

COGNITIVE PROCESSING AND GROWTH FOLLOWING TRAUMA

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Abstract

The possibility of positive psychological change following traumatic life experiences has now been well documented in the literature. This phenomenon is most commonly referred to as posttraumatic growth. Several theoretical models have sought to explain the development of posttraumatic growth, many of which have emphasised the important role of cognitive processing (Calhoun, Cann & Tedeschi, 2010; Tedeschi & Calhoun, 2004a). This thesis sought to further our understanding of the nature of posttraumatic cognitive processing and its association with psychological growth following trauma and adversity. A narrative review of the existing literature on cognitive processing and posttraumatic growth was conducted (Chapter 2) and suggested that cognitive processing might be best understood as comprising *intrusive*, *deliberate* and *ruminative* subtypes. Two cross-sectional studies and one longitudinal study were then conducted to develop and test this conceptualisation using samples of survivors of sexually traumatic experiences (Study 1; $n = 123$), trauma-exposed individuals recruited from trauma-focused websites and support forums (Study 2; $n = 254$), and trauma-exposed students from the University of Nottingham (Study 3; $n = 174$). The influence of these three subtypes of cognitive processing on levels of growth following adversity were also tested using the expressive writing intervention (Study 4; $n = 24$). Taken together, findings from the four studies supported the conceptualisation of cognitive processing as multidimensional, comprising intrusive, deliberate and ruminative subtypes that are differentially associated with posttraumatic growth. Results also provided consistent evidence to suggest that deliberate processing is especially important in the occurrence of growth following trauma and adversity. Unexpectedly, intrusive processing was not found to positively influence posttraumatic growth in the ways hypothesised by existing theoretical models. Implications of these findings with respect to both further research and clinical work with trauma survivors were reviewed in the final chapter.

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Character cannot be developed in ease and quiet. Only through experience of trial and suffering
can the soul be strengthened, vision cleared, ambition inspired, and success achieved.

Helen Keller

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Publications and Conference Presentations

Publications

- Joseph, S., Maltby, J., Stockton, H., Hunt, N., Regel, S., & Wood, A. M. (in press). The Psychological Well-Being – Posttraumatic Changes Questionnaire (PWB-PTCQ): Reliability and validity. *Psychological Trauma: Theory, Research, Practice and Policy*.
- Stockton, H., Hunt, N., & Joseph, S. (2011). Cognitive processing, rumination and posttraumatic growth. *Journal of Traumatic Stress, 24*, 85-92.

Conference Presentations

- Stockton, H., Hunt, N., & Joseph, S. (2010). Assessing narrative development and coherence in essays about trauma. Paper presented at the BPS Qualitative Methods in Psychology Section (QMIP) Conference, University of Nottingham, 25th August 2010.
- Stockton, H., Joseph, S., & Hunt, N. (2010). Expressive writing and posttraumatic growth. Paper presented at the Psychological Approaches to Trauma, Recovery and Growth Conference, University of Nottingham, 1st July 2010

Chapter 1

Positive Psychology and Growth Following Adversity

1.1 Positive Psychology

Positive psychology has been defined as “the study of the conditions and processes that contribute to the flourishing or optimal functioning of people, groups and institutions,” (Gable & Haidt, 2005, p. 104). It aims to discover and promote the factors that allow individuals and communities to thrive. Positive psychologists therefore emphasise the need to recognise and explore positive human functioning and well-being by focusing on what is right with people, not just what is wrong (Seligman & Csikszentmihalyi, 2000). It is an influential movement that has attracted a great deal of attention by prioritising the study of positive experiences and emotions in contrast to psychology’s more traditional focus on weakness and deficiency.

Although the positive psychology movement is often quoted as originating in 1999 with Martin Seligman’s presidential address to the APA’s Annual Convention, it actually has roots that extend as far back as William James’ (1902) writings on *healthy mindedness* (Froh, 2004; Taylor, 2001). Other antecedents include the humanism of psychologists such as Abraham Maslow and Carl Rogers, who were critical of the application of the medical model to psychology and sought to embrace a non-pathologising view of the person, as well as the works of Allport (1961), Jahoda (1958), Jung (1933) and Ryff (1989), amongst others. Accordingly, positive psychology is not a new perspective, but earlier versions were not

unified into a recognised ideology or integrated framework. Thus, Seligman did not ‘invent’ positive psychology as such, but in his role as President of the APA in 1998 and 1999, he drew attention to the importance of studying the positive and sought to unite a diverse and disparate range of research themes into one unified movement. As Linley and Joseph (2004) describe:

“the single most important contribution of positive psychology has been to provide a collective identity – a common voice and language for researchers and practitioners from all persuasions who share an interest in health as well as in sickness – in the fulfilment of potential as well as in the amelioration of pathology,” (p. 4).

Seligman’s presidential address articulated many of the concerns that had long been held about the state of psychology, and clinical psychology in particular. He argued that psychology as a discipline had failed in its mission to make the lives of all people better, highlighting that psychology’s post-WWII alignment with psychiatry had led to an exclusive focus on diagnosing mental disorders and attempting to remedy them. It was explicitly acknowledged that the underlying framework and assumptions of psychology had embraced a disease-oriented model of human functioning which emphasised abnormality and poor adjustment over normality and healthy adjustment.

Even beyond this dominance of the medical model, psychology had become a distorted discipline with an overwhelming focus on the negative aspects of human functioning: in the latter half of the 20th Century, psychology had learnt a great deal about mental illness, racism, violence, prejudice, aggression, anger and low self-esteem but had a lot less to say about character strengths, happiness, fulfilment, hope and the things that make life worth living (Gable & Haidt, 2005). This imbalance was recognised by Maslow in 1954:

"The science of psychology has been far more successful on the negative than on the positive side. It has revealed to us much about man's shortcomings, his illness, his sins, but little about his potentialities, his virtues, his achievable aspirations, or his full psychological height. It is as if psychology had voluntarily restricted itself to only half its rightful jurisdiction, and that the darker, meaner half." (Maslow, 1954, p. 354).

Seligman sought to correct this imbalance by reminding the field that the science of psychology is not just the study of illness, weakness, and disease; it is also the study of strengths and well-being. Treatment is not just fixing what is wrong, but nurturing what is right (Seligman, 2002). Through positive psychology, Seligman urged psychologists to explore the positive features that make life worth living and that make people stronger and more productive. Following his address, positive psychological research began to flourish in two ways: first, existing positive psychological research activities that were not previously recognised or understood as such now became more visible, with positive psychology providing a conceptual home and common language for previously isolated but related lines of inquiry (Linley & Joseph, 2004). Secondly, researchers were inspired to look at existing issues in new, more positive ways, as well as turning their attention to previously unexplored topics that can be considered the fundamental factors that make life worth living. Positive psychology research topics now include life satisfaction, gratitude, forgiveness, hope, optimism, wisdom, inspiration, curiosity, love and laughter. The explosion of interest in this area demonstrates that positive psychology has grown from a call for psychologists to expand their research domain into a multi-faceted movement with impressive momentum (Seligman, Steen, Park & Peterson, 2005).

1.1.1 Positive Clinical Psychology and the Illness Ideology

Positive clinical psychology rejects the illness model as the most appropriate way to conceptualise the psychologically problematic aspects of life (Maddux, Snyder & Lopez, 2004), because the illness model is a socially constructed ideology and therefore a product of current historical and cultural understandings rather than objectively 'true.' Thus, distinctions between psychological illness and wellness are not natural distinctions that can be discovered and described, but are abstract ideas defined by the cultural, personal and professional values of that time: Diagnostic and Statistical Manual (DSM) diagnoses are not scientifically verifiable facts but social constructs – heuristic social artefacts, in the same way that our social constructions of race, gender, social class and sexual orientation are (Maddux, 2008). Thus, imitating the medical model and attempting to classify mental disorders is likely to impede rather than facilitate our understanding of these psychological states.

Positive clinical psychology therefore outlines the following main assumptions, as highlighted by Maddux et al. (2004):

1. Positive psychology is as concerned with everyday problems in living as it is with the more extreme variants that have previously been referred to as *psychopathology*. Similarly, understanding and enhancing subjective and psychological well-being is seen to be as important as alleviating distress and reducing maladaptive functioning.
2. Positive psychology rejects dichotomies between normality and abnormality, wellness and illness, clinical and non-clinical problems, stipulating that they are not separate or distinct entities but lie along a continuum of human functioning. Thus, clinical problems are considered to differ in degree, not in kind, from non-clinical problems and are therefore extreme variants of normal psychological phenomena rather than qualitatively different.
3. Psychological disorders are not analogous to biological or medical diseases and are not located inside the individual. Instead, they reflect problems in the individual's interactions

with their environment and are therefore located within these interactions with other people and the larger culture.

4. The role of the positive psychologist is to identify human strengths and promote positive psychological functioning. The medical language of clinical psychology is rejected, therefore people who seek assistance are clients or students rather than patients; the professionals are teachers, counsellors, consultants or coaches rather than clinicians or doctors, and they use educational, relational, social and even political techniques rather than medical interventions.

These assumptions provide a way of conceptualising psychological functioning that gives at least as much emphasis to understanding and facilitating psychological well-being as to alleviating distress (Maddux, 2008). In that sense, positive clinical psychology can be seen as a drive to restore *both* of the originally stated aims of clinical psychology: “to reduce psychological distress *and* to enhance and promote psychological well-being,” (Division of Clinical Psychology, 2001, p. 2, emphasis added).

1.1.2 Positive Psychology and its Critics

Despite its success in attracting attention to previously unexplored areas of positive human functioning, positive psychology has also attracted considerable criticism. Many regard the study of positive human functioning as frivolous and unnecessary, asserting that psychology should be focusing on the more important issues of alleviating distress and dysfunction. Yet the point that this criticism misses is that certain aspects of positive human functioning may serve to protect against or alleviate distress and dysfunction (e.g. Sin & Lyubomirsky, 2009). Furthermore, positive psychology is not solely concerned with the hedonistic pursuit of pleasure, but with the eudemonic drive for meaning and purpose in life (Miller, 2008).

Others depict positive psychology as a ‘basic science’ that has simply catalogued and described psychological strengths as opposed to making significant scientific contributions (Steger, 2007). There is also an assumption that positive psychological research is not as rigorous as ‘psychology as usual.’ This assumption is incorrect: one of the distinguishing features of positive psychology is its insistence that research should follow the same standards of research quality as traditional scientific investigations (Seligman & Csikszentmihalyi, 2000). Thus, for the most part, positive psychologists understand their approach as a part of mainstream social science that seeks to uncover principles and processes that can be used to promote psychological well-being.

Positive psychology is also often confused with positive thinking and its critics are quick to tarnish it as naïve, ‘happyology’ and a Pollyanna view of the world which oversimplifies the human condition. The suggestion that positive psychology claims to have found “a magic elixir of health and well-being,” (Lazarus, 2003 p. 93) by encouraging people to think positively and abandon their preoccupation with the stressful side of life is wholly inaccurate and represents a deep misunderstanding of the movement. Positive psychologists do not dispute or deny the distressing aspects of life: they fully acknowledge the existence of human suffering and dysfunction. Nor do they view these aspects of experience through rose-tinted glasses or suggest that positive thinking is the answer (Gable & Haidt, 2005). They also do not advocate the study of *only* the positive aspects of human functioning at the expense of studying the negative aspects; this would only serve to maintain the sense of imbalance. They simply recognise that if psychology is to be a comprehensive discipline, it must study the whole spectrum of human experience. Positive psychologists also share the belief that psychology could, and *should*, be used to help people experience a better quality of life (Diener, 2003).

The philosophical underpinning of positive psychology therefore provides the conceptual framework for the research presented in this thesis, which focuses on the experience of psychological growth following traumatic life events. As such, positive functioning is understood as more than an absence of distress or disorder, but as a qualitatively distinct aspect of psychological well-being. Likewise, the medical model is rejected as the most appropriate way to conceptualise psychological adjustment. As with other research in positive psychology, the research conducted within this thesis is empirical in nature, striving for the qualities of replicability and objectivity outlined by Seligman and Csikszentmihalyi (2000) as underlying the positive psychology approach.

1.2 Traumatic Life Events

This thesis investigates the impact of traumatic life events on psychological well-being. Whilst definitions of what constitutes trauma vary considerably and have evolved over the years, a traumatic life event is generally considered to be a single experience or an enduring or repeated event that is emotionally overwhelming and causes significant distress. The term ‘trauma’ originates from the Greek word meaning to ‘wound’ or ‘injure’, with psychological traumas largely understood as constituting a painful emotional experience that causes great psychological injury.

McCann and Pearlman (1990) suggest that an experience can be considered traumatic if it “(1) is sudden, unexpected or non-normative, (2) exceeds the individual’s perceived ability to meet its demands, and (3) disrupts the individual’s frame of reference and other central psychological needs and related schemas,” (p. 10). Events that have typically been considered to qualify as traumatic stressors include military combat, sexual assault, violent physical assault, kidnapping, torture, being a hostage, prisoner of war or concentration camp

victim, experiencing a natural or man-made disaster, severe motor vehicle accident, terrorist attack, or being diagnosed with a life-threatening illness.

Within the posttraumatic stress disorder (PTSD) literature, the various versions of the *Diagnostic and Statistical Manual of Mental Disorders (DSM, American Psychiatric Association [APA])* have sought to provide comprehensive definitions of traumatic stressors. However, finding agreed-upon criteria has been problematic and each new edition has had to revise the definition of trauma provided by the edition before. One of the many difficulties of defining traumatic events is that too broad a definition may be too inclusive and can blur the boundaries between traumatic stressors and ordinary stressors of everyday life. This risks rendering the existing trauma literature irrelevant because it is based on a less liberal understanding of trauma and therefore will not generalise to more inclusive definitions. Yet on the other hand, being overly restrictive about what should be considered traumatic may serve to deny individuals' subjective experience and invalidate their distress.

In line with the latter concern, it has been suggested that rather than attempting to objectively define traumas they should be defined subjectively or ideographically, where the meaning of the event for the individual is prioritised. Thus, events that would not necessarily meet the DSM criteria of traumatic stressors may be considered traumatic if the individual experiences it as such. This position is supported by evidence to suggest that a variety of non-threatening life events that would not qualify as traumatic in terms of the DSM-IV definition, such as divorce, financial difficulties (Scott & Stradling, 1994), spousal affair (Helzer, Robins & McEvoy, 1987), caring for a chronically ill loved one (Scott & Stradling, 1994), bereavement (Gold, Marx, Soler-Baillo & Sloan, 2005) and loss of cattle due to foot and mouth disease (Olf, Koeter, Van Haaften, Kersten & Gersons, 2005) can be experienced as a

major life trauma by the individual. Consequently, the term 'trauma' is not seen to refer to the event itself, but the nature of the response that the event causes (Busfield, 1992).

Within the posttraumatic growth literature, the use of the term 'trauma' tends to be broader and more inclusive than that provided in the DSM. Thus, research in this area has studied posttraumatic growth after events such as cancer, bereavement, and illnesses such as rheumatoid arthritis or lupus. This thesis also uses a relatively broad definition of trauma by expanding the DSM conceptualisation to include events that are perceived to be traumatic by the participant. It is not the intention to be overly inclusive but the boundaries between stressful life events and traumatic stressors are not clear cut and this thesis makes no attempt to draw that line. It is inevitable that definitions of trauma will be fraught with assumptions about what is and is not regarded as traumatic, but the goal of this thesis is to understand the impact of life experiences that are perceived by the individual to present a significant emotional challenge to their psychological well being. As such, the individuals that took part in the research contained within this thesis were self-identified trauma survivors who volunteered for participation based on their perception of having experienced a traumatic life event.

1.3 Positive Psychological Approaches to Trauma

The dominance of the illness ideology and the purported value of psychiatric diagnoses for any type of mental distress following trauma has meant that research in the trauma literature has largely focused on posttraumatic stress disorder and its psychobiology. Whilst this focus on PTSD has created a substantial and indeed valuable body of research, it has had the side effect of creating an unbalanced research field and a strengthening of the perception that any form of distress following trauma is indicative of disorder. Positive

psychologists working in the field of trauma have sought to replace this medically-oriented perspective on posttraumatic stress with a more humanistic and person-centred understanding that recognises that the struggle with traumatic life events can serve as a springboard to psychological growth (Joseph, 2009).

