yourself and assume the worst? *E.g., It went wrong so it must be all my fault, I'm such a total idiot or I don't deserve anything good to happen to me.*

0-10

13) When you come across a situation that you feel helpless in, to what extent do you automatically assume the worst? *E.g., I will lose everything, It's all over now and there is no point or there is nothing I can do to make anything better.*

0-10

9.40 Appendix 41

Situations Question

Key:
SAFETYHEALTHACHIEVEMENTORGANISATIONGCONTROLCONFRONTATIONFINANCEEMBARRASSMENTPERSONAL

Hearing the fire alarm being set off

being diagnosed with cancer
Not getting the degree classification that I wanted
Finding out about a deadline only a short time before
Going into a meeting that I didn't feel prepared for
having the upstairs sewage pipe leaking down my wall day before surveyor comes to value property
As a result of medical situations
Found changes in a mole
Not getting up when the alarm goes off
a request for a meeting without an agenda (i'm going to get fired!)
Running late for invigilation and not being able to find the exam papers!
Looking at the calendar and realising a deadline is closer than you think.
Waiting for a delayed train.
Forgetting something, and thinking that means I've got alzheimer's
Getting an angry email
Experience a bit of plane turbulence
Putting diesel into a petrol car
trains running late-running late for work
Problem with gear stick in car - not going into reverse
driving in the dark on an unknown road
starting a new job and feeling overwhelmed at the beginning
Job review date
Anything unusual happening to/with my car while I'm driving

not achieving required A level grades
There's a problem with the car, but i don't know what.

Going into your overdraft
Whenever my husband goes out in the car I'm convinced he'll have an accident
when redundancies have been proposed at work
Can't find my keys
being lost in an unfamiliar place
kitchen leak as I'm about to leave for holiday
Having to engage in a public speaking event
Being late
Sleeping through my morning alarm
When I am with people who I perceive to be of higher intellect than myself

Flat battery in the car when I need to travel.....
Going for an job interview
realising you have an exam and have left it too late to do as much study as you want
Forgetting to complete student finance
A situation where my children may be hurt, such as them running away from me in public
I can't get my new car to start!
husband not picking up phone
Not getting offered a job I apply for
A letter from HMRC.
An increase in workload given during staff meetings
my boyfriend breaking up with me
being late
Argument with husband
car overtaking when cars are coming towards you on the oppisite side of road
Forgetting to do something at work.
there's a traffic jam, we'll miss the plane and the holiday will be ruined
Receiving a phone call in the middle of the night
Having a tight deadline at work
Missing a train that would make me late for another mode of transport
Coming to late for school for the very first time.
Realizing I made a mistake at work
Making a small professional mistake.
being exposed to gaseous methyl methacrylate (about a drop worth evaporated, about .15 grams exposu
though)
Seeing police outside my apartment complex.
Playing out imaginary arguments in my head with my in-laws
When the computer freezes.
wallet stolen with bank cards in it
Pet is sick and needs to go to the vet.
getting medical symptoms which might hint towards more than simple ailments
A test that is slightly harder than expected
Not hearing from someone you expect to and not knowing why (job interview, friend, parent...)
Being locked up for 7 hours in a mental ward for a panic attack.
Confessing feelings.
the "check engine" signal beeps when driving my car.
Hearing a loud thump from my kids room
Trying to lose weight
Noticing behavioural changes In my dog attitudes

being stood-up on a date
Having a journal article rejected
Having to give a talk
Waking up after a night out where I wasn't quite sure how it ended
When I was much younger, having someone I fancy not text back
If I feel someone else's plans are not thought out
Noise coming from car engine

Not earning enough money
being late
Running late to hand in the marking papers ;)
Stuck in traffic and looking at the time, thinking you'll definitely be late for something.
Being told my pay may be delayed.
Having shakes (from Caffeine), and thinking that I'm getting parkinson's
Partner upsetting me
Have an evening without plans
missing a flight
partner late home and cant get hold of him by phone.
Losing a piece of work on the computer
being at the front at a music gig
Being stuck in traffic on way to airport
Asked to attend meeting with boss
Momentarily losing sight of children I'm looking after when in a busy public place

text message from parent saying "its urgent phone me back"
I'll need to get this looked at by a mechanic.

Being late for work
Not being up to date with my marking (I'm a teacher)
when one of ones nearest and dearest is diagnosed with cancer
Multiple missed calls from same person
somebody saying 'we need to talk'
husband made redundant when expecting a baby
Running a new / unfamiliar group session
making a mistake at work
seeing an empty bank account
when I am with people who are more confident than myself
When I realise the deadline for a report has passed and the stakeholder has sent an urgent note.
Giving a presentation
having an argument with husband
missing a period
A 'near miss' accident when driving
My husband is home late from work and has not text me
health symptom that could be something terminal
Being let down by builders
A phone call from OFSTED.
When presented with an assignment at university
a relative being hospitalized in a psychiatric facility
being misunderstood
Baby not feeding
Young children running freely around a coffee shop when the mother is too busy talking to her friend
Having to ask for help or support.
offended someone, they won't speak to me and I won't have any friends

Getting called into the boss's office
Having my phone die when I was supposed to call my husband and plan to meet
Not being able to access university resources in time for work
My cat didn't come back home like normal until the day after.
Not getting a job offer
Coming ill-prepared for an exam.
finding the rash on my neck had gotten a bit bigger
My friend doesn't respond to my texts.
Recalling negative events from the past

dog goes missing
Significant other calls to say you need to talk.
condom might've not worked
A birthday party where the first people to RSVP can't come
Finding that something valuable is not where you expect it (triple tap goes wrong: phone wallet keys)
Losing a full-ride scholarship to my dream school.
Preparing for an exam.
my 2mo daughter vomits all her milk on her newly, entirely clean and unworn apparel.
Feeling I did not do well on an exam
Trying to pass a test
Receiving a telephone call late at night

driving past a speed camera well over the speed limit
Not being successful in an application for job etc
Not being able to find my phone immediately
Waiting for feedback on work
getting a B instead of A* for gcse drama
Car issues or something that will impact financially
Mammogram
Being unprepared for a work situation
seeing doctor / being asked to go for a blood test.