Positive psychological approaches to trauma have highlighted that focusing solely on the negative consequences of traumatic experiences can lead to a biased and incomplete understanding of posttraumatic reactions, since evidence from epidemiological studies has demonstrated that only a small minority of trauma survivors - approximately 8% - actually go on to develop PTSD (Kessler, Sonnega, Bromet, Hughes & Nelson, 1995). They also argue that conceptualising positive outcomes as the absence of negative outcomes does not accurately reflect the quality of positive change and assert that healthy adjustment following trauma is more than an absence of PTSD (Calhoun & Tedeschi, 1999). The increasing popularity of the positive psychology movement has provided fertile ground for researchers to broaden the focus from the negative effects of trauma to the potential for positive outcomes and psychological well-being (Calhoun & Tedeschi, 1991, 1999). This more comprehensive focus is not designed to deny that people suffer from psychological distress following trauma, but questions how appropriate it is to label that distress as 'disorder', prompting researchers to consider other outcomes as equally worthy of study. This broader empirical attention brings a welcome relief from the increasingly prevalent assumption that emotional disorder is an inevitable response to adversity, with popular culture readily embracing the notion that exposure to trauma always results in mental illness (Bowman & Yehuda, 2004).

Positive change following adversity is not a new concept. The notion that people grow, develop or change following suffering has been a prominent theme throughout human history and has long been recognised in philosophy, literature and religion (Linley, 2003; Tedeschi & Calhoun, 1995). Within the clinical literature, the existential writings of Frankl (1963), Caplan (1964), Finkel (1975), Yalom (1980) and others describe trauma as a life transition and discuss how facing one's mortality can result in positive changes in perspective and priorities (Barakat, Alderfer & Kazak, 2006). Yet it is only recently that psychologists have begun to study positive change following trauma systematically. Research in this area continues to proliferate and the last few years in particular have seen exciting developments in research into this phenomenon (Park & Helgeson, 2006).

1.3.1 Posttraumatic Growth

The term posttraumatic growth has been used to describe profound positive psychological changes experienced following trauma that “propel the individual to a higher level of functioning than that which existed prior to the event,” (Linley & Joseph, 2004, p.11). Implicit in this conceptualisation is that growth is more than just survival, resilience, or a return to baseline functioning (Linley & Joseph, 2005). It implies a quality of transformation that represents changes which enable the survivor to go beyond previous levels of adaptation, psychological functioning or life awareness (Tedeschi & Calhoun, 2004a). Individuals experiencing growth use their struggle with trauma as an opportunity for improvement and personal development, enabling them to find new meaning and purpose in their lives (Smith & Cook, 2004; Zoellner & Maercker, 2006).

The positive changes that have been observed following trauma and adversity have been variously referred to as adversarial growth (Linley & Joseph, 2004), benefit finding

(Affleck & Tennen, 1996), discovery of meaning (Bower, Kemeny, Taylor & Fahey, 1998), flourishing (Ryff & Singer, 1998), perceived benefits (McMillen & Fisher, 1998), positive re-interpretation (Scheier, Weintraub & Carver, 1986), posttraumatic growth (Tedeschi & Calhoun, 1995), stress-related growth (Park, Cohen & Murch, 1996), thriving (O'Leary & Ickovics, 1995), and transformational coping (Aldwin, 1994). While the terminology used denotes some subtle conceptual differences, the terms all maintain a common theme: that growth is both a process and an outcome whereby an individual attains and maintains perceived positive outcomes that are directly attributed to surviving a severe stress experience (Siegel & Schrimshaw, 2000).

The term posttraumatic growth is used in this thesis because it is favoured by most researchers in this area and most accurately captures the essential features of the phenomenon; namely, that it occurs following an extreme crisis or major trauma rather than everyday stresses or hassles; that it is a veridical outcome rather than an illusion or coping mechanism; and that it arises following a significant threat to or fundamental shattering of deeply held beliefs and assumptions which terms such as *thriving* and *flourishing* do not signify (Tedeschi & Calhoun, 2004b). However, some have argued that using the term 'posttraumatic' is problematic because it may contribute to the drawing of automatic parallels with posttraumatic stress (Joseph & Linley, 2008b). These unspoken associations might imply that posttraumatic growth is the 'opposite' of PTSD, with each representing a separate end of a continuum rather than being seen as integrative processes that can coexist (Linley & Joseph, 2004).

Whilst the relationship between the constructs of PTSD and posttraumatic growth is complex, broadly speaking they can be seen to represent two mutually exclusive paradigms:

the medical model and humanistic psychology (Joseph & Wood, 2010). Thus, the posttraumatic growth literature adopts the meta-theoretical perspective of the person-centred approach that people are intrinsically motivated towards growth, well-being and optimal functioning. This is in contrast to the meta-theoretical perspective of the medical model seen in clinical psychology and the PTSD literature (Joseph, 2006). From the humanistic perspective, posttraumatic growth is not an 'added extra' or separate aspect of functioning to PTSD, but is a continuous dimension of well-being that represents an alternative way of conceptualising psychological functioning following trauma (Joseph & Linley, 2006). As such, the concept of growth can be seen as an epistemological position that replaces PTSD by conceptualising it as indicative of emotional processing rather than disorder or impairment (Joseph & Wood, 2010).

1.3.2 Domains of Growth

Empirical research has identified three main domains of growth: changes in self-perception; changes in interpersonal relationships; and changes in philosophy of life (e.g. Tedeschi & Calhoun, 1995; Turner & Cox, 2004; Woodward & Joseph, 2003). Growth following adversity can manifest itself in many ways, so all three domains of change may not necessarily be experienced by each individual.

1.3.2.1 Changes in self-perception. This domain refers to the perception of positive personal change and a re-defined sense of self. Trauma survivors often report that they feel they have 'become a better person' through the development of personal attributes such as greater patience, tolerance, empathy, sensitivity and courage (Chun & Lee, 2008). This domain of change also includes an increased sense of resilience, strength and wisdom, and a new found confidence in the capacity to deal with future difficult experiences. Many

survivors report feeling that “If I can survive this, I can handle anything,” (Aldwin, Levenson & Spiro, 1994). This increase in feelings of personal strength is often paradoxically coupled with a greater understanding and acceptance of personal vulnerabilities and limitations, and recognition of the preciousness and fragility of life. It is often the case that the experience of trauma reminds individuals that they are vulnerable, but the way in which they cope in the aftermath can simultaneously enable them to feel resilient (Calhoun & Tedeschi, 1999).

1.3.2.2 Changes in interpersonal relationships. This domain of change reflects enhanced relationships with others, where individuals experience a sense of increased intimacy and closeness with their friends and family (Calhoun & Tedeschi, 1999). People frequently report becoming closer to their spouses following traumatic events such as bereavement (e.g. Ponzetti, 1992), heart attack (Laerum, Johnsen, Smith & Larsen, 1987), and being taken hostage (Sank, 1979). This deepening of relationships is closely tied to trauma survivor’s reports of an increased willingness to express their emotions and more freedom in self-disclosure, coupled with an acceptance of needing others and knowing that people can be relied upon in times of trouble. Commonly reported changes also include feeling more compassionate and altruistic towards others, particularly those who are vulnerable or have experienced similar events. This heightened sensitivity to the suffering of others can prompt a desire to help other people and in some cases can instigate radical life changes in the name of altruism.

1.3.2.3 Changes in life philosophy. This domain of change corresponds with changes regarding fundamental questions about life and its meaning, as well as a greater appreciation of ‘the smaller things in life,’ a shift in life priorities, and renegotiation of what really matters. For some trauma survivors, their experience of a life-threatening event can initiate

feelings that one has been spared and they must therefore appreciate their second chance whilst living life to the full (Joseph, Williams & Yule, 1993). There may also be a development of new interests, opportunities or paths in life that may not have been available otherwise, such as a change in career or advancing a social cause (e.g. Herman, 1997). This domain may also involve positive changes in spiritual, religious or existential matters and a greater sense of purpose and meaning in life (Calhoun & Tedeschi, 1999).

1.3.3 Initiating Events

Posttraumatic growth has been documented across a wide range of traumatic experiences and stressful life events. These events include assault (Kleim & Ehlers, 2009), bereavement (Calhoun & Tedeschi, 1990; Polatinsky & Esprey, 2000), bone marrow transplant (Curbow et al., 1993; Fromm et al. 1996; Widows et al., 2005), cancer (Bower et al., 2005; Cordova et al., 2001; Manne et al., 2004; Sears et al., 2003), combat (Fontana & Rosenheck, 1994), heart disease (Affleck et al., 1987; Garnefski et al., 2008; Sheikh, 2004), HIV/AIDS (Bower et al., 1998; Littlewood et al., 2008; Milam, 2004; Richards, 2001; Siegel & Schrimshaw, 2000), Multiple Sclerosis (Mohr et al., 1999; Pakenham, 2005), rape (Borja et al., 2006; Burt & Katz, 1987; Frazier & Burnett, 1994; Frazier et al., 2001), spinal cord injury (Chun & Lee, 2008; McMillen & Cook, 2003), terrorism (Davis & McDonald, 2004; Milam et al., 2005; Powell et al., 2003; Vázquez, Hervás & Pérez-Sales, 2006), and transport accidents (Joseph, Williams & Yule, 1993; Rabe et al., 2006; Zoellner et al., 2008).

1.3.4 Prevalence of Growth

Many people that have experienced a wide range of traumatic events are later able to attest to the positive outcomes arising in the aftermath of those events (McMillen, Smith & Fisher, 1997), although prevalence rates of posttraumatic growth vary considerably. In a

review of 39 studies, Linley and Joseph (2004) report that prevalence rates range from 3% for people coping with the loss of a family member (Davis, Nolen-Hoeksema & Larson, 1998), to 98% for women with breast cancer (Weiss, 2002). Despite this vast range, estimates indicate that on average between 40% and 70% of people who experience a traumatic event are later able to report some benefit from the experience (Calhoun & Tedeschi, 1999).

In a longitudinal study of female victims of sexual assault, the majority of survivors reported positive changes even at 2 weeks post-assault, with 80% reporting increased empathy, 46% reporting improvements in family relationships, and 46% reporting a greater appreciation for life (Frazier, Conlon & Glaser, 2001). Sears, Stanton and Danoff-Burg (2003) found that 83% of women in their study reported at least 1 benefit of their breast cancer experience. In a study of posttraumatic growth in women living with HIV/AIDS, Siegel and Schrimshaw (2000) found that 83% reported at least one positive change which they attributed to their illness, with most participants reporting multiple positive changes. McMillen, Smith and Fisher (1997) examined perceived benefit and adjustment one month after three different types of disaster. Their results indicated that survivors of a tornado reported the highest rates of perceived benefit (90%), followed by survivors of a mass shooting (76%), then survivors of a plane crash (55%). McMillan and Cook (2003) reported that 79% of individuals who had a traumatic spinal cord injury reported perceived benefits from the experience.

In sum, there is growing evidence that the majority of survivors of traumatic events are able to report at least some positive changes that they attribute to those events. Tedeschi and Calhoun (2004a, p. 2) go as far as arguing that “reports of growth experiences in the aftermath of traumatic events far outnumber reports of psychiatric disorders.” However,

while posttraumatic growth appears to be fairly common, it is not universal (Calhoun & Tedeschi, 1999). Furthermore, the concept of posttraumatic growth does not negate the potentially severe and chronic psychological difficulties experienced by survivors of trauma (Linley & Joseph, 2002). Trauma is never desirable and growth is not a given outcome. The concept of posttraumatic growth has been misunderstood if it is thought to be suggesting that trauma is a good thing. Rather, it is the struggle in the *aftermath* of the trauma that produces posttraumatic growth, and *not the trauma itself*.

Posttraumatic growth should therefore not be seen as an inevitable outcome of trauma (Tedeschi & Calhoun, 2004b). Wortman (2004) importantly brings to our attention the danger that comes with claiming that posttraumatic growth is prevalent, which may burden survivors with the expectation that they *should* report positive outcomes and may contribute to feelings of failure or inadequacy if they do not. As Cash (2006) highlights, we should not paint a picture that some people fail at trauma and others succeed. Rather, growth should be seen as another aspect of the overall experience of adjusting to trauma (Park & Fenster, 2004), with growth and distress inextricably linked as part of the posttraumatic reaction. Consequently, the occurrence of posttraumatic growth does not necessarily mean less emotional distress (Tedeschi & Calhoun, 2004b).

1.3.5 Variables Associated with Posttraumatic Growth

A number of variables have been found to be related to posttraumatic growth. These include characteristics of the event, pre-trauma personality and socio-demographic characteristics, social support, and cognitive coping processes. Whilst this thesis is primarily concerned with cognitive processes involved in posttraumatic growth, the influence of event-related, personality and socio-demographic characteristics will also be reviewed.

1.3.5.1 Event characteristics. A major disruption or traumatic loss is documented to be necessary for the development of posttraumatic growth. The initiating event must be sufficiently traumatic to ‘shatter’ existing schemas in order to trigger the processes fundamental to growth. Several studies have shown that both *objective* trauma severity (e.g. Maercker, Herrle & Grimm, 1999) and *subjective* trauma severity (e.g. Park et al., 1996) are positively associated with posttraumatic growth. For example Cordova, Cunningham, Carlson and Andrykowski (2001) demonstrated that the extent of perceived life threat posed by having breast cancer was positively associated with posttraumatic growth. Likewise, Fromm, Andrykowski and Hunt (1996) found that bone marrow transplant survivors with a poorer prognosis reported more posttraumatic growth, and Zoellner, Rabe, Karl and Maercker (2008) showed that accident severity, degree of life-threat and subjective reports of injury severity were positively associated with posttraumatic growth in survivors of motor vehicle accidents.

In their review of the literature, Linley and Joseph (2004) concluded that greater levels of perceived threat and harm are associated with increased posttraumatic growth. Similarly, Helgeson, Reynolds and Tomich’s (2006) meta-analysis of 87 benefit-finding studies reported that the objective severity of the event was related to significantly more benefit-finding. However, the relationship between trauma severity and posttraumatic growth is not always linear, with Fontana and Rosenheck (1994) and Schnurr, Rosenberg and Friedman (1993) both reporting a curvilinear relationship between trauma exposure and perceived benefits. These studies showed an inverted-U curve best represented the relationship, such that intermediate rather than high or low levels of trauma exposure produced the highest levels of posttraumatic growth. Calhoun and Tedeschi (2001) also proposed a non-linear but positive relationship between the severity of the trauma and the

degree of growth, such that events must be sufficiently traumatic to instigate growth, but not so extreme that they overwhelm one's ability to cope and impede growth. However, there is no consensus regarding the exact nature of this relationship because findings from previous research remain inconclusive.

1.3.5.2 Individual personality variables. In recent years, personality variables have been increasingly studied in the context of posttraumatic growth (Affleck & Tennen, 1996; Schaefer & Moos, 1998). Tedeschi and Calhoun (1996) found that openness to experience and extraversion, as measured by the NEO Personality Inventory (Costa & McCrae, 1992), were moderately associated with posttraumatic growth, while the remaining Big Five personality dimensions were not. Jaarsma, Pool, Sanderman and Ranchor (2006) found that openness to experience predicted posttraumatic growth scores in a sample of cancer patients, while Val and Linley (2006) found that higher levels of extraversion predicted posttraumatic growth in residents of Madrid following the 2004 train bombings. Similarly, Sheikh (2004) found that extraversion was the only Big Five personality variable that was significantly associated with posttraumatic growth. However, Shakespeare-Finch, Gow and Smith (2005) studied emergency ambulance personnel and found that extraversion, openness to experience, agreeableness and conscientiousness were all significantly correlated with posttraumatic growth. The final finding in terms of personality and posttraumatic growth is that neuroticism is negatively associated with growth (e.g. Evers et al., 2001; Updegraff et al., 2002).

Posttraumatic growth has also been shown to be positively associated with a range of positive personality characteristics including *internal locus of control* (Maercker & Herrle, 2003; Park, Cohen & Murch, 1996; Wollman & Felton, 1983); *sense of coherence*, a concept introduced by Antonovsky (1993) which refers to the sense that the world is comprehensible,

manageable and meaningful (Znoj, 1999); *hardiness* (Waysman, Schwarzwald & Solomon, 2001); *persistent belief in a just world* (Kiecolt-Glaser & Williams, 1987); *self-esteem* (Abriado-Lanza, Guier & Colon, 1998; Joseph et al., 1993; McMillan et al., 1995); *dispositional hope* (Tennen & Affleck, 1998); and *optimism* (Affleck & Tennen, 1996; Curbow, Somerfield, Baker, Wingard & Legro, 1993; Milam et al., 2005; Rini et al., 2004).

1.3.5.3 Socio-demographic characteristics.

1.3.5.3.1 Gender. There have been several studies indicating that women experience more growth than men. For instance, Tedeschi and Calhoun (1996) used the PTGI to study posttraumatic growth in college students and found that women reported significantly higher levels of growth than men. Similarly, Park et al. (1996) studied a college sample using the Stress-Related Growth Scale (SRGS) and also found that females reported more growth than males. In non-student samples, gender differences have also been reported for events such as cancer (Bellizzi, 2004), HIV/AIDS (Milam, 2004), terrorism (Milam et al., 2005), and natural disasters (Jang, 2006), with women reporting more posttraumatic growth than men. However, the evidence on gender is mixed, with other studies reporting either no difference in the rates of posttraumatic growth between men and women (e.g. Ho, Chan & Ho, 2004; Polatinsky & Esprey, 2000; Widows et al., 2005), or the opposite gender relationship (e.g. Hooper, 2003). Helgeson et al.'s (2006) meta-analysis reports a small but significant effect for gender, indicating that females reported marginally more growth than males. In a more recent and comprehensive meta-analysis of 70 studies exploring gender differences in self-reported posttraumatic growth, Vishnevsky, Cann, Calhoun, Tedeschi and Demakis (2010) found that women reported significantly higher levels of growth than men and concluded that there are modest but reliable gender differences in the occurrence of posttraumatic growth.

1.3.5.3.2 Age. Findings regarding the relationship between age and posttraumatic growth are unclear. Kurtz et al. (1995) and Milam et al. (2004) found growth to be positively associated with age, whilst several others have found growth to be higher among younger individuals (e.g. Bower et al., 2005; Davis et al., 1998; Evers et al., 2001; Klauer, Ferring & Filipp, 1998; Politansky & Esprey, 2000; Widows et al., 2005), and others still found no significant differences for age and posttraumatic growth (e.g. Cordova et al., 2001; Sears, Stanton & Danoff-Burg, 2003; Sheikh & Marotta, 2005; Weiss, 2004). These mixed findings make it difficult to draw conclusions about the influence of age on the development of posttraumatic growth, but it is apparent that a certain level of developmental maturation is necessary (i.e. late adolescence rather than childhood) (Milam et al., 2004). Whilst preliminary findings provide support for the development of posttraumatic growth in children (Cryder, Kilmer, Tedeschi & Calhoun, 2006), growth is considered unlikely for children who fall below the age at which cognitive capability and awareness of psychological processes allow for the identification of simultaneous losses and gains (Shakespeare-Finch & de Dassel, 2009).

1.3.5.3.3 Ethnicity. To date, the majority of research on posttraumatic growth has been conducted in Western countries, predominantly the US. Some have speculated that posttraumatic growth may be a Western phenomenon arising from the American culture of the positive attitude and championing resilience (McMillen, 2004; Shakespeare-Finch & Copping, 2006). However, posttraumatic growth has been studied across numerous cultures outside of North American and Northern European populations, with empirical reports of growth found in refugee populations in Sarajevo (Powell et al., 2003), Israelis (Laufer & Solomon, 2006; Lev-Wiesel & Amir, 2003), Latinas (Abriado-Lanza et al., 1998), Palestinians (Salo, Qouta & Punamaki, 2005), Turkish Muslims (Dirik & Karanci, 2008),

South Africans (Peltzer, 2000), Malaysians (Schroevers & Teo, 2008), Indians (Thombre, Sherman & Simonton, 2010), Chinese (Ho, Chan & Ho, 2004), Japanese (Taku et al., 2007), and Thai (Tang, 2007) populations. However, the literature is relatively sparse and researchers must be mindful that traditional measures of growth such as the Posttraumatic Growth Inventory may not capture the unique manifestations of growth across diverse ethnic groups. Most of the studies listed above attempted to address potential cultural bias in the assessment tools by translating the scales to gain both conceptual and linguistic equivalence and by adding culturally relevant items (e.g. increased patience in Abriado-Lanza et al., 1998). Nevertheless, these studies still assume that Western measures of posttraumatic growth assess the same construct across cultures and are therefore unable to understand cultural variations in the expression of growth (Splevins, Cohen, Bowley & Joseph, 2010).

As with other socio-demographic characteristics, findings regarding the relationship between ethnicity and posttraumatic growth are mixed. Milam et al. (2005) reported that Hispanic and White, compared to Persian, participants reported significantly greater growth following the September 11th terrorist attacks. African American sexual assault survivors (Kennedy, Davis & Taylor, 1998) and African American HIV patients (Milam, 2004) have been shown to report more posttraumatic growth than White Americans. Kleim and Ehlers (2009) found that non-Caucasian ethnicity predicted greater growth at 6 months in assault survivors, and Tomich and Helgeson (2004) reported that African American and Hispanic women with breast cancer perceived more benefits than Caucasian women; this difference remained significant when socio-economic status and stage of disease were controlled for. Similarly, Urcuyo, Boyers, Carver and Antoni (2005) found that African American and Hispanic women reported greater benefit-finding than non-Hispanic White women.

However, not all studies have found significant associations between ethnicity and growth (e.g. Carpenter et al., 1999; Lechner et al., 2003; Manne et al., 2004; Sears et al., 2003; Widows et al., 2005). Nevertheless, Helgeson et al.'s (2006) meta-analysis demonstrated that people from ethnic minorities are more likely to report growth. In addition, Helgeson et al. (2006) reported that the association between growth and well-being has been strongest in studies where there are a larger percentage of ethnic minority participants. Sumalla, Ochoa and Blance (2008) consequently concluded that there is a degree of consensus that belonging to an ethnic minority group correlates positively with posttraumatic growth.

Some authors have speculated that the association between ethnicity and posttraumatic growth might be because people from minority groups often face discrimination in their daily lives, which coaches them to derive benefits from adversity (e.g. Tomich & Helgeson, 2004). Others have suggested that religion may underlie this relationship, because African Americans are more likely to use religious coping to deal with trauma (Koenig, 1998), and religious coping has been shown to be associated with greater growth (e.g. Frazier et al., 2004; Park et al., 1996; Prati & Pietrantonio, 2009). This suggestion is further supported by evidence from Urcuyo et al. (2005), who demonstrated that once religious coping was taken into account, women from ethnic minorities no longer reported significantly more growth.

1.3.5.4 Social support. Theories of posttraumatic growth have included social support as a predictor of positive change following trauma (e.g. Schaefer & Moos, 1998; Tedeschi & Calhoun, 2004). Whilst not all studies have found social support to be associated with growth (e.g. Cordova et al., 2001), in general social support has evidenced positive

associations with posttraumatic growth in cross-sectional studies of women with multiple sclerosis (Mohr et al., 1999), women with breast cancer (Bozo et al., 2009; Weiss, 2004), bereaved caregivers of partners with HIV/AIDS (Cadell et al., 2003), and individuals experiencing a variety of stressful events (Park et al., 1996). Frazier et al. (2004) also found that self-reported experience of social support was a significant predictor of posttraumatic growth in victims of sexual assault, whilst Pinquart et al. (2007) reported that higher levels of illness-related positive outcomes in cancer patients were associated with higher levels of social support at the start of chemotherapy. Finally, in a meta-analysis of 103 studies, Prati and Pietrantonio (2009) concluded that social support is significantly associated with greater posttraumatic growth.

1.3.5.5 Cognitive processing. The role of cognitions in reactions to trauma has been a major area of study, particularly with respect to cognitive based treatments of distress and disorder following major life crises. Such treatments seek to identify, challenge and reformulate negative beliefs and schemas about the self and world that have been impacted by the event (e.g. Foa & Rothbaum, 1998). Beyond therapeutic interventions, cognitive processing has also been examined as a potential precursor to posttraumatic growth and there is evidence for its positive role in the development of growth. Calhoun, Cann, Tedeschi and McMillan (2000) reported that cognitive processing was positively associated with posttraumatic growth in a sample of college students that had experienced a major trauma. Similarly, cognitive processing has been shown to positively predict posttraumatic growth in stroke survivors (Gangstad, Norman & Barton, 2009) and adults with newly acquired limb loss (Phelps et al., 2008). In Linley and Joseph's (2004) review of the growth literature, the cognitive processes of rumination, intrusion and avoidance were all positively associated with posttraumatic growth.

However, findings concerning the impact of cognitive processing have been mixed (e.g. Carboon et al., 2005; Salsman et al., 2009) and conceptualisations of processing vary across studies. As such, the measures that have been used to assess cognitive processing are diverse and there is no empirical consensus regarding its nature or role in growth following adversity. As Calhoun and Tedeschi (2006, p. 17) highlight, “one of the most promising areas in which more work needs to be done is in the ways in which cognitive factors are connected to growth... It is important to begin to examine the role of cognitive factors with a bit more precision and breadth.” Given these gaps in the literature, this thesis focused on cognitive processing of traumatic events and sought to address the broad question of how cognitive processing is associated with posttraumatic growth. Before proceeding to discuss this topic in further detail, theoretical models of posttraumatic growth will be reviewed in order to provide a context for subsequent discussions about the nature and role of posttraumatic cognitive processing.

1.4 Theoretical Models of Growth Following Adversity

Within the stress and coping literature, many models exist that attempt to explain how individuals make use of negative or stressful events to further their personal development (e.g. Aldwin, 1994; Nerken, 1993; O’Leary & Ickovics, 1995), although they do not deal specifically with the process of psychological growth following extreme life events or major trauma. However, while the growth literature remains largely in the descriptive stages of study, several theoretical models of positive change following adversity have been developed. The three most comprehensive and influential models will be reviewed here, namely shattered assumptions (Janoff-Bulman, 1985; 1989; 1992), life crises and personal growth (Schaefer & Moos, 1992), and trauma and transformation (Tedeschi & Calhoun, 1995; 2004a; Calhoun & Tedeschi, 2006). All of these models emphasise the interaction

between personality, cognitive appraisal processing and coping activities (Joseph & Linley, 2006).

1.4.1 Theory of Shattered Assumptions

Although this theory was initially proposed as a model of posttraumatic stress reactions, it can also be applied in the context of posttraumatic growth and has been revised in order to account for the change in focus. The theory of shattered assumptions emphasises the crucial role of internal models or schemas that help people to make sense of their everyday lives and that are significantly disrupted or challenged by traumatic events. Social psychologist Janoff-Bulman (1985; 1989; 1992) sought to integrate research on the just world theory (e.g. Lerner & Miller, 1978) with her own clinical observations of the experiences of victims of life threatening accidents and people with terminal illnesses (Cason, Resick & Weaver, 2002). Her theory of shattered assumptions argues that we all hold a set of fundamental assumptions that predominantly operate outside of conscious awareness and are usually not seriously challenged to any great degree. The three basic assumptions are (1) the belief that the world is benevolent; (2) the perception that the world is meaningful and comprehensible; and (3) the view of the self as worthy (Janoff-Bulman, 1985). Traumatic events present information that is entirely inconsistent with these pre-existing assumptions about the self and the world, thus invalidating at a deep experiential level the individual's fundamental beliefs about how the world operates.

The traumatised individual's assumptive world now becomes shattered by evidence presented by the trauma that (1) the world is malevolent, (2) the world is not meaningful, controllable or predictable; and (3) and the self is not worthy. Their conceptual system is consequently in a state of upheaval and disintegration, with the psychological structures that

had previously provided coherence and stability now shattered (Janoff-Bulman, 1992). This invalidating of prior assumptions forces the trauma survivor to search for new meaning and recreate assumptions about the world and the self that can integrate this information, either by incorporating the new information into prior assumptive worlds, or by constructing new assumptive worlds. In line with Horowitz's (1986) model, intrusive thoughts, denial and distress are considered to be normal during this period and are seen to facilitate cognitive reconstruction. Similarly, deliberately reflecting on the trauma and its' impact on one's life is also regarded as a necessary part of this process (Brewin & Holmes, 2003). As Janoff-Bulman (1992) explains:

"Representations of the traumatic event – through intrusive thoughts and images – provide a means for rendering closer and closer approximations of the new, threatening data and the old assumptions, such that ultimately assimilation of the traumatic experience and accommodation of prior assumptions can be successfully completed," (p. 106).

Joseph and Linley (2005) build on this model to provide a more detailed theoretical account of cognitive assimilation and accommodation processes in their Organismic Valuing Theory. They explain that, following traumatic events, information can be processed in only one of two ways: either the new trauma-related information must be *assimilated* within existing models of the world, or existing models of the world must *accommodate* the new trauma-related information. For example, traumatic events may shatter the individuals' beliefs and schemas that the world is just. Individuals who assimilate that trauma-related information into their existing model of the world may therefore blame themselves in order to maintain the sense that the world is just. In contrast, victims who accommodate the trauma-related information may perceive their experience as a random occurrence and as such, modify their existing view of the world as just into a view of the world as random.

Joseph and Linley (2005) further explicate that accommodation demands a change in world views which by definition can be in either a negative or positive direction. For example, a person could accommodate the new trauma-related information that the world is random and bad things happen to good people in one of two ways: negative accommodation (e.g. a depressogenic reaction of hopelessness and helplessness) or positive accommodation (e.g. that life should be lived to the full in the here and now). Accommodation can therefore result in negative changes in worldviews and psychopathology, or positive changes in worldviews and personal growth (Joseph & Linley, 2008a). Consequently, Joseph and Linley (2005) propose three cognitive outcomes of the struggle with trauma: first, experiences are assimilated and the individual returns to baseline functioning, but is vulnerable to future traumatisation because they have maintained their pre-trauma assumptions despite evidence to the contrary. Second, experiences are accommodated in a negative direction, leading to distress and psychopathology. Third, experiences are accommodated in a positive direction, leading to posttraumatic growth.

1.4.2. Life Crises and Personal Growth

Schaefer and Moos (1992; 1998) adapted the transactional model of stress (Folkman & Moskowitz, 2000; Lazarus & Folkman, 1984) to explain growth following bereavement. Their model describes how effective adaptation to a life crisis arises from a complex and dynamic interplay of environmental, personal and event-related factors. Their conceptual model posits that three sets of factors shape the life crisis and its aftermath: (a) characteristics of the crisis (e.g. timing, severity and duration of the trauma); (b) relatively stable personality factors (e.g. socio-demographic characteristics and personal resources such as self-efficacy, motivation, resilience, health, and prior crisis experience); and (c) environmental system factors (e.g. social support, interpersonal relationships, aspects of the financial, home and

community living situation). The interplay of these factors influences the cognitive appraisal and coping responses the person uses following a life crisis, which in turn contributes to the development of positive outcomes and personal growth. According to Schaefer and Moos (1992), three major types of positive outcome may emerge: (a) enhanced social resources, such as better relationships with friends and family and new support networks; (b) enhanced personal resources, such as more cognitive differentiation, self-understanding, empathy and maturity; and (c) the development of enhanced coping skills, such as the ability to regulate affect, think through a problem logically, and seek help when needed.

This model further focuses on the role of cognitive appraisal, attribution and coping in positive adjustment to life crises. Moos and Schaefer (1993) distinguish between approach and avoidance coping, where approach coping involves analysing the crisis in a logical way, positive reappraisal, support seeking and active coping, whilst avoidance coping involves trying to minimise the problem, withdrawing from the problem, seeking alternative rewards and venting emotions. It is argued that people who use approach coping strategies to deal with life crises are more likely to experience positive outcomes than those who rely on avoidance coping (Moos & Schaefer, 1993). In addition, cognitive coping strategies of redefining a crisis event as a challenge and attributing meaning to it are also discussed as important responses associated with personal growth (Mahoney, 1982; Nerken, 1993).

1.4.3 Trauma and Transformation

Tedeschi and Calhoun's (1995; 2004a; Calhoun & Tedeschi, 1998; 2004; 2006; Calhoun, Cann & Tedeschi, 2010) functional-descriptive model of posttraumatic growth (see Figure 1.1) has been revised and expanded over the years as the growth literature has developed. Like the model provided by Schaefer and Moos (1992), it also considers the

individual's personal characteristics, social context, and the impact of the event on perceived coping capacities and world assumptions. Their model encompasses Janoff-Bulman's (1992) work by conceptualising traumatic events as seismic challenges to the individual's pre-trauma schematic world which shatter prior goals, beliefs, worldviews and ways of managing distress. The resulting emotional distress initiates a process of ruminative activity and behaviours designed to deal with and reduce that distress.

In the initial phase, rumination is largely automatic and is characterised by frequent and intrusive thoughts and images about the trauma and related issues. While this is often experienced as distressing, it is indicative of the cognitive processing activity that is necessary for rebuilding shattered schemas and fuelling the growth process. Social support networks provide comfort, relief, new schemas and coping behaviours, which assist the individual to experience coping successes, namely reductions in emotional distress and disengagement from unreachable goals. With this successful coping comes a transformation in ruminative activity, which now becomes more effortful, deliberate thinking about the trauma and its impact on one's life. This effortful rumination includes analysing and re-appraising the new situation of one's life, finding meaning in the experience, and narrative development, and is assumed to play a fundamental role in the development of posttraumatic growth.