Feeling painful and avoiding activity for fear of more hurt.
A large bill comes in the post.
A stranger shouting something, and worrying that they will attack me
Getting ill
Don't know the answer to a question
losing a graduation certificate
Pets appear unwell.
blur screen of death on computer
driving test
Having to find a new apartment
Got to meet somewhere new
My dad not answering his home phone, office line or mobile when I call in the evening

expecting someone to arrive but they are late and are not answering their phone

Missing your period and thinking your pregnant
Having to make decisions

Partner home late
my period being late
car needs costly repair when already overdrawn on bank account

saying something silly
rowing with my husband

Toothache

making a mistake at work
forgetting to put oil in the car and its below the minimum line
Making a (generally minor) mistake at work (I really don't do anything life saving at work!)
I have to give a presentation

Running late to work
Your child becoming ill.
When being challenged during an exercise class
not being able to find a job
relationship not working out
Ill health

Getting a letter from the tax office!

Coworker quitting without notice
Having to lead a meeting with senior management
Getting locked out of my home
I forgot to deliver an assignment on time.
Not hearing back about a job past the day they told me I'd hear
Not being able to sleep at night (insomnia).
the edtpa. all of it. (teachers performance assessment. needed to become a teacher in WA.)

parent diagnosed with cancer
You find you have 3 missed calls from your boss.
fucking up in interpersonal relationships
Someone you love not texting back for a long time
Feeling a pain or something somewhere
Loving someone who can't love me back.
Ending a relationship.
I accendatally press no when Word ask to save when quitting, wasting 1 hour of work.

Running late
Looking for something that is lost

9.41 Appendix 42

Thoughts Question

Key: Health Achievement CONTROL Embarrassment Rhetorical Self-criticism Organisational Helpless Safety Social Finance

Oh my god. Is this a real fire that will burn everything to the ground? Will I lost everything?

I'm going to die
I'm never going to get a job
I will look so stupid
I can't do this, it will be a disaster
why is this happening to me
What can I do
I have cancer
Why am I so useless?
what did i do? is it that bad, yes, of course, why didn't you realise before, you idiot
Oh mon dieu! I am very late!
This is not going to work.
I can't deal with this right now.

Going to be fired
This plane is going to crash and then my parents will be too sad to cope with life or if it doesn't I'm going to be too scared to ever fly again and will never be able to go on holiday ever again
It's gone totally irreplaceable
i'm going to fail.
Why does it always happen to me??
someone is going to get hurt
I will Not be able to do this
What have i done wrong
Someone has stolen away the kids to abuse them and it's all my fault

Why does this always happen to me
I can't do this

MY LIFE IS OVER AND I WANT TO DIE
I'm a terrible teacher
this is the end of the world
Something terrible had happened
I am going to humiliate myself
this is the last thing I need
What should I do?!
Everyone thinks I'm an idiot
It's all over now there is no point
You think I am stupid
I will be perceived badly in the team

I won't be able to do this
I'm going to fail and its all my fault
I'm going to fail/ I'm a failure
What if he / she died?
My husband has crashed the car!
I am happy so therefore something bad is going to happen
Am I going to get in trouble?
What have I done?
How am I supposed to do this?
I cannot face the loneliness
ill never get another chance
I must have a terrible disease
I am too old to be doing this the youngsters are laughing at me
I've screwed up
I am useless
I just can't take anymore.
I will never get this done
I'm going to be stranded
Oh F**K, my father is gonna be mad!
I'm a complete failure
I'm not going to sleep at all tonight.
I'm going to die of a rare disease

Everyone hates me

they (the thieves) will empty my bank account
This will never work.
i should have X instead of Y
No one likes me
What did I ever do to deserve this?!
Why bother living if they treat me this way?
See example: "Oh my god I'm going to fail."
it's gonna be really expensive and time consuming to fix that.
Ugh, this is going to end up bad
There's no point in even trying.
Oh my god. My dog might be sick and going to die

He/she doesn't love me
My relationship won't survive because my career required moving around
It's all going wrong
Everyone will hate me I'm the worst person ever
everything is ruined
I knew it would happen
this is going to cost lots of money
This is never going to work
shit shit shit shit, everyone is going to hate me because i've been disrupted

I will never make it on time!
What to do? What to do?
This is not going to get any better.

Loosing partner
Noone likes me, I am friendless and am going to be lonely and sad forever
they won't choose me
I'm going to lose someone i love.
No, no, no, no!!!
what if a bomb goes off
This is not going to work out
He must want to fire me/tell me off
What if my dad is dead?!

It's all going wrong
I'm useless, a child could do this

I could not feel anymore worse than i already do,
I'm never going to be able to do this
things will never be the same again
I will be humiliated
my life is ruined
I cant cope with anymore of this
People are going to think I'm stupid.
theyll realise I don't know what I'm doing
It will never work
I am useless and I should not be doing this
I have let everyone down.
I do not have the expertise to do well at this
He's going to walk out
I have let people down
I'm a terrible driver
I will never be able to work out how to drive this car
I dont deserve to have something good happen to me so it will go go wrong
I'm never going to get the job I want
Why is this happening to me?
I don't know what I'm doing
He is going to turn mad/schizophrenic
i can neve make it better
My partner will leave
why did i start this its going to be awful

I'll never be able to do this
No, not now. Oh god, why now?
Everyone will laugh at me

I'm going to fail
Oh what if he is dead?
I can't do this job, I should just quit and be a super highly educated waitress
If all else fail I have this solid backup plan.
I'm going to crash my car as I drive home tonight

I'm incompetant

my dog will be hit by a car and die
I hate my life.
i'll work it out probably
I am not smart enough
Why is everything going wrong all the time!
Why even go to school?
I'll never be happy.