Tedeschi and Calhoun's (1998) model specifies that emotionally-laden, automatic and intrusive rumination in the early wake of trauma is a necessary antecedent to subsequent growth since it provides the 'raw data' that can be processed more deliberately to support growth (Greenberg, 1995). Thus, posttraumatic growth is seen as most likely when there is first an automatic ruminative process superseded by a later more deliberate one. They also

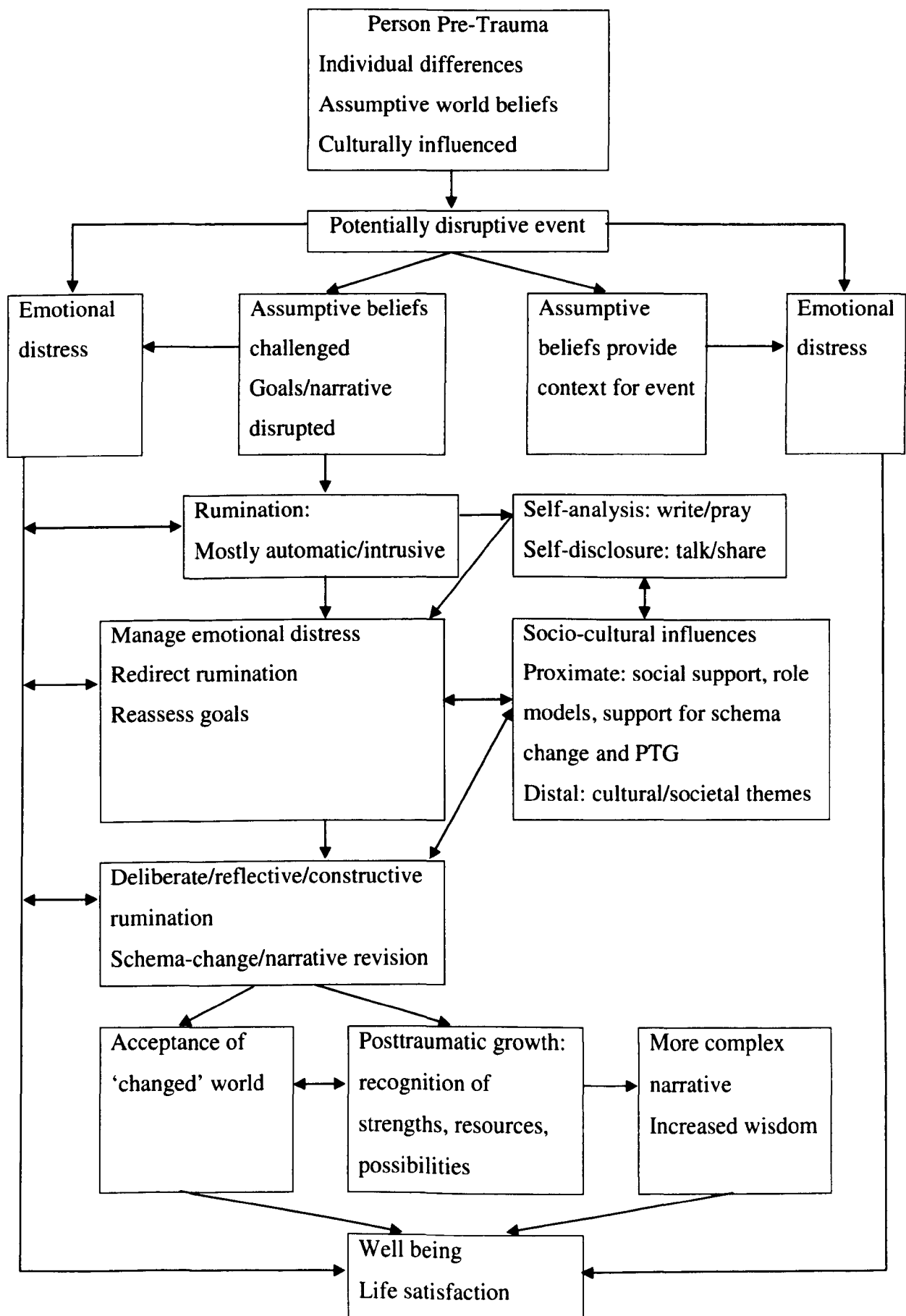


Figure 1.1 Calhoun, Cann and Tedeschi's (2010) comprehensive model of PTG

speculate that automatic intrusive processing that remains elevated over prolonged periods, without the transition to more deliberate processing, may exacerbate distress and preclude growth (Calhoun & Tedeschi, 1998).

Calhoun, Cann and Tedeschi's (2010) model is arguably the most comprehensive and widely accepted theory of posttraumatic growth, with most researchers adopting their model to frame their empirical work. In addition, their model is the first to provide a detailed description of the cognitive processes presumed to be involved in the development of growth. Thus, their model extends previous work by specifying that cognitive processing can be automatic and intrusive or deliberate and effortful, with both aspects believed to play important roles in the development of subsequent growth (Calhoun & Tedeschi, 1998). However, while this aspect of the model is descriptively comprehensive, it has been insufficiently tested and as yet, the nature and role of these cognitive processing components is not well understood. This gap in the literature forms the motivation for this thesis, which seeks to both test and extend Calhoun, Cann and Tedeschi's (2010) model of posttraumatic growth with respect to the role of cognitive processing. The broad aim of this thesis is therefore to place a spotlight on the intrusive and deliberate ruminative activity that has been theoretically hypothesised to play a fundamental role in the growth process. The following section provides a more detailed exploration of the main limitations and confusions that have so far prevented progress in understanding in this area.

1.5 Posttraumatic Cognitive Processing

As has been outlined in the preceding sections, cognitive processing plays a central role in Calhoun, Cann and Tedeschi's (2010) model of posttraumatic growth, where it is regarded as fundamental for the integration of trauma-related information and subsequent

growth. As Calhoun and Tedeschi (1998, p. 222) state, “a process that we consider central to posttraumatic growth is rumination.” Despite its’ central role in posttraumatic growth theory, the impact of cognitive processing has not been rigorously tested and remains theoretically presumed rather than empirically proven. Thus, although studies exist that have sought to explore the role of cognitive processing as a determinant of growth (e.g. Calhoun et al., 2000; Carboon et al., 2005; Manne et al., 2004; Salsman et al., 2009), results from these studies have been mixed and have failed to demonstrate overall support for Calhoun, Cann and Tedeschi’s (2010) model. One potential reason for this is because there is no agreed definition or operationalisation of cognitive processing which has meant that numerous methods have been employed to assess processing. This has contributed to inconsistent findings and has negatively impacted the development of the literature in this area.

A further issue that has complicated this literature is that at the core of Calhoun, Cann and Tedeschi’s (2010) model is an emphasis on *rumination* as the key determinant of posttraumatic growth. This focus on the functional value of rumination is in contrast with the well-established literature demonstrating the role of rumination in the onset, severity and maintenance of depression and negative affect (e.g. Just & Alloy, 1997; Kuehner & Weber, 1997; Nolen-Hoeksema, 2000; Nolen-Hoeksema, Parker & Larson, 1994). With respect to traumatic events, research has also demonstrated that ruminating about a traumatic experience contributes to the development and maintenance of depression following trauma (e.g. Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema et al., 1994), and there is evidence that ruminative thinking about issues surrounding a traumatic event such as its causes, meanings and consequences, predicts posttraumatic stress symptom severity (Clohessy & Ehlers, 1999; Ehlers, Mayou & Bryant, 1998; Holeva, Tarrier & Wells, 2001; Michael, Halligan, Clark & Ehlers, 2007; Steil & Ehlers, 2000). As such, results from these studies

suggest that rumination, as a form of repetitive trauma-related thought, may impede processing of traumatic events and prevent resolution and adjustment. This stands in direct contrast to Tedeschi and Calhoun's (2004a) perspective that rumination about past traumas is functional and positively associated with growth outcomes.

Tedeschi and Calhoun (2004a) acknowledge that their focus on the functional value of rumination may be a potential source of confusion and ask readers to reconceptualise rumination as cognitive processing, in line with their understanding of rumination as "a process of frequently returning to thoughts of the trauma and related issues," (Calhoun & Tedeschi, 1998, p. 227) that "includes positive, negative, and neutral cognitive elements, and can involve more deliberate, thoughtful reflection and pondering about various aspects of the event," (Calhoun & Tedeschi, 1999, p. 18). This definition is in contrast to the more common understanding of rumination as a type of passive, repetitive thought that is characterised by repeated 'worry and why' thoughts about one's distress; the causes, meanings or consequences of that distress; and the possibility of ongoing suffering (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008). Key features of rumination include a sense of pre-occupied dwelling or 'brooding', centring on abstract themes such as "why?" and "what if?" questions (Michael et al., 2007). There is also a cyclic quality to rumination and a sense of continual replaying without any drive toward problem resolution or symptom alleviation.

Calhoun, Cann and Tedeschi's (2010) use of the term rumination to reflect a process that is otherwise understood as cognitive processing has contributed to a degree of ambiguity and a sense uncertainty about what cognitive processing actually is. These confusions highlight the need for a detailed examination of the various ways cognitive processing has been conceptualised and assessed, in order to clarify ambiguities and allow research in this

area to progress. There is also much room to further test and develop the literature on cognitive processing of traumatic events, particularly with respect to the hypothesised distinction between more and less constructive patterns of event-related thinking.

Calhoun and Tedeschi (2004) also acknowledge the gap in our understanding of posttraumatic cognitive processing and call for a more comprehensive examination and assessment of:

“the amount, content, and quality of cognitive processing in which individuals engage as they struggle with what has happened to them, and how these various elements and forms of cognitive processing are related to posttraumatic growth... The way individuals think and what individuals think about in the aftermath of trauma can be regarded as one important indicator of how well they are functioning psychologically. However, the full picture of the ways in which these cognitive processes are related to growth is still not clear and remains to be investigated,” (pp. 96-97).

Likewise, Salsman, Segerstrom, Brechting, Carlson and Andrykowski (2009, p. 39) highlight that “much work remains to further delineate the nature of cognitive processing.” As such, the aim of this thesis was to focus on the cognitive processing elements of the model presented by Calhoun, Cann and Tedeschi (2010) by testing the assumption that cognitive processing comprises of an automatic intrusive element and a more deliberate, effortful element, both of which have been speculated to be important predictors of subsequent growth. A further aim of this thesis was to expand Calhoun, Cann and Tedeschi’s (2010) model by exploring whether there might be more to cognitive processing than the automatic and deliberate subtypes they specify.

This empirical attention to posttraumatic cognitive processing is important in terms of both conceptual and practical implications. Not only is it theoretically advantageous to develop a broader and more accurate understanding of cognitive processing in order to advance models of posttraumatic growth, such work also has valuable implications for therapeutic engagement with trauma survivors. Unlike many other factors in models of posttraumatic growth, cognitive processing is not considered to be a stable, pre-event characteristic but one that is amenable to change and manipulation. As such, identifying the components of cognitive processing that are not constructive and impede adjustment, as well as those that are more constructive and serve as potential precursors to subsequent growth, can inform therapeutic work by highlighting the trauma-related thought processes that are to be eliminated and those that are to be facilitated.

1.6 Chapter Summary

The positive psychology movement has emphasised the need to adopt a more comprehensive approach to understanding human experience by striving to understand and facilitate psychological well-being as well as working to alleviate distress. This movement has contributed to the proliferation of interest in the phenomenon of posttraumatic growth. As the growth literature moves beyond descriptive stages there is a need to test and refine the models that have been developed to explain the process of growth following adversity. This thesis focuses on the cognitive processing elements of the model presented by Calhoun, Cann and Tedeschi (2010) and aims to explore the ways cognitive processing may predict growth. In order to empirically examine cognitive processing, it is necessary to first consider how it has previously been defined and operationalised. Chapter two therefore provides a review of the cognitive processing literature with respect to posttraumatic growth.

Chapter 2

Cognitive Processing and Posttraumatic Growth: A Review

2.1 Introduction

Chapter one highlighted that although cognitive processing is widely considered to be fundamental for the integration of trauma-related information and subsequent posttraumatic growth, there is inconsistent empirical evidence to support existing theoretical models, in part because the term ‘cognitive processing’ has been poorly defined and differentially operationalised. As a result of this conceptual imprecision, a disparate range of measures have been used to assess cognitive processing which has resulted in mixed findings regarding its role in posttraumatic growth. Given this uncertainty regarding the nature and function of cognitive processing, Calhoun and Tedeschi (2006) have called for further research examining the ways in which cognitive factors are associated with growth. This thesis represents an attempt to meet that call for research.

As such, the purpose of this chapter is to provide a narrative review of the existing literature on cognitive processing and posttraumatic growth in order to produce a comprehensive summary of the various conceptualisations of cognitive processing and their associations with growth following trauma. This will facilitate an understanding of the current state of the literature, thus identifying gaps and areas for refinement, as well as informing subsequent studies and ensuring that the research conducted in this thesis is both original and of value.

2.1.1 Narrative Reviews

The purpose of a narrative review is to objectively and methodically collate and summarise the findings from a range of studies in order to make sense of a particular body of research or topic of interest (Green, Johnson & Adams, 2006). The aim is therefore to go beyond simple cataloguing and describing of existing research by providing a new synthesis or perspective that can shed light on a research problem and guide further inquiry. One of the strengths of narrative reviews is the ability to comprehend the diversities and pluralities of understanding surrounding a particular topic or phenomenon such that inconsistencies or tensions within that literature can be identified and potentially resolved. This was seen as a particular advantage for the current review, given the existing diversity in understandings of cognitive processing. Narrative reviews can also assist researchers to keep up to date with relatively rapidly advancing literatures, which was also considered desirable for the current review in view of the fact that many of the studies included have been conducted within the last two years. Finally, narrative reviews are useful for highlighting fruitful lines of further research and can be a valuable theory-building or theory-refining technique that may also serve hypothesis-generating functions (Baumeister & Leary, 1997).

Narrative reviews have come under scrutiny due to concerns that they are biased and do not produce reliable evidence (e.g. Greenhalgh, 1997). However, if conducted rigorously and systematically, narrative reviews can be thorough, replicable, and can provide a comprehensive overview of the phenomenon of interest. This chapter therefore adopted this methodology for reviewing the existing literature on cognitive processing of trauma, with the specific question of how cognitive processing has previously been conceptualised and assessed and how it is associated with posttraumatic growth.

2.1.2 Literature Search Strategies

The aim of the literature search was to identify publications that examined the relationship between cognitive processing and posttraumatic growth. It was also intended to explore the methods that have been used to assess cognitive processing of trauma. The review focused only on published, peer-reviewed studies on the basis that they were expected to be of good quality and methodologically rigorous. Articles were identified through computerised literature searches of electronic databases (e.g. PsycINFO, Ingenta, PILOTS [Published International Literature On Traumatic Stress], Ovid, Web of Knowledge) using two separate searches that were then combined. Search 1 used the search terms *cognitive processing*, *ruminat**, *intrus**, and *intrusive thoughts*. Search 2 used the search terms *posttraumatic growth*, *post-traumatic growth*, *stress-related growth*, *adversarial growth*, and *growth following adversity*. Results of searches 1 and 2 were then combined using the AND function to generate publications meeting both sets of search criteria.

The final search results were screened for their relevance to the review. Publications relating to peri-traumatic cognitive processing (e.g. Halligan et al., 2003) or experimental analogue studies (e.g. Halligan, Clark & Ehlers, 2002) were excluded from this review. Studies that conceptualised intrusive thoughts as distress or PTSD symptomatology, rather than as cognitive processing, were also excluded (e.g. Harms & Talbot, 2007; Lurie-Beck et al., 2008; Mystakidou et al., 2008). In addition to these search strategies, the reference lists of published studies identified through the above searches were screened to locate other publications relevant to the review that had not been detected using the database searches. These strategies collectively identified 29 empirical studies which are presented in Table 2.1 and reviewed in the following sections.

2.2 Outline of Studies Identified

The set of 29 studies to be reviewed comprised 21 cross-sectional and 8 longitudinal (Carboon et al., 2005; Kilmer & Gil-Rivas, 2010; Kleim & Ehlers, 2009; Manne et al., 2004; Phelps et al., 2008; Salsman et al., 2009; Sears et al., 2003; Wolchik et al., 2008) research designs. Only one study (Bower et al., 1998) employed a qualitative design. The studies had been published between 1998 and March 2011, with 12 of the studies being published during the previous 12 months and only 10 in publication prior to the start of this thesis. The sample sizes ranged from 30 (Proffitt et al., 2007) to 655 (Taku et al., 2009), with a mean number of 153 participants. In terms of the types of traumatic events reported by study participants, 8 studies used cancer patients, 6 studies used college student samples (3 of which pre-screened the sample for recent trauma history), 5 studies used people that had experienced bereavement, 3 used children or adolescents exposed to a traumatic event (hurricane Floyd, hurricane Katrina, death of a parent during childhood), 3 used patients with medical problems (stroke, amputation, HIV), 1 used spouses of myocardial infarction patients, 1 used parents of children with Attention Deficit Hyperactivity Disorder, 1 used physical or sexual assault survivors, and 1 used Judeo-Christian clergy that had experienced a traumatic event.