Why didn't I do something different
I give up because it's too hard.
Oh my god. There is a healthy emergency with someone in the family

I'm going to loose my driving licence
I won't be able to have a happy, comfortable family life
I will lose everything
Everyone will think i'm an idiot
I can't cope

this will not end well
I don't know what to do
oh, so i'm going to die then.

I can't believe this is happening.
This is shit.

long term health problems
I am too stupid for this job, I'm never going to make anything of myself or succeed in anything, and my stupidity will make me too boring to talk to
not qualified enough
I'm going to lose my job

everything always goes wrong
I can't do anything right any way
I'm going to crash and die, and probably kill other people too

I don't know what to do

I'm a bloody idiot

WHY AM I SO AWFUL AT BEING A HUMAN
I don't care enough anymore
You just dont care
I will be shamed
how am I going to get myself out of this
what is the point, everything I do goes wrong
Am I ever going to understand this?!
im not good enough
Nothing will ever be the same again

The system never allows me to succeed.
I am going to totally embarrass myself
I'm going to lose my job
i am an idiot

I won't be able to cope with this

I'm not good enough / I'm not as good as other people
How on earth am I going to solve this?
I'm not as good as they think
I won't be able to support myself/I'm worthless
i will always feel this awful
I will lose everything
That car is going to hit me if it does not slow down,

I don't want to do this; I don't want to do any of this.
I will embarass myself
I'm going to get mugged

Everyone will know how much I suck

I'm going to fail every portion of the edtpa and have to spend another year in college

my mum will die of cancer
I've screwed everything up.
?
I will never be successful
I just need a few days off from everything. But then I'll be bored.
I'm going to be alone for the rest of my life.
I'll never recover.

Shit!
This is a waste of time.

9.42 Appendix 43

Competing models – item kurtosis and skew

Descriptive Statistics

	N	Mean	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Safety	143	4.45	7.588	.243	.203	-1.154	.403
Health	143	4.42	6.400	.115	.203	-.910	.403
Achieve	143	5.38	6.379	-.153	.203	-.670	.403
Organise	143	5.25	8.077	-.175	.203	-1.070	.403
Control	143	4.26	7.320	.267	.203	-.895	.403
Confront	143	5.28	7.386	-.093	.203	-.943	.403
Finance	143	4.74	7.249	.051	.203	-.873	.403
Embarrass	143	5.32	7.501	-.091	.203	-1.006	.403
Personal	143	5.98	5.993	-.536	.203	-.386	.403
Social	143	4.64	8.358	.096	.203	-1.059	.403
Rhetoric	143	4.42	7.710	.175	.203	-.985	.403
SelfCriticism	143	4.65	7.891	.071	.203	-1.020	.403
Helpless	143	4.53	6.983	-.036	.203	-.909	.403
Valid N (listwise)	143						

9.43 Appendix 44

PCA Eigenvalues

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total
1	5.517	42.435	42.435	4.917
2	1.271	9.775	52.210	4.271
3	.970	7.458	59.668	
4	.904	6.954	66.622	
5	.808	6.219	72.841	
6	.757	5.820	78.662	
7	.564	4.336	82.997	
8	.478	3.679	86.676	
9	.441	3.395	90.071	
10	.413	3.175	93.246	
11	.352	2.706	95.952	
12	.289	2.221	98.173	
13	.237	1.827	100.000	

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

9.44 Appendix 45

PCA - Factor structure for 2 factor model

Pattern Matrix[a]

	Component	
	1	2
Safety		.924
Health		.938
Achieve	.272	.460
Organise	.736	
General		.759
Confront	.570	
Finance	.515	
Embarrass	.398	.304
Personal	.771	
Social	.844	
Rhetoric	.497	
SelfCriticism	.737	
Helpless	.528	.253

Extraction Method: Principal Component Analysis.

Rotation Method: Promax with Kaiser Normalization.[a]

a. Rotation converged in 3 iterations.

9.45 Appendix 46

One factor model reliability

Reliability Statistics

Cronbach's Alpha	N of Items
.885	13

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Safety	58.88	439.627	.613	.874
Health	58.92	447.289	.602	.875
Achieve	57.95	451.089	.565	.877
Organise	58.08	456.486	.440	.884
Control	59.08	444.677	.579	.876
Confront	58.06	452.335	.505	.880
Finance	58.59	453.440	.500	.880
Embarrass	58.01	447.676	.543	.878
Personal	57.36	453.358	.563	.877
Social	58.69	427.257	.690	.870
Rhetoric	58.92	444.444	.563	.877
SelfCriticism	58.69	434.245	.648	.872
Helpless	58.80	441.525	.626	.874

9.46 Appendix 47

Competing models - Two factor model reliability

General

Reliability Statistics

Cronbach's Alpha	N of Items
.814	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Organise	29.71	135.431	.467	.805
Confront	29.69	135.372	.501	.799
Finance	30.22	138.316	.456	.806
Personal	28.99	134.972	.588	.785
Social	30.32	121.431	.701	.762
Rhetoric	30.55	132.841	.529	.794
SelfCriticism	30.31	126.443	.635	.775

Health and Safety

Reliability Statistics

Cronbach's Alpha	N of Items
.820	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Safety	8.68	21.135	.722	.702
Health	8.71	22.995	.726	.703
General	8.87	24.195	.582	.844

9.47 Appendix 48

Competing models – item kurtosis and skew

Descriptive Statistics

	N	Mean	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Safety	100	4.2700	.180	.241	-1.150	.478
Health	100	4.1900	.076	.241	-.873	.478
Organisation	100	4.7000	-.177	.241	-.983	.478
Control	100	3.9200	.381	.241	-.809	.478
Confrontation	100	4.9500	-.252	.241	-.858	.478
Finance	100	4.7600	.159	.241	-.967	.478
Personal	100	5.7300	-.436	.241	-.414	.478
Social	100	4.6300	.110	.241	-.962	.478
Rhetorical	100	4.4500	.211	.241	-.840	.478
SelfCriticism	100	4.6500	.099	.241	-.891	.478
Valid N (listwise)	100					

9.48 Appendix 49

Validation - Two factor model reliability

General

Reliability Statistics

Cronbach's Alpha	N of Items
.832	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Organisation	29.1700	141.274	.541	.816
Confrontation	28.9200	141.004	.525	.818
Finance	29.1100	145.614	.460	.828
Personal	28.1400	139.819	.612	.805
Social	29.2400	128.487	.686	.791
Rhetorical	29.4200	134.509	.605	.805
SelfCriticism	29.2200	134.739	.635	.801

Health and Safety

Reliability Statistics

Cronbach's Alpha	N of Items
.806	2

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Safety	4.1900	5.974	.679	.
Health	4.2700	7.391	.679	.

9.49 Appendix 50

About this App *Control*

We greatly appreciate you taking part in this study, we only ask that you do your best to complete tasks and questionnaires as they come so that you can get the most out of this app and so that we can get the data we need!

This app has been built to investigate how mobile phone use may influence mood. This experiment will last for two weeks, taking a minimum of a few minutes per day. The information you provide is confidential to the researchers and will be stored on a secure server.

Towards the end of each day you will be required to fill in a brief questionnaire to represent your overall mood that day. These results can be viewed from within the app so that you are able to track your own mood over the fortnight. On other days, you may also have extra questionnaires to complete that will take a few minutes each. In addition, as you progress through the two weeks tasks will unlock to be completed. These will each involve downloading a free game from the app store and playing it for at least 15 minutes. If you have limited data download, we recommend you do this when connected to Wi-Fi.

So, what first?

- Set up notifications within the app to trigger alarms at a time in the evening that will be generally convenient to spend a few minutes on questionnaires or quizzes.
- Take your time to read the information in the Introduction section.
- Complete your first task!

About this App *Experimental*

We greatly appreciate you taking part in this study, we only ask that you do your best to complete tasks and questionnaires as they come so that you can get the most out of this app and so that we can get the data we need!

This app has been designed to help improve how we control our negative emotions using a small set of techniques. This experiment will last for two weeks, taking a minimum of a few minutes per day. The information you provide is confidential to the researchers and will be stored on a secure server.

Towards the end of each day you will be required to fill in a brief questionnaire to represent your overall mood that day. These results can be viewed from within the app so that you are able to track your own mood over the fortnight. On other days, you may also have extra questionnaires to complete that will take a few minutes each. As you progress through the fortnight tasks will unlock for you to complete. These will

each involve reading about a new technique to keep potential negative emotions in check. This may also involve a few scenarios to give you some practice. These are all techniques that have been selected on the basis that they have been found to work with people from all walks of life.

So, what first?

- Set up notifications within the app to trigger alarms at a time in the evening that will be generally convenient to spend a few minutes on questionnaires or quizzes.
- Take your time to read the information in the Introduction section.
- Complete your first task!

Information day 1

What are emotions and how do they work?

We are all aware of what emotions feel like, but over the past few decades science has shown us where they are located within the brain and body. Over the past decade scientists have taken large steps in understanding how those systems work. Part of this dramatic increase is due to functional magnetic imaging (fMRI), which allows us to observe the brain while it is working. In these studies people complete different tasks or are exposed to different images, to trigger certain emotions or emotional self-control.

Studies have found one area that is particularly associated with emotion, the amygdala. It has been found to be essential in order to feel a range of emotions including fear and

aggression. It is also constantly scanning the environment for potential dangers or threats to our goals. When the amygdala becomes activated in response to a potential threat, nerve cells within it send impulses to other areas of the brain, such as the hypothalamus.

The amygdala. *Shutterstock*

The hypothalamus controls the release of stress hormones like cortisol adrenaline and noradrenaline, which have huge impacts on your body, such as the fight or flight response. Often, when the amydala triggers the hypothalamus it also uses its control to release neurotransmitters such as acetylcholine in the brain, to make it more alert. Alongside the stress hormones, the amydala then sends impulses to the body to activate the sympathetic nervous system, which increases processes such as respiration and heartrate.

The hypothalamus. *Shutterstock*

This can prepare us for actions needed to deal with threats at the slightest hint of danger. It prepares our muscles and keeps us awake and focused, ready to flee or fight. While this very rapid process is activating, the prefrontal cortex (PFC, located just behind and above your eyes) and the hippocampus are activated by their connections to the amydala.

The PFC and hippocampus begin a much slower and deeper investigation than the amygdala. Depending on the outcome of this analysis, the initial stress response is inhibited (if it was a false alarm) or further developed into the emotions we are more familiar with like sadness, anxiety, anger, guilt, shame, fear and disgust. These emotions serve evolutionary roles to facilitate responses to difficult situations. This could be when escaping from a dangerous animal or seizing an opportunity to kill an injured predator.