The mean time since the events had occurred ranged from 17.53 days for assault survivors (Kleim & Ehlers, 2009) to 10.9 years for individuals diagnosed with HIV (Nightingale, Sher & Hansen, 2010). Posttraumatic growth was assessed using the Posttraumatic Growth Inventory (or its' translated equivalent) in 24 of the 29 studies; the remaining studies used either the Stress-Related Growth Scale (Park & Fenster, 2004; Williams, Davis & Millsap, 2002), the Perceived Benefits Scale (Park, Chmielewski & Blank, 2010), a modified version of the Positive Meaning Scale (Boyraz, Horne & Sayger, 2010) or qualitative analysis of interview transcripts (Bower et al., 1998).

2.3 Assessment of Cognitive Processing

Overall, 14 different measures were used to assess cognitive processing. In addition, 10 studies used modified versions of existing measures that were adapted for their specific study. To illustrate, Williams et al. (2002) developed the Cognitive Processing of Trauma Scale (CPOTS), which consists of 17 items assessing cognitive processing across 5 separate subscales. Subsequent work by Phelps et al. (2008) added three items to the CPOTS and revised the structure so that the 5 subscales became two 10-item subscales: a positive processing factor and a negative processing factor. Likewise, Calhoun et al. (2000) developed a 7-item measure designed to capture intrusive and deliberate rumination about a traumatic event. Nine subsequent studies used this measure, although only one study (Proffitt et al., 2007) used the same items and scoring procedure as Calhoun et al. (2000). The remaining 8 studies added items (Cann et al., 2010; Nightingale et al., 2010), removed items (Taku et al., 2009), adapted it for use with children (Cryder et al., 2006; Kilmer & Gil-Rivas, 2010), adopted an alternative factor structure and subscales (Morris & Shakespeare-Finch, 2010; Taku et al., 2008), or used the items as a starting point to create an entirely new measure of cognitive processing (Cann et al., 2011). Taking these adapted versions of existing scales into account, cognitive processing was assessed in 22 different ways across the 29 studies.

Five studies employed more than one measure to assess cognitive processing (Cann et al., 2011; Carboon et al., 2005; Manne et al., 2004; Salsman et al., 2009; Williams et al., 2002), often using one measure to capture intrusive, automatic processing and another measure to capture more deliberate, effortful processing, in line with Calhoun, Cann and Tedeschi's (2010) theoretical distinction between these processing subtypes. Alternatively, 14 studies used a single measure to make this distinction using subscales rather than multiple measures. Thus, Boyraz and Efstathiou (2011) used the Rumination and Reflection subscales

of the RRQ (Trapnell & Campbell, 1999) to capture repetitive negative trauma-focused thinking and more adaptive, reflective processing, respectively. Similarly, Chan et al. (2011) used the Positive and Negative subscales of the Cancer-Related Rumination Scale to assess ruminative thoughts that focused on either the positive aspects of the cancer experience (e.g. “I have thought about how to ‘make peace’ with having cancer”) or the negative aspects of the cancer experience (e.g. “I have trouble stopping myself from thinking about cancer”). The various versions of the Rumination Inventory (Calhoun et al., 2000) also enabled distinctions between intrusive and deliberate rumination to be made in Cann et al. (2010), Cann et al. (2011), Kilmer and Gil-Rivas (2010), Nightingale et al. (2010), Taku et al. (2008) and Taku et al. (2009). A further 2 studies differentiated types of cognitive processing by the timing, rather than the valence or content of trauma-related thoughts. Both Calhoun et al. (2000) and Proffitt et al. (2007) distinguished between early rumination that occurred soon after the event and recent rumination that had occurred within the last 2 weeks in order to explore the impact of the timing of cognitive processing.

Based on the preceding review, it is evident that the assessment of cognitive processing has been diverse and as yet there exists no one single measure that has consistently been adopted to capture event-related processing. This is in contrast to the relatively uniform assessment of posttraumatic growth using the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) in 24 of the 29 studies. Even when validated measures from prior research are used to capture cognitive processing, they are frequently adapted or modified such that comparison across studies is compromised. The same measures of processing have also often been analysed differently across studies, with some utilising the existing subscale scores, others providing analyses based on total scores only, and others still using factor analysis to separate or combine subscales into new dimensions of processing.

Again, such inconsistencies mean that it is difficult to compare the findings of these studies and as such there is little sense of unity to the cognitive processing literature with respect to operationalisation. The impact of these inconsistencies on the literature concerning the role of processing in posttraumatic growth is yet to be established, but the following section will review the associations between cognitive processing and posttraumatic growth in order to examine how the diversity of processing measures has impacted this literature.

2.4 Associations between Cognitive Processing and Posttraumatic Growth

Many of the studies reviewed reported positive associations between cognitive processing and posttraumatic growth. Cross-sectionally, cognitive processing was found to be positively correlated with growth in HIV-positive men that had recently experienced AIDS related bereavement (Bower et al., 1998), bereaved individuals (Boyratz et al., 2010), bereaved college students (Michael & Snyder, 2005), stroke survivors (Gangstad, Norman & Barton, 2009), and college students (Williams et al., 2002). Likewise, cognitive processing was a positive predictor of posttraumatic growth in women with breast cancer (Chan et al., 2011; Cohen & Numa, 2011; Manne et al., 2004), mixed cancer patients (Morris & Shakespeare-Finch, 2010), college students (Park & Fenster, 2004) and spouses of myocardial infarction patients (Senol-Durak & Ayvasik, 2010).

Using the Rumination Inventory (Calhoun et al., 2000) to explore the timing of cognitive processing, several studies also reported positive associations between processing and growth with respect to processing both soon after the event and recently. Thus, early cognitive processing soon after the event was positively associated with growth in college students that had experienced a recent trauma (Calhoun et al., 2000), Judeo-Christian clergy that had experienced a personal trauma (Proffitt et al., 2007), and bereaved Japanese

university students (Taku et al., 2008). Recent cognitive processing within the last 2-3 weeks was also positively associated with growth in college students that had experienced a recent trauma (Cann et al., 2010). Likewise, both early and recent processing were found to positively predict growth in college students that had experienced a recent trauma (Cann et al., 2011), individuals with HIV (Nightingale et al., 2010) and college students (Taku et al., 2009). Although cognitive processing soon after the event was assessed retrospectively in these studies and as such they are still cross-sectional in design, they provide a useful indication of the patterns of processing over time that are important in the development of growth.

Longitudinal studies have also demonstrated positive associations between cognitive processing and growth. Kilmer and Gil-Rivas (2010) reported that intrusive cognitive processing at baseline significantly predicted subsequent growth at 1 year follow-up among 7 to 10 year olds impacted by Hurricane Katrina. Kleim and Ehlers (2009) demonstrated that the extent of rumination at 2 weeks post-assault significantly predicted posttraumatic growth at 6 months, and Phelps et al. (2009) reported that positive cognitive processing at 9 weeks post-amputation was positively associated with growth at 12 months.

Despite this large number of studies supporting the positive role of cognitive processing in the development of posttraumatic growth, not all studies examined in this review demonstrated a positive relationship. Eleven studies failed to detect a significant association between particular cognitive processing subtypes and posttraumatic growth. For example, intrusive processing soon after the event (Taku et al., 2008) and recently (Taku et al., 2009) was not predictive of current posttraumatic growth. Reflective processing also did not predict growth in Cann et al. (2011). Longitudinally, Carboon et al. (2005) reported that

intrusive processing during treatment for blood cancer did not predict posttraumatic growth at treatment completion. Similarly, Salsman et al. (2009) found that baseline intrusive and deliberate cognitive processing did not predict growth at baseline or at 3 month follow-up in colorectal cancer patients.

In addition, five studies reported negative relationships between processing and growth. Cann et al. (2010) reported that recent intrusive processing negatively predicted posttraumatic growth in college student trauma survivors, and Cann et al. (2011) found that, when conceptualised as a stable tendency to ruminate on past experiences, cognitive processing negatively predicted posttraumatic growth. Park et al. (2010) reported that intrusive cognitive processing was negatively associated with posttraumatic growth in young to middle-aged adults with cancer. Finzi-Dottan et al. (2011) used a somewhat unusual conceptualisation of cognitive processing - the perception of parenthood as a threat – and reported that perceiving parenthood as a threat, rather than a challenge, negatively predicted posttraumatic growth in parents of children with ADHD. Finally, Proffitt et al. (2007) demonstrated that recent cognitive processing negatively predicted posttraumatic growth in Judeo-Christian clergy that had experienced a personal trauma.

These mixed findings concerning the relationship between cognitive processing and posttraumatic growth are likely to be a result of the various conceptualisations and assessment methods for capturing cognitive processing. Many studies included in this review distinguish between subtypes of cognitive processing, with some subtypes considered to be more adaptive and conducive to growth than others. Thus, a range of associations between cognitive processing and growth have emerged because not all aspects of cognitive processing are necessarily equivalent and may reflect more or less constructive types of

event-related thinking. As such, it is important to conduct a more fine-grained analysis of the relationship between cognitive processing and posttraumatic growth by taking into account the various conceptualisations of processing. The following sections of this review will therefore identify and describe the main processing subtypes and discuss the findings of existing studies with respect to these conceptualisations.

2.5 Distinguishing Cognitive Processing Subtypes

During initial inspection of the studies under review it became evident that there were essentially two main ways of conceptualising cognitive processing: as automatic, intrusive thoughts or as more intentional, deliberate processing. As discussed in Chapter 1, the theoretical literature has suggested that cognitive processing can be separated into automatic, intrusive forms of processing and more deliberate, effortful contemplation (e.g. Calhoun, Cann & Tedeschi, 2010). As such, it was encouraging to find that this theoretical understanding of cognitive processing had also emerged in the way processing has been described and operationalised in several of the more recent research studies (e.g. Cann et al. 2010; Cann et al., 2011; Nightingale et al., 2010).

However, on closer inspection, a third aspect to cognitive processing was also identified. This third subtype of cognitive processing was termed ruminative processing, since it reflected the type of passive, repetitive dwelling that has long been recognised in the literature on depression and negative affect but has only relatively recently been considered with respect to event-related thinking about past traumas. Although only a small number of studies conceptualised cognitive processing in this way, it is nevertheless important to consider this subtype of processing as a potential addition to current theoretical understandings of posttraumatic processing.

2.5.1 Intrusive Processing

Intrusive thoughts have frequently been defined as unwelcome, involuntary thoughts or images that repeatedly invade conscious awareness; are upsetting or distressing; and can be difficult to control or eliminate. Following traumatic events, they are largely considered to be fragmented recollections of the traumatic experience that are predominantly sensory in nature (Ehlers, Hackmann, Steil, Clohessy, Wenninger & Winter, 2002), but can also take the form of more abstract cognitive elaborations of the event and its consequences (e.g. Reynolds & Brewin, 1998, 1999). Intrusive or re-experiencing phenomena are not exclusive to trauma survivors and are observed across the human condition (Ørner & Stolz, 2002), although intrusive trauma-related thoughts have often been considered to be the hallmark of posttraumatic stress disorder and comprise one of the central features of the re-experiencing component of PTSD (APA, 1994).

However, other theorists (e.g. Creamer, Burgess & Pattison, 1992; Horowitz, 1986; Janoff-Bulman, 1992; Tedeschi & Calhoun, 2004) have argued that intrusive thoughts are a normal and necessary part of the psychological adjustment process and should be seen to reflect functional processing rather than disorder. Thus, intrusive cognitions are regarded as the mechanism through which trauma-related information is repeatedly presented into consciousness until it can be integrated within existing schemata (Salsman et al., 2009). From this perspective, although intrusions indicate that resolution and integration is incomplete, they provide a useful marker of the extent to which the individual is cognitively processing and working to make meaning from the experience (Park, Chmielewski & Blank, 2010). Intrusive thoughts have therefore been seen as a form of cognitive processing that can facilitate posttraumatic growth (Calhoun, Cann & Tedeschi, 2010).

In line with the latter perspective, 16 studies in this review operationalised cognitive processing as intrusive thoughts about the traumatic experience. Of those, 6 studies used the Intrusion subscale of the Impact of Event Scale (IES; Horowitz, Wilner & Alvarez, 1979) to assess cognitive processing, with an additional study by Sears et al. (2003) combining the IES intrusion subscale with a further three items to form a composite processing measure. Similarly, Carboon et al. (2005) used the Re-experiencing subscale of the PTSD Checklist – Civilian version (PCL-C; Weathers, Litz, Huska & Keane, 1994) and Wolchik et al. (2008) used the Intrusive Grief Thoughts Scale (IGTS; Program for Prevention Research, 1999) to assess intrusive cognitive processing.

Results from these 9 studies demonstrated inconsistent findings with respect to intrusive processing and posttraumatic growth. Park and Fenster (2004) found that a higher level of intrusive thoughts positively predicted stress-related growth in college students who had experienced a range of traumatic events; Senol-Durak and Ayvasik (2010) reported a significant positive correlation between intrusion and posttraumatic growth in spouses of myocardial infarction patients; Williams et al. (2002) reported a significant positive correlation between intrusion and posttraumatic growth in trauma-exposed college students; Sears et al. (2003) demonstrated that intrusive cancer-related processing was a positive predictor of posttraumatic growth at 12 month follow-up; and Manne et al. (2004) reported that intrusive thoughts predicted greater posttraumatic growth over time in partners of breast cancer patients, although it did not predict increased growth over time in the breast cancer patients themselves.

In contrast to these positive findings concerning intrusive cognitive processing, Park et al. (2010) reported that intrusive thoughts were negatively associated with posttraumatic

growth among younger adults diagnosed with cancer, and Salsman et al. (2009) demonstrated that although 3 month intrusive processing was positively correlated with 3 month posttraumatic growth, baseline intrusive processing was unrelated to either baseline or 3 month growth in colorectal cancer patients undergoing treatment. Similarly, Carboon et al. (2005) found that although there was a small positive correlation between intrusive re-experiencing during treatment for hematologic cancer and spiritual change at treatment completion, intrusive re-experiencing did not significantly predict any domain of posttraumatic growth in the regression model. Finally, Wolchik et al. (2008) found that intrusive grief-related thoughts at baseline did not predict posttraumatic growth at 6 month follow-up in young adults who had experienced parental death during adolescence.

Results from these studies provide mixed support for the argument that intrusive cognitive processing is associated with greater growth following trauma. However, the use of scales otherwise designed to assess subjective distress (e.g. the IES) or symptoms of disorder (e.g. the PCL-C) may account for the inconsistent results since they potentially fail to capture adaptive processing activity. As such, more recent work in this area has adapted the Rumination Inventory (Calhoun et al., 2000) to include an intrusive rumination subscale that can be used to assess intrusive processing in a more neutral way. Thus, the intrusive rumination subscale is designed to capture the presence of intrusive trauma-related thoughts without implying posttraumatic stress symptoms (Cann et al., 2011).

Seven studies assessed intrusive cognitive processing using the intrusive rumination subscale. Morris and Shakespeare-Finch (2010) reported that recent intrusive rumination was positively associated with posttraumatic growth in a sample of patients diagnosed with a variety of cancers. Cann et al. (2010) demonstrated that intrusive rumination soon after the

event was positively associated with posttraumatic growth, while further analyses revealed that, in contrast to findings from Morris and Shakespeare-Finch (2010), recent intrusive rumination negatively predicted growth. Nightingale et al. (2010) and Taku et al. (2009) also both reported that intrusive rumination soon after the event positively predicted posttraumatic growth, with longitudinal evidence from Kilmer and Gil-Rivas (2010) further establishing that baseline intrusive rumination predicted greater growth at 12 month follow-up. Additional findings from Taku et al. (2009) demonstrated that recent intrusive rumination was not significant predictor of posttraumatic growth, which was in contrast to results from Taku et al. (2008) that revealed that recent, but not past, intrusive rumination was positively associated with growth. Taku et al. (2008) also reported that intrusive rumination soon after the event was only indirectly associated with growth through its relationship with deliberate rumination soon after. This finding is similar to that of Cann et al. (2011), who demonstrated that although intrusive rumination did not significantly predict growth, it significantly predicted deliberate rumination, which in turn predicted growth.

These results concerning the role of intrusive processing in posttraumatic growth demonstrate that although to some extent there is a degree of consensus that intrusive rumination soon after the event is associated with greater subsequent growth, findings regarding the role of recent intrusive rumination are mixed. Thus, while some studies demonstrated positive associations between recent intrusive rumination and growth, others either failed to find a significant association, or found a negative association between intrusive rumination and growth. As such, the role of continued intrusive cognitive processing in the development of growth following adversity remains poorly understood.

Calhoun and Tedeschi (2006) argue that intrusive processing soon after the event is adaptive and important for eventual growth, while intrusive ruminations that persist some time after the event can signify an inability to constructively rebuild the assumptive world and therefore preclude growth. Thus, ongoing intrusive engagement with trauma memories is seen to reflect an inability to progress from the largely intrusive phase of early processing to the more deliberate phase of processing that reflects the cognitive work necessary for rebuilding the assumptive world. Taku et al. (2009) also suggest that intrusive cognitions may not represent adaptive cognitive processing per se, but reflect an early process designed to keep the event in mind which primes the subsequent process of more deliberate rumination which ultimately facilitates growth. Early intrusions are therefore seen as adaptive because they motivate the individual to seek a better understanding of the traumatic experience and fuel the later more deliberate engagement with trauma-related information. Continued intrusions are considered less constructive because they signify that the transition to deliberate processing has not occurred and distress remains elevated.