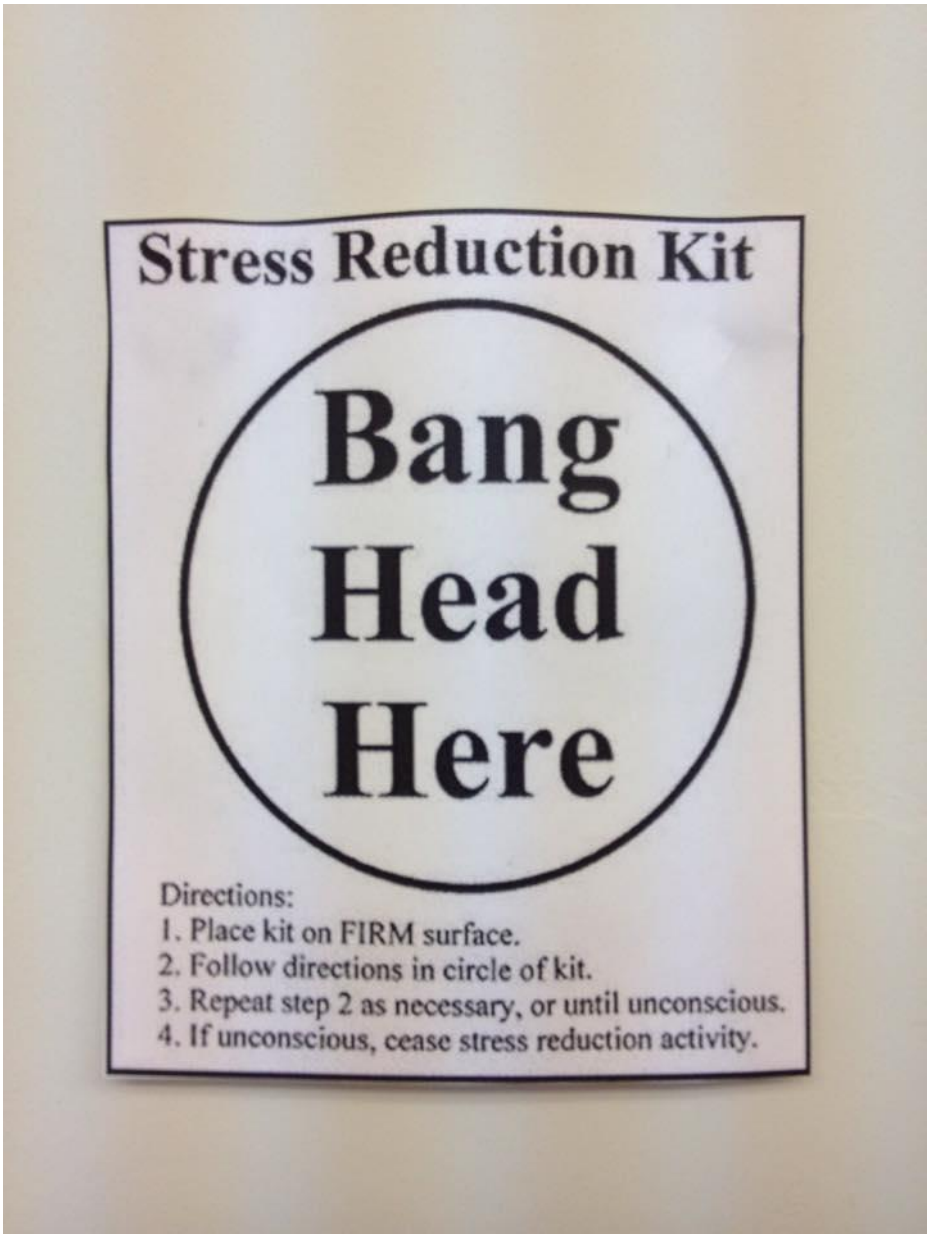
Information Day 2

What are emotions and how do they work?

So, yesterday we looked at how the brain develops emotions in the brain and the processes involved. These complex emotional processes involving the PFC, amygdala and hippocampus, among other associated areas developed as an adaptive evolutionary response. Our more emotional ancestors were more able to adapt to the environment and protect their offspring than their less emotional counterparts. This led to a very meaningful advantage in the evolutionary process selecting for human beings that react emotionally to important events. While these emotions were perfect for an ancient world's predators and threats, they can appear quite useless when you have just lost several hours of saved work. For example, in that situation the most adaptive response would be to stay calm and redo it in the knowledge that it will be easier this time around. However, it is much more tempting to throw the computer out of the window and complain to a friend. Unfortunately for us, neither the destruction of the threat (the computer) nor needing sympathy from others will get that work done.

This group of processes, both behind the development of emotions and the emotions themselves are designed to help and protect us. However, as this system has not caught up with modern day life the way it assesses situations may prompt emotions that can drive us to behave in unhelpful ways. It is good to recognise that these emotions are doing their best to help us but that they are often deeply outdated. So it is always wise to critically question what behaviours your emotions are driving you to do and if that action would actually help you. Alternatively, you could wait for evolution to catch up if you have a few million years to spare.

In the short term, stress is perfectly healthy and gives us a wide range of improvements still relevant in the modern world, such as the extra focus we get before a deadline. However, long term high stress levels have very different and negative effects on the body. This can result in a mixture of issues, whether it is physical such as, muscle tension, insomnia, headaches or more mental health issues, such as depression, anxiety and burnout.



However, it is not all bad news! Our emotional processes have been developed over millions of years of evolution and what they do, they do very effectively. This means that when we learn how to work with our emotions, they can be amazing allies. Instead of treating them as a part of you, try treating them as advisors, which is their primal role. For example, sadness is trying to tell us that perhaps with our current efforts, we will not reach an important goal. Disgust is telling us that this is something we need to stay away from to stay safe. Anger is telling us to assert ourselves and defend our goals. On the other end of the spectrum, happiness is also an excellent reward motivator to keep us chasing goals important to us.

Remember to question your emotions and try to understand what they are driving you to do, and is it helpful?

Information day 3

What is catastrophising and magnification?

This app is focussed on two objectives, improving your understanding of emotions and using that knowledge to better regulate those emotions. One particular way people respond to a negative emotion is to catastrophise. Catastrophising is often an irrational belief that something is much worse than it actually is. Perhaps after an event has happened you have realised the horrors you expected never happened, maybe it wasn't pleasant but felt like you had made a mountain out of a molehill. In these cases the catastrophising can feel a lot worse than the event itself. This is a reaction we are all prone to and typically takes one of two forms.

The first type is situation based, for example if you get an email informing you that you did not get a job you were hoping for, you may believe that no matter how hard you try you will never find success and that you are too stupid to be worth hiring. Yet this might be a one off or perhaps it was incredibly competitive so you just need to keep trying. Or perhaps you made a fool out of yourself in front of co-workers and now you think they will all hate you and laugh at you. This form of catastrophising takes a negative situation and magnifies that negativity.

The other type of catastrophising is centred around future events. These are usually based around thoughts and beliefs such as, I am going to mess up eventually and my other half will leave me or that everything is bound to go wrong. If you are not careful this belief in something going wrong in the future can also make it more likely to happen.

Catastrophising has all sorts of negative effects on us. Most noticeably, it can cause more suffering than the event or fear in question. However, its impact goes more deeply than this. Catastrophising can make you give up without even trying; it amplifies risks and fear, which in turn can limit the opportunities you take in personal and professional life. It can create an outlook on life based upon disappointment, under-appreciation and failure. It can be reinforced with confirmation bias, where you only remember events that confirm these catastrophic beliefs and lead to self-fulfilling prophecies. Much as in the short term, catastrophising can spiral negative expectations out of control. If it becomes a habit it can have similar long term effects on your life.

Defeating Catastrophising!

The previous information emphasised how significant catastrophising can be. The first step towards defeating catastrophic thoughts and beliefs are to recognise when you are doing it. This can be hard at times, and will take deliberate effort, especially in the height of the moment. However, the ability to label your own emotions and behaviours is the vital first step to retaking control. Once you can spot your catastrophising, you can take steps to evaluate the situation to work out the best way to achieve what you want. This app will teach you techniques to retake that control and work to take those unhelpful fears out of your life.

Good luck!

CONTROL TASKS

Task 1

Please download Drop 7 for free from the App Store and play for at least 10-15 minutes. Please also play this for a few minutes each following day until your next task unlocks!

Don’t know if you can link to it from within the app, if so it is this one https://itunes.apple.com/us/app/drop7/id425242132?mt=8

Task 2

Please download Crossey Road for free from the App Store and play this game and/or the previous game for at least 10-15 minutes. Please also play this for a few minutes each following day until your next task unlocks!

Don’t know if you can link to it from within the app, if so it is this one

https://itunes.apple.com/us/app/crossy-road-endless-arcade/id924373886?mt=8

Task 3

Please download Super Stickman Golf 2 for free from the App Store and play this game and/or previous games for at least 10-15 minutes. Please also play this for a few minutes each following day until your next task unlocks!

Don't know if you can link to it from within the app, if so it is this one https://itunes.apple.com/us/app/super-stickman-golf-2/id585259203?mt=8

Task 4

Please download Bejewelled Blitz for free from the App Store and play this game and/or previous games for at least 10-15 minutes. Please also play this for a few minutes until you reach the end of the experiment!

Don't know if you can link to it from within the app, if so it is this one https://itunes.apple.com/us/app/bejeweled-blitz/id469960709?mt=8

EXPERIMENTAL TASKS

Developing Goals

How would you like to benefit from this app?

There are two primary ways we can phrase goals we set for ourselves, which are called approach and avoidance goals. Avoidance goals are directed towards avoiding an undesirable outcome (to avoid failure); where as an approach goal is directed to a positive outcome (to do your best). Research has shown that avoidance goals are related to less satisfaction with progress, decreased self-esteem and feeling less capable of completing goals.

This app has been designed to help reduce the tendencies we can have to see the worst in situations. However, you may have noticed that this is an avoidance goal! So, to come up with a good approach goal take a minute or two to imagine what you want to be like because of this app. Visualise what might be different about you if you did reduce the number of times you believed the worst might happen. Remember, an approach goal is something you wish to attain or become, it is positive.

I would like to be: WRITE GOAL HERE

Now that you have come up with this goal, you can set up a daily reminder, which will help you keep your goal in mind for the following two weeks. We recommend that you set this notification for about a few hours after you generally wake up.

Time: default 11am

Acceptance

Welcome back! So in the last task we learnt about setting the most effective goals for what we want to achieve. Now let's take another step towards achieving that goal. When we find ourselves catastrophising over situations, we can easily lose touch with the moment and get lost in catastrophic thoughts and beliefs. These thoughts and fears can also generate unpleasant emotions.

It is good to remember that being prepared for or preventing a worst case scenario is a very useful life skill, but when that skill damages your mood or your ability to cope, it has become unhelpful. Yet as a learnt skill it cannot be adjusted very easily through willpower alone, so unlike a robot you cannot just turn it off. Fortunately, this is not the only way to deal with catastrophising.

So this technique is aimed at trying to regain control from your catastrophic thoughts and resulting unpleasant feelings to reduce the impact they will have on your life. For this exercise we would like you to take two minutes to do a short visualisation.

NEXT PAGE

First, just make sure that you are sitting or lying down comfortably. When you do this, you may close your eyes if you wish, although it is not necessary. Do not try to empty your mind, just sit or lay still and just be aware of your breathing in and out. Thoughts will automatically come into your head and that is alright. When a thought comes into your head, whether it is 'I really need to be getting on with something' or 'well doing this is weird' just let the thought be. Don't develop on it or focus on it, just let it sit there. Many people find this easier to do by imagining their mind is a great big blue sky. Then the random thoughts are small clouds on that blue sky. There is nothing wrong with those clouds, they aren't storm clouds or rainclouds, just small white and puffy and

just watch them drift on by. Once the thought has faded, return to your breathing and the clear sky, until the next thought comes up. This can seem difficult at first, remember having thoughts constantly popping up is no bad thing, just try not to focus on them or develop them.