Whilst findings from several of the studies reviewed support this model of intrusive processing, other findings indicate that a) early intrusions do not always predict subsequent growth (e.g. Salsman et al., 2009; Wolchik et al., 2008) and b) current intrusive processing can predict greater growth (e.g. Park & Fenster, 2004; Morris & Shakespeare-Finch, 2010; Taku et al., 2008). In addition, many of the studies providing support for the positive role of early intrusive processing assessed intrusive ruminations retrospectively which limits reliability since participants might be unable to accurately recall thought processes that occurred in the past, especially since recalling those thought processes that occurred soon after the event may be influenced by current trauma-related thought processes.

As a result of these inconsistencies concerning the relationship between automatic intrusive thoughts and growth following trauma, particularly with respect to the impact of early versus ongoing intrusions, there is a need for a more sophisticated understanding of the role of intrusive cognitive processing in posttraumatic growth. Further research is also warranted to examine how intrusive processing relates to more deliberate forms of processing in order to test the theoretical assumption that early intrusive processing fuels subsequent deliberate processing. Finally, as previously highlighted, intrusion is seen to reflect only one of several aspects of cognitive processing. The following section therefore moves from conceptualising cognitive processing as automatic, uncontrolled intrusive thoughts to a more effortful, controlled process that is considered particularly important in the development of posttraumatic growth.

2.5.2 Deliberate Processing

Several posttraumatic growth theorists have described a form of cognitive processing that is more deliberate, effortful and focused on making sense of the experience than the more automatic, intrusive types of repetitive thought previously discussed. Tedeschi and Calhoun (2004a) distinguish between automatic and intentional forms of cognitive processing, with automatic processing manifesting as intrusions while more intentional forms of processing are characterised by active, deliberate repetitive thoughts focused on understanding the event and its implications. Janoff-Bulman (1992) also hypothesised that there are two distinct cognitive strategies involved in the rebuilding of assumptive worlds: automatic, intrusive activity for the processing of new trauma-related information and more deliberate, effortful contemplation leading to the re-interpretation of that new information in light of existing assumptive worlds (see Greenberg, 1995).

In line with these theoretical descriptions of deliberate processing, 17 of the 29 studies in this review examined deliberate or effortful forms of cognitive processing using 7 different methods. Prior to the development of the deliberate rumination subscale of the Rumination Inventory (Calhoun et al., 2000), a range of measures were used to capture intentional cognitive processing. Three studies used the Reflection subscale of the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999). Boyraz, Horne and Sayger (2010) demonstrated that reflection was positively associated with positive meaning-finding among bereaved individuals and Boyraz and Efstathiou (2011) reported that reflection was positively associated with posttraumatic growth in bereaved women. However, Cann et al. (2011) found no significant association between reflection and posttraumatic growth in their study of college students that had recently experienced a traumatic event. Given their null findings, Cann et al. (2011) suggested that the use of the RRQ to assess deliberate processing was unsuitable because it captures a stable tendency to engage in reflective rumination, rather than the more transient, event-specific processing activity that occurs following a major life crisis.

Other studies have employed measures that are specifically designed to capture transient, trauma-related cognitive processing that is purposeful and designed to make sense of the event. Chan et al. (2011) used the Positive subscale of the Chinese Cancer Related Rumination Scale (CCRRS) to measure the frequency of rumination about the positive aspects of the cancer experience (e.g. "I have thought about how to best manage the challenges associated with cancer"). Their results demonstrated that positive cancer related rumination was significantly and positively associated with posttraumatic growth in women with breast cancer. Salsman et al. (2009) assessed effortful processing using the 4-item 'Cognitive Rehearsal and Processing' subscale of the Rumination Scale (Martin, Tesser &

McIntosh, 1993) and found that effortful processing was positively associated with posttraumatic growth among individuals with colorectal cancer. Manne et al. (2004) assessed deliberate cognitive processing using three items evaluating the extent to which participants had tried to find some meaning in their experience with cancer. Results demonstrated that greater frequency of thoughts contemplating the potential reasons why they had developed cancer and engaging in more attempts to search for meaning in cancer predicted greater growth in breast cancer patients, while searching for the cause of cancer was not associated with posttraumatic growth. Cohen and Numa (2011) used the same three cognitive processing items in their study of women with breast cancer, although their analyses relied on the mean score rather than separate analysis of each item. Results from this study demonstrated that deliberate cognitive processing positively predicted posttraumatic growth.

While findings from these studies provide evidence that deliberate cognitive processing is associated with greater posttraumatic growth, the measures used in Salsman et al. (2009), Manne et al. (2004) and Cohen and Numa (2011) consisted of only 3 or 4 items to capture cognitive processing which may be insufficient for comprehensively exploring the construct of trauma-specific cognitive activity. Likewise, the use of these items as scales to assess deliberate, effortful cognitive processing has not yet been psychometrically explored or validated and as such, findings from these studies must be interpreted with caution. In addition, all four studies assessed cognitive processing and posttraumatic growth in cancer patients or survivors. While it is important to understand the impact of deliberate cancer-related cognitive processing, theories of posttraumatic growth must extend to all trauma survivors and as such, further work using individuals exposed to a variety of traumatic events is warranted.

Recognising the need for a measure of trauma-specific cognitive processing, Williams, Davis and Millsap (2002) developed the Cognitive Processing of Trauma Scale (CPOTS). The CPOTS consists of 17 items assessing five aspects of cognitive processing: a) positive cognitive restructuring, b) downward comparison, c) resolution/acceptance, d) denial and e) regrets, with the first 3 subscales representing positive cognitive processing and the latter 2 subscales representing a lack of cognitive processing. Findings from Williams et al. (2002) demonstrated that the 3 CPOTS positive processing subscales were positively associated with posttraumatic growth while the 2 CPOTS negative processing subscales were not significantly associated with growth.

A subsequent study by Gangstad et al. (2009) replicated these findings by demonstrating positive associations between the 3 CPOTS positive processing subscales and posttraumatic growth in a sample of stroke survivors, although Gangstad et al. (2009) unexpectedly found that the negative subscale denial was also positively associated with growth. Finally, Phelps et al. (2008) used a modified version of the CPOTS which comprised only two subscales: positive processing and negative processing, where positive processing consisted of items relating to positive cognitive restructuring, resolution and acceptance. Results from this study revealed that positive cognitive processing 9 weeks following limb amputation was positively associated with posttraumatic growth at 12 month follow up.

Using a qualitative methodology, Bower et al. (1998) assessed deliberate cognitive processing using transcripts of semi-structured interviews about bereavement in their study of HIV-seropositive men who had recently been bereaved of a close friend or partner to AIDS. They defined cognitive processing as “deliberate, effortful or long-lasting thinking about the death,” and all statements that reflected active or deliberate thinking about the death were

coded as cognitive processing (p. 980). Results from this study showed that cognitive processing was significantly associated with the discovery of meaning, such that men who engaged in active or deliberate thinking about the death were more likely to report positive shifts in their values or priorities in response to the loss.

The final group of studies to be discussed are those that used the deliberate processing subscale of the Rumination Inventory (Calhoun et al., 2000) to capture purposeful cognitive processing. Although the original version of the Rumination Inventory included items designed to capture deliberate rumination about a traumatic event, Calhoun et al. (2000) did not distinguish between intrusive and deliberate rumination items in their analyses and instead combined all 7 items into a single 'event-related rumination' score. However, subsequent work by Taku et al. (2008) used a Japanese translation of the Rumination Inventory and separated the items into the respective intrusive and deliberate rumination subscales. Their results demonstrated that deliberate rumination, both soon after the event and recently, was positively associated with posttraumatic growth.

Following the publication of Taku et al. (2008), 6 studies used the deliberate rumination subscale to assess deliberate cognitive processing, although all of those studies made adjustments to the scale by adding items (Cann et al., 2010; Cann et al., 2011; Nightingale et al., 2010), removing items (Taku et al., 2009), adjusting it for use with children (Kilmer & Gil-Rivas, 2010), or exploring an alternative factor structure (Morris & Shakespeare-Finch, 2010). Despite these differences in the items used to capture deliberate processing, the findings across the 6 studies were largely consistent, with 5 of the 6 studies reporting positive associations between recent deliberate processing and posttraumatic growth. However, inconsistencies were observed with respect to deliberate processing soon

after the event, with some studies demonstrating that early deliberate rumination positively predicted subsequent growth (Cann et al., 2011; Taku et al., 2008; Taku et al., 2009), while other studies failed to detect a significant impact of early deliberate rumination on posttraumatic growth (Cann et al., 2010; Kilmer & Gil-Rivas, 2010; Nightingale et al., 2010).

These mixed findings concerning the role of deliberate cognitive processing soon after the event highlight the need for longitudinal research to more accurately examine the relative influence of early and recent cognitive processing. The assessment of early deliberate rumination in these studies relied on retrospective reports of thought processes that occurred in the past and, as previously highlighted, such reports could be biased by an inability to accurately recall the type and frequency of trauma-related thoughts that one experienced in the first few weeks following a traumatic event. It is also not yet known how such retrospective reports may be influenced by current trauma-related thinking patterns. As such, although these studies are useful in providing a rudimentary insight into patterns of processing subtypes over time and their association with growth, more rigorous longitudinal testing of Calhoun, Cann and Tedeschi's (2010) model is required.

Nevertheless, the findings from the studies reviewed in this section demonstrate the importance of expanding the conceptualisation of cognitive processing to include deliberate, effortful contemplation of trauma-related material, given its important role in the occurrence of growth following trauma and adversity. This deliberate, reflective way of contemplating past traumas is thought to help repair, restructure and rebuild the schemas that have been shattered by the trauma and is therefore considered to be fundamentally important in facilitating posttraumatic growth (Calhoun, Cann & Tedeschi, 2010). As demonstrated in this review, existing work in this area has shown positive associations between indicators of

deliberate processing and posttraumatic growth, with recent evidence in particular supporting the theoretical suggestion that recent event-focused cognitive processing that reflects attempts to make meaning is crucial to growth outcomes. Despite this progress, empirical evidence is required to confirm the theoretical distinction between intrusive and deliberate types of processing, since none of the studies examined in this review tested the factor structure of the measures they used in order to establish whether the hypothesised subtypes of processing are distinct. As such, further research in this area is warranted.

2.5.3 Ruminative Processing

Theoretical models of posttraumatic growth have largely conceptualised cognitive processing as bi-dimensional, comprising of either intrusive or deliberate trauma-related thoughts. However, a small number of researchers have acknowledged that repetitive trauma-related thoughts can also be ruminative in nature. In their theoretical model of bereavement-related cognitive processing, Michael and Snyder (2005) identified a ruminative form of processing that is characterised by a repetitive focus on the negative aspects of the death and the inability to resolve the loss, in contrast to a more purposeful form of processing aimed at finding meaning and resolution (Michael & Snyder, 2005). Similarly, Phelps et al. (2008) acknowledged that cognitive processing can be characterised by ruminative thoughts that include counterfactual thinking, blaming oneself or others, and repetitive thoughts concerning “Why me?” or “Why didn’t I do something different?” Such ruminative processing is considered to be qualitatively different from the deliberate cognitive processing that includes active engagement in meaning making (Phelps et al., 2008), and the intrusive processing that includes the automatic invasion of trauma-related memories into conscious awareness (Michael & Snyder, 2005).

Tedeschi and Calhoun (2004a; Calhoun & Tedeschi, 2006; Calhoun, Cann & Tedeschi, 2010) have also emphasised the importance of ruminative processing in their model of posttraumatic growth. However, attention to their definition of rumination simply as a general process of frequently returning to thoughts of the trauma highlights important conceptual differences between the type of ruminative processing that they refer to and the type of repetitive, cyclical, distress-focused thoughts that are understood as ruminative processing both in the wider rumination literature and in this thesis. Thus, Tedeschi and Calhoun (2004a) are critical of the restrictive use of the term rumination to refer to “exclusively negative, self-punitive thinking,” (p. 9) and argue that depressive rumination is fundamentally different from event-related rumination, which entails activation and contemplation of trauma-related material that can be either intrusive or more deliberate in nature (Calhoun & Tedeschi, 1998). However, as is clear from this definition, their understanding of rumination following trauma is more akin to the intrusive and deliberate processing styles described in the previous sections, rather than the more commonly used conceptualisation of rumination as a style of responding to negative feelings that involves repetitively and passively focusing on the causes, meanings or consequences of those feelings (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008). As such, it becomes apparent that when Tedeschi and Calhoun (2004a) refer to rumination, they are using this term to depict intrusive or deliberate cognitive processing activity, rather than recurrent negative thoughts that are focused on the incomprehensible aspects of the experience and one’s inability to find meaning.

In order to avoid confusion about the types and nature of processing being discussed, this thesis amends Tedeschi and Calhoun’s (2004a) terminology by referring to intrusive *processing* and deliberate *processing*, rather than intrusive rumination and deliberate

rumination. Similarly, for the purposes of this thesis, rumination is understood as a type of repetitive, automatic, hard-to-distract-from cognition that is largely focused on one's negative or sad feelings and their possible causes or implications (Nolen-Hoeksema, 1991), rather than the conceptualisation of rumination offered by Tedeschi and Calhoun (2004a). Ruminative processing following traumatic events is therefore conceptualised as a distress-focused form of repetitive thought that centres on the unchangeable or uncontrollable aspects of the event, its negative implications, one's perceived inability to find resolution, and how bad it is to feel that way.

This aspect of cognitive processing has often been incorporated into the construct of intrusive processing, where the two are frequently considered essentially equivalent (e.g. Holman & Silver, 1998). Likewise, Calhoun, Cann and Tedeschi (2010) combine intrusions and ruminations into a single 'intrusive rumination' construct and their model fails to capture the distinction between the two. Recent theoretical (Ehlers & Clark, 2000; Joseph, Williams & Yule, 1997) and empirical (Speckens et al., 2007) work has suggested that intrusions and ruminations are phenomenologically and functionally distinct. Thus, intrusions mainly consist of relatively brief sensory fragments of the traumatic experience that appear to be happening in the here and now, while ruminations are largely more abstract thought processes that include 'why?' and 'what if?' type questions and a repetitive dwelling on how one's life has been impacted by the event (Speckens et al., 2007).

In line with this distinction between intrusive re-experiencing and rumination, intrusive processing and ruminative processing are hypothesised to reflect different forms of cognitive processing that may be differentially associated with posttraumatic growth. Some may question the appropriateness of conceptualising rumination as a form of cognitive

processing, given the traditional emphasis on cognitive processing as a largely productive activity that promotes resolution and adjustment (e.g. Tedeschi & Calhoun, 2004a; Williams et al., 2002) and rumination as a maladaptive thought process that exacerbates distress (Nolen-Hoeksema, 1991). However, it is not necessarily the case that all forms of cognitive processing are entirely adaptive and we know that the effects of contemplating past traumas are not uniformly positive. Similarly, as Ørner & Stolz (2002) highlight, not all repetition phenomena following trauma are the same and their diversity must be recognised. Different types of repetitive thought about a traumatic experience are likely to differentially relate to adjustment following trauma, thus it is important to understand and develop a more consistent way of differentiating adaptive and maladaptive cognitive responses to trauma. In addition, it is important to understand the processes and types of repetitive thought that might impede the development of posttraumatic growth, as well as those that might facilitate it.

Furthermore, there is the possibility that rumination may have a positive role to play in the occurrence of growth following adversity. Taking the literature on intrusive thoughts following trauma as a comparison, inspection of this literature demonstrates that it is only relatively recently that the potentially functional value of intrusions has been acknowledged (e.g. Creamer et al., 1992). Prior to this, intrusive trauma-related thoughts were overwhelmingly considered to reflect a primary symptom of posttraumatic stress disorder and as such were seen to represent impeded processing and poor adjustment. Likewise, although rumination, as it is currently understood, might be considered to be a maladaptive cognitive activity that reflects circular thinking and an inability to resolve a traumatic experience, there is the possibility that rumination could serve an important function in the process of working through traumatic events, perhaps by stimulating engagement with unanswered questions and sense making activities. Given the infancy of the application of rumination to the growth

literature, this suggestion remains speculative. As such, one of the aims of this thesis was to empirically explore the nature and impact of ruminative processing in posttraumatic growth.