2 MINUTE TIMER BUTTON

NEXT PAGE

Now, why did I ask you to do that?

Your task over the remaining 2 weeks is to try and use this technique when you feel yourself falling into catastrophic thinking. This does not mean you have to suddenly pause for 2 minutes mid conversation or even find a secluded place to sit down and carry out this visualisation (unless you want to, in which case go for it!). It is simply catching yourself thinking the worst and choosing not to develop it. Don't try to supress it; just watch it like a puffy cloud on a warm summer's day. Sometimes, this may only take a couple of seconds or sometimes longer. But the key is that you do not need to develop or even believe these unpleasant thoughts if you don't think they are helpful.

Remember your feelings

In the two minute visualisation task you may not have encountered any strong negative feelings, mostly thoughts popping into your head. When using this technique during a situation that does feel negative, it can seem a lot harder. It is much easier to tolerate a negative thought than a negative emotion. However, treat your emotions in the same way, just as thoughts are clouds you can watch from a distance, so are emotions. You don't need to suppress or avoid the negative emotion, just let it be. Don't obsess over it, just watch it floating by and when you are ready, direct your attention somewhere helpful.

Good luck and remember you can practice this visualisation task as many times as you would like!

Using Probabilities

Hello again! So in the last task we looked at being more mindful and accepting of our feelings when we imagine the worst of a situation. We learnt to be able to sit with negative thoughts and emotions and not to engage with them. This can be difficult and don't worry if you still don't feel proficient in it yet, you have plenty of time. Now we are taking the next step to build on what you are already practicing.

So, as we now know, catastrophising or magnification, is the tendency to imagine the worst or most upsetting consequences for any given situation. Often, the likelihood of these negative events happening is greatly exaggerated. Sometimes this can seem obvious with hindsight, but in the moment it can be impossible to see.

Example: You are worried you are going to have a terrible first date at a good restaurant. You will be late, make an idiot of yourself and you will have nothing to talk about and there will be lots of awkward silences.

Perhaps you might think that this has a 50% chance of happening.

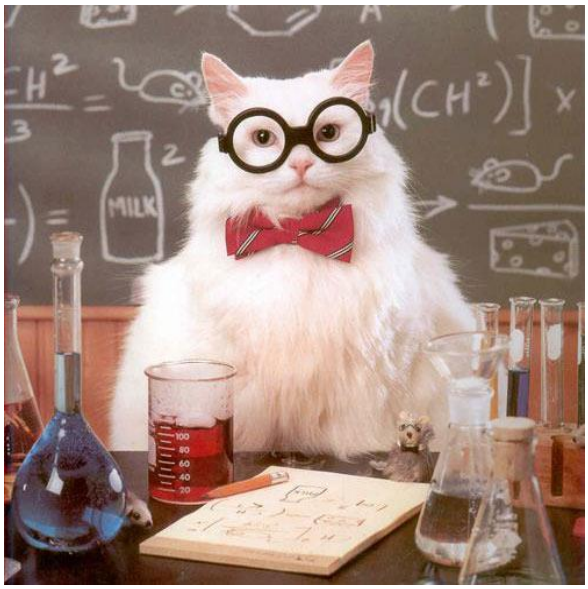
We can actually use some maths to estimate the probability of that happening. First, we need to list the conditions required for this event to happen and what chance they have of occurring. Also let's be generous with the chances, so we get the highest chance of these bad things happening.

- That you will be late. Let's say 20% chance.
- That you will say something really stupid. Maybe 30% chance? No one's perfect!
- That there will be really awkward silences. Perhaps 20% chance.

Therefore, if this is what is required for the first date to be terrible we do the maths! This just involves multiplying the percentages, so:

.2 x .3 x .2 = .012

This means that the probability of these three events occurring is only 1.2%! This shows how much catastrophising can rely on completely misjudging probabilities.



So next time you find yourself thinking the worst about an event, try to use the last task to distance yourself from the thoughts and emotions. Then, try to break down that event into the components that would be required for it to happen. Whether it is forgetting if you left your door unlocked and everything will be stolen (requiring you to have left the door unlocked, someone actually selecting your place for a break in and them being nearby at the time).

Still, don’t let this get in the way of problem solving. Remember to lock your door and date forgiving people!

Good luck!

What if?

Welcome back! This is the last task of the two week app, which will continue to build on the skills you have been learning and practicing. You have been learning how to sit with and tolerate unpleasant thoughts and emotions and you have been shown how to

calculate the probabilities of the worst happening, in order to bring some perspective into those difficult moments.

Today we will be looking at what if the worst did happen? When we catastrophise or magnify our perceived problems we are often not thinking clearly and emotions can make negative consequences seem unassailable. People often find that just taking the time to think through the consequences in a carefully structured way can make them seem much less scary. Let's take an example:

You are worried that you will completely run out of money for your degree, you will have to drop out and you will get stuck forever in a really boring job.

So now we simply ask what if that did happen?

Feared outcome	What if?	What would you do?
I can't afford to finish my degree and as a result get stuck in a dead end job?	What if I cannot afford to finish my degree?	-Get a part time job -Contact the university for potential help -Find cheaper accommodation
	What if I get stuck in a dead end job?	- Use the money from the full time job to complete my degree through the open university - Keep applying for more interesting jobs - Use the work experience to my advantage once I get the degree

This structure serves dual purposes, as well as reducing the negative impact of potentially scary events, it helps give you a plan of what to do if "the worst" does happen. This can help us make sensible decisions in the moment and ensures that we always have a plan B and a softer landing if it does go wrong. Now have a go yourself, using a catastrophic thought you have realised yourself having.

Feared outcome	What if?	What would you do?

Now, when you come across other catastrophic thoughts, take a few moments and a piece of paper to jot down this little table. Give yourself a strong plan so if what you fear does happen, it is not the worst thing ever and you have a strong plan. It might be tempting to just do this in your head, but the release of having it written down on paper makes a significant difference!

Best of luck and keep up the good work!

9.50 Appendix 51

Final CQ

People react differently to all sorts of situations. These questions ask you about the kind of thoughts you have when you experience a situation that might seem difficult or challenging in some way. Please read each of the questions below, which describe different situations and a particular kind of response. Indicate the extent to which you respond in that way, ranging from never (0) to all of the time (10)

1. When you come across a situation that you see as a threat to your safety, to what extent do you generally assume the worst? *E.g., I'm going to crash on the way home and die, I'm going to get mugged or this plane is going to crash.*
2. When you come across a situation that you see as a risk to yourself and others, to what extent do you generally assume the worst? *E.g., I am going to have an incurable disease, my pet is never going to recover or when you hear someone close to you has been hospitalised.*
3. When you come across a situation where you fear your organisational skills may let you down, to what extent do you generally assume the worst? *E.g., realising a deadline the night before, losing your keys or being late because you missed a train.*
4. When you come across a situation that involves confrontation with others, to what extent do you generally assume the worst? *E.g., an argument with a significant other, boss or friend.*
5. When you come across a situation that you see as negative to your finances, to what extent do you generally assume the worst? *E.g., I am never going to be able to afford to fix that, there is no way I'll be able to support myself or someone has stolen all of my money.*
6. When you come across an issue between yourself and others, to what extent do you generally assume the worst? *E.g., a partner saying 'we need to talk', that you have offended your friends or when asking for help*
7. When you come across a social situation that you see as negative, to what extent do you generally assume the worst? *E.g., everyone is going to hate me, I am going to be alone forever or no-one cares about me.*
8. When you come across a situation that you see as negative, to what extent do you tend to ask dramatic questions about yourself? *E.g., why is this always happening to me? Why am I so useless? Or what did I ever do to deserve this*
9. When you come across a situation that you see as negative, to what extent do you generally criticise yourself and assume the worst? *E.g., It went wrong so it must be all my fault, I'm such a total idiot or I don't deserve anything good to happen to me.*

9.51 Appendix 52

School of Psychology and Clinical
Language Sciences
University of Reading
Whiteknights
Reading RG6 6AL

Consent Form

Initials

1. I have read and understood the accompanying Information Sheet relating to the project on mood and mobile phone use. ☐

2. I have had explained to me the purposes of the project and what will be required of me, and any questions I have had have been answered to my satisfaction. I agree to the arrangements described in the Information Sheet in so far as they relate to my participation. ☐

3. I understand that participation is entirely voluntary and that I have the right to withdraw from the project any time, and that this will be without detriment. ☐

4. This project has been reviewed by the University Research Ethics Committee and has been given a favourable ethical opinion for conduct. ☐

5. I have received a copy of this Consent Form and of the accompanying Information Sheet. ☐

Name:
……

Date of birth:
……

Signed:
……

Date:
……

University of Reading
School of Psychology and Cli
Language Scie
University of Rea
Whitekni
Reading RG6

9.52 Appendix 53

Information sheet

Mood and mobile phone use

Supervisors:	Email:	Phone:
Dr Craig Steel	c.steel@reading.ac.uk	0118 378 7550

Experimenters:

David Angell	D.J.Angell@pgr.reading.ac.uk	0118 378 7937

What is the study about?

This study is investigating links between mood and the use of tasks on mobile phones through an app.

Are there any restrictions on who can take part?

You must be aged 18 or over to participate in this study. You must also own an iPad or iPhone to use the app in the study.

What do I have to do?

First you will have to sign up to the app, which will then be enabled by the experimenter. Following this you will have access to the information on the app. Initially, you will complete some questionnaires, some of which will be repeated daily and others only at certain points during the two week period. Additionally, on certain days tasks will unlock that need to complete on that day at a time suitable for you.

How long will it take?

The study will take approximately two weeks, taking a few minutes each day.

What will happen to my data if I take part?

Your data will be kept confidential and securely stored, and you will only be identifiable by an anonymous number. Information linking that number to your name will be stored securely and separately from the data you provide us.

What if I want to withdraw my consent?

Taking part in this study is completely voluntary; you may withdraw at any time without having to give any reason. Please feel free to ask any questions that you may have about this study at any point.

This application has been reviewed by the University Research Ethics Committee and has been given a favourable ethical opinion for conduct.

9.53 Appendix 54

Debrief Form

Mood and mobile phone use

Project Supervisor: Dr Craig Steel: c.steel@reading.ac.uk

Researcher: David Angell: D.J.Angell@pgr.reading.ac.uk

Thank you very much for taking part in this experiment. This study was investigating the effect of a brief low intensity intervention targeting a specific method we sometimes use to control our emotions, called catastrophising. Catastrophising can be characterised as interpreting a situation that has been perceived as negative with the absolute worst outcomes. Afterwards it can often seem like making mountains out of molehills. This study was designed as a randomised controlled trial between a group with an app dedicated to targeting catastrophising and a control group asked to download and play games for the same time duration as the catastrophising tasks.

Therefore, your data will be used to evaluate how much the intervention improved general mood over the duration of the intervention as well as how it changed catastrophic thinking. Your results will be anonymously compared with those of other participants taking part in the study. If at any point you wish to withdraw your results or ask any questions concerning this investigation please email the project supervisors (contact details above).

The project has been reviewed by the University of Reading research Ethics Committee and has been given favourable ethical opinion for conduct.