In line with this conceptualisation of ruminative cognitive processing, 5 studies included in this review explored the association between ruminative cognitive processing and posttraumatic growth. Boyraz and Efstathiou (2011) assessed rumination using the Rumination subscale of the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999) and failed to detect any significant association between rumination and posttraumatic growth in a sample of bereaved women. Phelps et al. (2008) captured ruminative processing using the negative processing subscale of the modified Cognitive Processing of Trauma Scale (CPOTS; Williams et al., 2002) which included rumination, counterfactual thinking, denial, blaming oneself or others, and feeling like a victim. Their results also demonstrated that the association between ruminative processing and posttraumatic growth was not significant. Like Boyraz and Efstathiou (2011), Cann et al. (2011) used the RRQ Rumination subscale to assess ruminative processing and reported that rumination was negatively associated with posttraumatic growth, leading the authors to conclude that the tendency to ruminatively focus on distress and potential losses can inhibit the experience of growth.

However, Michael and Snyder (2005) reported that bereavement-related ruminative processing was positively associated with posttraumatic growth amongst individuals that had been bereaved more than 12 months previously. Likewise, Kleim and Ehlers (2009) assessed rumination using the 10-item version of the Response Styles Questionnaire (Nolen-Hoeksema, Morrow & Fredrickson, 1993) and reported that ruminative thinking 2 weeks after the event significantly predicted posttraumatic growth at 6 month follow-up in a sample

of physical or sexual assault survivors. An additional study by Kane (2009), which was excluded from the literature review because it was an unpublished doctoral dissertation but nevertheless has important findings, assessed trait rumination using the Rumination subscale of the RRQ (Trapnell & Campbell, 1999) and state rumination using the Brooding subscale of the Mood Orientation Scale (McFarland & Buhler, 1998) and reported small but significant positive associations between ruminative thoughts and posttraumatic growth for both trait and state forms of rumination. These latter findings indicate that ruminative engagement with trauma-related distress is not necessarily maladaptive and might potentially motivate the re-assessment and re-interpretation of traumatic material that contributes to subsequent growth. However, given the limited evidence body and inconclusive findings, further research is clearly warranted.

In addition, many of the measures of ruminative processing employed in the studies reviewed were not specifically designed to capture trauma-focused ruminative processing. The Rumination-Reflection Questionnaire (Trapnell & Campbell, 1998) and the Response Styles Questionnaire (Nolen-Hoeksema, Morrow & Fredrickson, 1993) are designed to assess dispositional self-focusing processes rather than event specific rumination triggered by trauma. While it is useful to understand how people generally process emotional material, it is important when testing posttraumatic cognitive processing models that event-specific processing activity is also captured. The only measure of ruminative processing to do this is the negative processing subscale of the Cognitive Processing of Trauma Scale (CPOTS, Williams et al., 2002), although in the study by Phelps et al. (2008), the rumination items were combined with items relating to anger, victimisation and denial to create a negative processing subscale such that it was not possible to isolate the impact of ruminative processing in this study. For research in this area to progress, it will rely on the identification

or development of a measure of ruminative processing that is specifically designed to capture transient trauma-focused cognitive activity that is ruminative in nature.

2.6 Methodological Considerations

Before concluding this review, attention to several methodological issues is warranted. First, as has been noted in previous sections, the need for well-validated measures of trauma-focused cognitive processing is evident. The absence of such measures has, in part, contributed to the current diversity in the assessment of processing, with 14 different measures of cognitive processing employed in the 29 studies reviewed. A lack of consistency in the use of measures was also evident, with many studies adapting, modifying, shortening or expanding published scales to suit the demands of their research such that overall, there were 22 different methods for assessing cognitive processing across the 29 studies reviewed. These inconsistencies in research design compromise comparison across studies and hinder the possibility of establishing a unified literature. The consequences of this are evident in the diversity of findings concerning the relationship between cognitive processing and posttraumatic growth.

Second, 21 of the 29 studies in this review were cross-sectional in design and as a result it is not possible to establish the direction of causal relationships between associated variables. As such, it could be that deliberate cognitive processing leads to posttraumatic growth, posttraumatic growth leads to deliberate cognitive processing, or a third variable leads to both deliberate cognitive processing and posttraumatic growth. Studies with fully prospective longitudinal designs are necessary to more accurately establish the strength and direction of the relationships between subtypes of cognitive processing and posttraumatic growth over time, although such methodological designs are extremely resource-intensive

and difficult to conduct. Nevertheless, this research field would benefit greatly from studies using approximations of this ‘gold standard’.

2.7 Conclusions

This review has examined 29 published studies exploring the nature of cognitive processing following traumatic life events and its association with posttraumatic growth. Based on the preceding review, it can be argued that cognitive processing is best conceptualised as a multifaceted construct comprising several distinct but related subtypes of processing. These subtypes can be seen as falling into three main categories: intrusive processing, deliberate processing and ruminative processing. Intrusive processing is seen to represent an automatic, memory-driven type of processing that is predominantly sensory and involves replaying or reliving the event. Deliberate processing represents a deeper, more intentional form of processing that involves effortful contemplation of the meaning of the trauma and how it can be resolved. Ruminative processing is seen to represent a more superficial, distress-focused form of repetitive thought that centres on the unchangeable or uncontrollable aspects of the event and its negative implications. While there is likely to be some degree of overlap between these three aspects of cognitive processing, it is hypothesised that they are essentially distinct and will differentially relate to growth following trauma.

The evidence reviewed in this chapter indicates that of the three processing subtypes, deliberate processing is perhaps the best understood, with a degree of empirical consensus that it plays a strong role in the development of posttraumatic growth. This supports theoretical models that have also placed most emphasis on deliberate processing (Calhoun, Cann & Tedeschi, 2010). However, this is not to say that the literature is unanimous or that

there is not more to learn about the nature and role of deliberate processing. Several unanswered questions remain, including how deliberate processing relates to intrusive and ruminative forms of processing, what factors contribute to engagement in deliberate processing, whether deliberate processing can be facilitated, and if so, whether improved deliberate processing contributes to corresponding increases in posttraumatic growth.

Findings from this review also highlight that there is much to learn about the nature and role of intrusive processing in posttraumatic growth. The question of whether intrusive thoughts about a traumatic experience are adaptive remains an unanswered one, in part because, to date, the assessment of intrusive processing has been confounded by measures tapping into distressing intrusive experiences rather than a cognitive processing mechanism. Likewise, the theoretical assumption that early intrusive processing is only adaptive via its role in stimulating subsequent deliberate processing also needs to be tested.

With respect to ruminative cognitive processing, the paucity of studies examining this aspect of trauma-related cognitive activity demonstrates the need for further work in this area. Such work will rely on the development of a validated measure designed to capture this form of processing that can occur following traumatic life events. It is also necessary to empirically confirm the theoretical distinction between intrusive and ruminative forms of processing. Attention to the potential adaptive value of rumination in motivating the re-assessment and re-interpretation of traumatic material is also warranted.

Table 2.1 Summary of Published Studies Examining Cognitive Processing and Posttraumatic Growth

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Bower, Kemeny, Taylor & Fahey (1998)	HIV-seropositive men who had recently experienced AIDS-related bereavement	40	<i>M</i> = 8 months following bereavement (range = 4 days to 18 months)	Assessed via semi-structured interviews of psychological response to loss. All statements reflecting active, deliberate thinking about the death were coded as cognitive processing.	Inter-rater agreement was acceptable ($k = .67, p < .01$)	Assessed discovery of meaning via semi-structured interviews of psychological response to loss. All statements reflecting a significant change in values, priorities or perspectives in response to the death were coded as discovery of meaning.	Cognitive processing was significantly associated with finding meaning in the bereavement. Among the men who reported finding meaning, 14 out of 16 reported high levels of cognitive processing. However, 12 out of 26 men classified as high in cognitive processing did not find meaning from the bereavement, indicating that cognitive processing was not always associated with meaning finding.
Boyras & Efstathiou (2011)	Bereaved women	187	26.2% within the last year; 38.5% within the last 4 years; and 35.3% more than 4 years previously	Rumination-Reflection Questionnaire (RRQ)	Rumination $\alpha = .93$ Reflection $\alpha = .91$	PTGI	Reflection was positively associated with posttraumatic growth ($r = .21, p < .01$) while rumination was not significantly associated with growth ($r = -.08, p > .05$). Further analyses using structural equation modelling indicated that the direct path from reflection to growth was not significant but was fully mediated by positive affect. Positive affect also fully mediated the relationship between rumination and posttraumatic growth such that women who engaged in rumination reported lower positive affect, which was in turn associated with lower growth.
Boyras, Horne & Sayger (2010)	Bereaved individuals	380	50.3% within the last year; 38.4% within the last 5 years; and 11.3% more than 5 years	Reflection subscale of the Rumination-Reflection Questionnaire (RRQ)	$\alpha = .91$	Modified version of the Positive Meaning Scale (Tugade & Fredrickson, 2004)	Reflection was significantly positively correlated with positive meaning finding ($r = .44$). Reflection was also found to partially mediate the relationship between search for meaning and positive meaning finding.

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Calhoun, Cann, Tedeschi & McMillan (2000)	College students pre-screened for recent trauma history	54	Within the last 3 years	The Rumination Inventory: 7 specifically selected items from prior measures designed to capture intrusive and deliberate rumination about a traumatic event. Each item is rated with respect to rumination soon after the event and rumination within the last 2 weeks.	Rumination soon after $\alpha = .81$ Rumination recently $\alpha = .88$	PTGI	Event-related rumination soon after the event (assessed retrospectively) and recent rumination were both positively associated with posttraumatic growth ($r = .57, p < .001$ and $r = .45, p < .001$, respectively). Regression analyses showed rumination soon after the event was a significant predictor of posttraumatic growth.
Cann, Calhoun, Tedeschi & Solomon (2010)	College students pre-screened for recent trauma history	118	$M = 15.1$ months; $SD = 10.8$ months	Modified version of the Rumination Inventory (scale used in Calhoun et al., 2000). This version consists of 12 items: 6 assessing intrusive rumination and 6 assessing deliberate rumination. Each item is responded to in two different time frames: soon after the event and within the last 3 weeks.	Intrusive rumination $\alpha = .80$ Deliberate rumination $\alpha = .93$	Paired-format PTGI-42 (Baker et al., 2008)	Intrusive and deliberate rumination soon after the event were positively associated with posttraumatic growth ($r = .33, p < .05$ and $r = .49, p < .05$, respectively). Recent deliberate rumination was positively associated with posttraumatic growth ($r = .40, p < .05$), while recent intrusive rumination was not ($r = .20, ns$). Regression analyses demonstrated that recent deliberate rumination positively predicted posttraumatic growth while recent intrusive rumination negatively predicted growth.
Cann, Calhoun, Tedeschi, Triplett, Vishnevsky & Lindstrom (2011)	College students pre-screened for recent trauma history	400	Within the last 8 months	Event-Related Rumination Inventory (ERRI; product of further revision and expansion of scale used in Calhoun et al., 2000). Consists of 20 items: 10 assessing intrusive rumination and 10 assessing deliberate rumination. Also used the Rumination-Reflection Questionnaire (RRQ)	Intrusive rumination $\alpha = .94$ Deliberate rumination $\alpha = .88$ Reflection $\alpha = .78$ Rumination $\alpha = .88$	PTGI	Deliberate rumination, both soon after the event and recently, positively predicted posttraumatic growth. Intrusive rumination did not predict posttraumatic growth, but was a significant predictor of Deliberate rumination both soon after the event and recently. RRQ Reflection also predicted recent Deliberate rumination. RRQ Rumination and Reflection were not significantly correlated with posttraumatic growth in either time frame. RRQ Reflection did not significantly predict posttraumatic growth, while RRQ Rumination negatively predicted growth.

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Carboon, Anderson, Pollard, Szer & Seymour (2005)	Adults being treated for hematologic (blood system) cancer	62	<i>M</i> = 6.21 months post diagnosis <i>SD</i> = 1.53 months	Re-experiencing subscale of the PTSD Checklist – Civilian version (PCL-C). Cognitive avoidance subscale of the Mini Mental Adjustment to Cancer Scale (MAC) – active avoidance conceptualised as an indicator of absence of processing.	Not provided	PTGI	Intrusive re-experiencing during treatment was positively associated with Spiritual Change at treatment completion ($r = .22, p < .05$) but did not significantly predict any domains of growth in the regression model. Cognitive avoidance during treatment positively predicted Personal Strength at treatment completion.
Chan, Ho, Tedeschi & Leung (2011)	Women with breast cancer	170	<i>M</i> = 15.59 months since diagnosis; <i>SD</i> = 5.84 months	The Chinese Cancer-Related Rumination Scale (CCRRS). Contains 2 subscales: 6 items assessing negative cancer-related rumination (NCRR) and 6 items assessing positive cancer-related rumination (PCRR)	NCRR $\alpha = .79$ PCRR $\alpha = .66$	Chinese PTGI	Positive cancer-related rumination (PCRR) was positively associated with posttraumatic growth ($r = .51, p < .001$), while negative cancer-related rumination (NCRR) was not significantly associated with growth ($r = -.06, ns$). PCRR also positively predicted posttraumatic growth in the regression model.
Cohen & Numa (2011)	Breast cancer survivors	124	<i>M</i> = 9.95 years since diagnosis	The Cognitive Processing Scale (from Manne et al., 2004). Consisted of 3 items evaluating how often in the previous month the respondent had 1) searched for meaning; 2) searched for a cause; and 3) contemplated the reason for their experience with cancer.	$\alpha = .83$	Hebrew version of the PTGI	Cognitive processing was positively associated with posttraumatic growth ($r = .39, p < .001$) and positively predicted posttraumatic growth in the regression model.
Cryder, Kilmer, Tedeschi & Calhoun (2006)	Child survivors of Hurricane Floyd	46	1 year post-hurricane	The Rumination Scale for Children (5 item adaptation of The Rumination Inventory used in Calhoun et al., 2000). Estimated the deliberateness, intrusiveness and content of their thoughts about the hurricane.	$\alpha = .75$	PTGI for Children	Ruminative thinking was not significantly associated with posttraumatic growth.

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Finzi-Dottan, Triwitz & Golubchik (2011)	Parents of children with ADHD	151	Not provided	Modified version of the Cognitive Appraisal Questionnaire for Parenthood (Dimitrovsky, Levy-Shiff & Perl, 2000). Contains 19 items: 10 referring to the extent that parenting is viewed as a challenge with potential positive implications (e.g. "To what extent does being a parent give meaning to your life?") and 9 items referring to the extent that parenting is viewed as a threat with potential negative implications (e.g. "To what extent does being a parent jeopardise your independence?").	Challenge $\alpha = .80$ Threat $\alpha = .82$	PTGI	Viewing parenthood as a challenge was positively associated with posttraumatic growth ($r = .46, p < .001$) while viewing parenthood as a threat was negatively associated with posttraumatic growth ($r = -.19, p < .01$). Viewing parenthood as a challenge also positively predicted growth in the regression analyses.
Gangstad, Norman & Barton (2009)	Stroke survivors	60	$M = 2.67$ years $SD = 1.99$ years	Cognitive Processing of Trauma Scale (CPOTS; Williams et al., 2002). Consists of 17 items assessing five aspects of cognitive processing: a) positive cognitive restructuring, b) downward comparison, c) resolution, d) denial and e) regrets.	Positive cognitive restructuring $\alpha = .73$; downward comparison $\alpha = .81$; resolution $\alpha = .81$; denial $\alpha = .67$ and regrets $\alpha = .76$	PTGI	4 of the 5 CPOTS subscales (positive cognitive restructuring, downward comparison, resolution and denial) were positively associated with posttraumatic growth (r 's = .52, .29, .44 and .38, respectively).
Kilmer & Gil-Rivas (2010)	Children impacted by Hurricane Katrina (age 7-10 years old)	51	$M = 12.62$ months since hurricane $SD = 4.08$ months	Rumination Scale for Children (5-item adaptation of the Rumination Inventory used in Calhoun et al., 2000). 2 items assessed intrusive rumination and 3 items assessed deliberate rumination.	Correlation between intrusive rumination items = .33. Deliberate rumination $\alpha = .65$	PTGI for Children - Revised	Intrusive and deliberate rumination were both positively associated with the children's posttraumatic growth at baseline ($r = .51, p < .001$ and $r = .54, p < .001$, respectively) and at 1 year follow-up ($r = .46, p < .001$ and $r = .35, p < .01$, respectively). Regression analyses showed that deliberate rumination was the only significant predictor of baseline posttraumatic... (continued over)

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
							(continued) ...growth, but that intrusive rumination, rather than deliberate rumination, was the only significant predictor of higher posttraumatic growth scores at 1 year follow-up.
Kleim & Ehlers (2009)	Assault survivors	180	<i>M</i> = 17.53 days since assault <i>SD</i> = 7.83	10 item version of the Response Styles Questionnaire (RSQ; Nolen-Hoeksema, 1991).	$\alpha = .93$	PTGI	Ruminative thinking style at 2 weeks post-assault predicted greater posttraumatic growth at 6 months.
Manne, Ostroff, Winkel, Goldstein, Fox & Grana (2004)	Breast cancer patients and their partners	162	<i>M</i> = 4.5 months since diagnosis	Intrusion subscale of the Impact of Event Scale (IES; Horowitz, Wilner & Alvarez, 1979) used to assess automatic cognitive processing. Intentional cognitive processing was measured using 3 study-specific items evaluating how often in the previous month the respondent had searched for meaning; searched for a cause; and contemplated the reason for their experience with cancer.	IES Intrusion $\alpha = .86$ Not provided for intentional cognitive processing	PTGI	Intrusive thoughts were not associated with posttraumatic growth for breast cancer patients but intrusive thoughts did predict increased growth over time in their partners. Greater frequency of thoughts contemplating the potential reasons why they had developed cancer and engaging in more attempts to search for meaning in cancer predicted greater growth in breast cancer patients but not their partners. Searching for the cause of cancer was not associated with growth in patients or their partners.
Michael & Snyder (2005)	Bereaved college students	158	Acute sample: (<i>n</i> = 34) within last 12 months. Prolonged sample: (<i>n</i> = 124) 13 or more months previously	Study-specific measure of bereavement-related processing. Consisted of 9 items: 7 'rumination' items tapping repetitive thoughts and the degree to which those thoughts were intrusive or distressing, and 2 finding meaning items: "Do you feel that you have been able to make sense of the death?" and "Have you found anything positive in this experience?"	$\alpha = .84$	PTGI	Rumination was positively associated with posttraumatic growth in the prolonged sample ($r = .31, p < .001$). Making sense of the death was negatively correlated with rumination in both the acute group ($r = -.66, p < .001$) and the prolonged group ($r = -.29, p < .001$). Associations between the finding meaning items and posttraumatic growth were not reported in this study.

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Morris & Shakespeare-Finch (2010)	Cancer patients	313	$M = 2.12$ years since diagnosis $SD = 1.86$ years	Modified version of the Rumination Inventory (scale used in Calhoun et al., 2000). This version consists of 6 items assessing rumination following a traumatic event. Principal components analysis in this study revealed a 3 factor solution comprising intrusive rumination, deliberate rumination of benefits and life purpose rumination.	Intrusive rumination $\alpha = .85$ Deliberate rumination of benefits $\alpha = .86$ Life purpose rumination $\alpha = .87$	PTGI	Posttraumatic growth was positively associated with intrusive rumination ($r = .27, p < .001$), deliberate rumination of benefits ($r = .47, p < .001$) and life purpose rumination ($r = .39, p < .001$). Structural equation modelling revealed that deliberate rumination of benefits was positively related to posttraumatic growth. Intrusive rumination and ruminating on the purpose of life were positively related to distress (as measured by IES-R Total).
Nightingale, Sher & Hansen (2010)	Individuals with HIV	112	$M = 10.9$ years since diagnosis $SD = 5.7$ years	Modified version of the Rumination Inventory (scale used in Calhoun et al., 2000). This version consists of 12 items: 6 assessing intrusive rumination and 6 assessing deliberate rumination. Each item is responded to in two different time frames: during the first 3 months following HIV diagnosis and over the past 3 months.	α 's ranged from .67 to .91	PTGI	Intrusive and deliberate processing in the first months following HIV diagnosis were positively associated with posttraumatic growth ($r = .31, p < .01$ and $r = .23, p < .05$, respectively). Likewise, current intrusive and deliberate rumination were positively associated with posttraumatic ($r = .21, p < .05$ and $r = .33, p < .01$, respectively). Path analyses showed that past, but not current, intrusive processing was directly associated with posttraumatic growth. Conversely, current, but not past, deliberate processing was directly associated with posttraumatic growth.
Park, Chmielewski & Blank (2010)	Younger adult cancer survivors	167	$M = 2.6$ years since diagnosis $SD = 1.6$ years	Intrusion subscale of the Impact of Event Scale (IES)	$\alpha = .86$	Perceived Benefits Scale	Intrusive thoughts were negatively associated with posttraumatic growth ($r = -.26, p < .001$).
Park & Fenster (2004)	College students	94	$M = 2.88$ months, $SD = 1.63$ months	Impact of Event Scale (IES)	Intrusion $\alpha = .88$ Avoidance $\alpha = .83$	SRGS	Intrusive thoughts positively predicted stress-related growth, while avoidance was not significantly associated with growth.

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Phelps, Williams, Raichle, Turner & Ehde (2008)	Adults with newly acquired limb loss	83	Within 9 weeks of amputation	Adapted version of the Cognitive Processing of Trauma Scale (CPOTS; Williams et al., 2002). Consists of 20 items which were subjected to principal components analysis which resulted in a two-factor solution reflecting positive and negative aspects of cognitive processing. Positive processing (8 items) included items from the original positive cognitive restructuring, resolution and acceptance subscales. Negative processing (7 items) included counterfactual thinking, rumination, anger, denial, blaming of self or others, and feeling like a victim.	Positive processing $\alpha = .82$ Negative processing $\alpha = .73$	PTGI	Positive cognitive processing at 9 weeks post-amputation was positively associated with posttraumatic growth at 12-month follow up ($r = .33, p < .01$), while negative cognitive processing at 9 weeks was not significantly associated with posttraumatic growth at 12 month follow up ($r = .12, ns$). Positive cognitive processing was also predictive of increased posttraumatic growth at 12-month follow up. Negative cognitive processing at 9 weeks post-amputation was predictive of PTSD symptom severity at 6 month follow-up.
Proffitt, Cann, Calhoun & Tedeschi (2007)	Judeo-Christian clergy that had experienced a personally traumatic event	30	Not reported	The Rumination Inventory (scale used in Calhoun et al., 2000). Consists of 7 items developed to assess the self-reported frequency of repeated thoughts about a trauma. Each item is asked in two time frames: soon after the event and within the last two weeks.	Rumination soon after event $\alpha = .70$ Rumination recently $\alpha = .87$	PTGI	Rumination soon after the event was positively associated with current posttraumatic growth ($r = .45, p < .05$), whilst recent rumination and posttraumatic growth were unrelated ($r = .10, ns$). In the regression model, rumination soon after the event positively predicted posttraumatic growth, while recent rumination negatively predicted growth, indicating that continued rumination well after the event might suggest ongoing difficulty in resolving issues and realising growth.

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Salsman, Segerstrom, Brechting, Carlson & Andrykowski (2009)	Colorectal cancer patients	55	$M = 1.07$ years post-diagnosis $SD = 0.19$ years	Intrusion subscale of the Impact of Event Scale (IES) to assess automatic processing. 4-item cognitive rehearsal and processing subscale of the Rumination Scale (Martin et al., 1993) to assess effortful processing.	Intrusion $\alpha = .88$ Cognitive rehearsal $\alpha = .69$	PTGI	Baseline intrusions were unrelated to baseline or 3 month posttraumatic growth ($r = .23$ and $r = .07$, respectively), while intrusion at 3 months was positively associated with 3 month posttraumatic growth ($r = .32, p < .05$). In the regression analyses, baseline intrusions were not significantly associated with baseline or 3 month posttraumatic growth. Baseline cognitive rehearsal was positively associated with 3month posttraumatic growth ($r = .36, p < .01$). However, regression analyses showed baseline cognitive rehearsal was not significantly predictive of baseline or 3 month posttraumatic growth, although the latter association showed a positive trend.
Sears, Stanton & Danoff-Burg (2003)	Women with early-stage breast cancer	92	$M = 7.12$ months since diagnosis $SD = 3.35$ months.	Study-specific measure termed the Perceived cancer-stress index which was a composite of the IES Intrusion and Avoidance subscales plus 2 items regarding sense of perceived control over cancer and 1 item regarding perceived stressfulness of the event	Not provided	PTGI	Perceived cancer stress was positively associated with posttraumatic growth at 12 month follow up ($r = .49, p < .01$). Perceived cancer stress was also shown to be a significant predictor of greater growth at 12-month follow-up and, together with longer time since diagnosis, predicted 30% of the variance in PTGI scores.
Senol-Durak & Ayvasik (2010)	Spouses of myocardial infarction patients	132	$M = 3.91$ years since MI; $SD = 8.05$ years	Developed a 'Cognitive process coping' variable consisting of: The Turkish version of the Impact of Event Scale – Revised (Isikli, 2006); The Turkish version of the Ways of Coping Inventory (Gencoz, Gencoz & Bozo, 2006); and two additional items relating to religious participation and beliefs.	Intrusion $\alpha = .88$ Avoidance $\alpha = .72$ Hyper-arousal $\alpha = .82$ Ways of Coping Inventory $\alpha = .71$	Turkish adaptation of the PTGI	All three IES-R subscales were significantly positively correlated with posttraumatic growth ($r = .33, r = .35$, and $r = .31$ for the intrusion, avoidance and hyper-arousal subscales, respectively; all p 's $< .01$). The cognitive process coping variable significantly predicted posttraumatic growth and accounted for 16% of the variance in PTGI scores.

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Taku, Calhoun, Cann & Tedeschi (2008)	Bereaved Japanese university students	71	26.8% within 2-12 months; 54.9% within 2-5 years; 18.3% over 5 years previously	Japanese translation of the Rumination Inventory (scale used in Calhoun et al., 2000). Consists of 7 items developed to assess the self-reported frequency of intrusive and deliberate ruminative thoughts about a trauma. Each item is asked in two time frames: soon after the event and recently.	Total score $\alpha = .88$	Japanese version of the PTGI	Recent intrusive and deliberate rumination were positively associated with posttraumatic growth ($r = .26, p < .05$ and $r = .37, p < .01$, respectively). Deliberate rumination soon after the event was also positively associated with posttraumatic growth ($r = .53, p < .01$). Results from structural equation modelling demonstrated that deliberate rumination soon after the event exerted a direct positive influence on posttraumatic growth, whilst intrusive rumination soon after the event and recent deliberate rumination both exerted an indirect positive effect on growth through their relationship with deliberate rumination soon after the event.
Taku, Cann, Tedeschi & Calhoun (2009)	US and Japanese college students	655	US sample $M = 34.91$ months; $SD = 53.75$ months Japanese sample $M = 40.80$ months; $SD = 37.59$ months	Modified version of the Rumination Inventory (scale used in Calhoun et al., 2000). Current study used 4 out of the 7 original items; 2 reflecting intrusive rumination and 2 reflecting deliberate rumination. Each of the 4 items was asked in two time frames: soon after the event and recently.	Intrusive rumination soon after $\alpha = .85, .86$; intrusive rumination recently $= .83, .89$; deliberate rumination soon after $\alpha = .72, .72$; and deliberate rumination recently $\alpha = .74, .77$ for US and Japanese samples, respectively.	PTGI	For the US sample, intrusive and deliberate rumination, both soon after the event and recently, were positively associated with posttraumatic growth (r 's = .31, .29, .23 and .46, respectively, all p 's < .01). The same pattern of associations was found in the Japanese sample (r 's = .25, .45, .22 and .51, respectively, all p 's < .01). In regression analyses, results for the US sample demonstrated that intrusive rumination soon after the event and recent deliberate rumination significantly predicted growth. For the Japanese sample, both intrusive and deliberate rumination soon after the event, and recent deliberate rumination positively predicted growth. Recent intrusive rumination was not a significant predictor of growth for either sample, while recent deliberate rumination was the strongest predictor of growth in both samples.

Study	Sample Type	N	Time Since Event	Measure of Cognitive Processing	Cognitive Processing Measure Reliability	Measure of Posttraumatic Growth	Main Findings
Williams, Davis & Millsap (2002)	College students	229	Information not provided	Cognitive Processing of Trauma Scale (CPOTS). Consists of 17 items assessing five aspects of cognitive processing: a) positive cognitive restructuring, b) downward comparison, c) resolution/acceptance, d) denial and e) regrets. Intrusion subscale of the Impact of Event Scale (IES)	Positive cognitive restructuring $\alpha = .83$; downward comparison $\alpha = .72$; resolution/acceptance $\alpha = .81$; denial $\alpha = .85$ and regrets $\alpha = .74$ Not provided for IES Intrusion.	SRGS	IES Intrusion was positively associated with the two negative subscales of the CPOTS (denial and regret, $r = .32, p < .001$ and $.25, p < .001$, respectively) and negatively associated with the three positive subscales of the CPOTS (resolution/acceptance, positive cognitive restructuring and downward comparison, $r = -.54, p < .001, r = -.16, p < .05$, and $r = -.21, p < .01$, respectively). Stress-related growth was positively associated with the CPOTS positive subscales (resolution/acceptance $r = .15, p < .01$; positive cognitive restructuring $r = .31, p < .001$, and downward comparison $r = .13, p < .05$) and not significantly associated with the CPOTS negative subscales. Intrusion and stress-related growth were positively associated ($r = .15, p < .05$).
Wolchik, Cox, Tein, Sandler & Ayers (2008)	Adolescents or young adults who had experienced parental death in childhood or adolescence	50	$M = 9.0$ months; $SD = 5.1$ months	Event-related rumination was assessed using the Intrusive Grief Thoughts Scale (IGTS) which consists of 9 items assessing the degree to which the respondent experiences intrusive, negative thoughts regarding the death which interfere with normal functioning (e.g. "How often did you think about how unfair it is that your parent died, even when you didn't want to?").	$\alpha = .85$	PTGI	Intrusive grief thoughts at baseline did not significantly predict stress-related growth at 6 year follow up.

Chapter 3

Thesis Aims and Research Questions

3.1 Aims

In the last 15 years, accumulating evidence has demonstrated the possibility of psychological growth following traumatic life events. Numerous personality, environmental, socio-demographic and event-related factors have been considered important in the development of posttraumatic growth and while the literature on some of these factors is relatively well developed, there is as yet no consensus regarding the role of cognitive processing in the development of posttraumatic growth (Calhoun & Tedeschi, 2006). As has been highlighted in the literature review (Chapter 2), there has been growing interest in this area in recent years and several studies have attempted to address the issue of how to assess cognitive processing (e.g. Cann et al., 2011) and how cognitive processing is associated with posttraumatic growth (e.g. Phelps et al., 2008; Taku et al., 2008; 2009). However, many of these studies have had differing conceptualisations of cognitive processing and have used a diverse range of measures to capture the construct. In addition, the cognitive processing literature has largely focused on intrusive or deliberate forms of cognitive processing, with scant attention to the possibility that ruminative thoughts could also represent a way of processing past traumas (e.g. Michael & Snyder, 2005). Furthermore, few longitudinal studies have been conducted that explore the nature and impact of cognitive processing over time. As such, there is still much to learn about the nature and role of posttraumatic cognitive processing.

Consequently, the broad aim of this thesis was to clarify our understanding of the relationship between cognitive processing and posttraumatic growth. Specifically, the goal was to theoretically identify and empirically distinguish subtypes of cognitive processing following traumatic life events and to explore the associations between these subtypes of processing and posttraumatic growth both cross-sectionally and longitudinally. As such, this research project sought to clarify the theoretical distinction between intrusive and deliberate forms of cognitive processing, as well as expanding this conceptualisation to include ruminative processing. Furthermore, it aspired to close the gaps within the current research literature by further elucidating the role of intrusive, deliberate and ruminative processing in the development of growth following adversity.

3.2 Research Questions

In line with the thesis aims, the main research questions asked were:

- I. How are intrusive, deliberate and ruminative subtypes of cognitive processing best assessed?
- II. Can intrusive, deliberate and ruminative forms of cognitive processing be empirically distinguished?
- III. How are these subtypes of cognitive processing cross-sectionally associated with posttraumatic growth?
- IV. What are the longitudinal associations between the subtypes of cognitive processing and posttraumatic growth?
- V. Can cognitive processing be facilitated using an expressive writing intervention?
- VI. Does expressive writing contribute to increased posttraumatic growth?
- VII. What are the associations between changes in cognitive processing and changes in posttraumatic growth, within an expressive writing intervention?

Chapter 4

Study 1: Distinguishing Subtypes of Cognitive Processing

4.1 Overview

This thesis conceptualises cognitive processing as comprising intrusive, deliberate and ruminative forms of repetitive thought about a prior traumatic experience. The current chapter sought to identify appropriate assessment tools for the measurement of these subtypes of processing and to explore whether they are empirically distinct. A further aim was to examine the relationship between the hypothesised subtypes of cognitive processing and posttraumatic growth using a cross-sectional study of 123 survivors of sexual abuse or sexual assault.

4.2 Assessing Subtypes of Cognitive Processing

Having identified and described the intrusive, deliberate and ruminative subtypes of cognitive processing that are the focus of this thesis, the studies from the literature review presented in Chapter 2 were examined to locate appropriate assessment tools for the measurement of each processing subtype. The decision of which measure to employ was based on consideration of several factors, including the extent to which the measure captured the features of the types of processing described, the extent to which it was a valid and psychometrically sound instrument, and the extent to which it had been used to assess cognitive processing in prior research. It is important to note that at the time of conducting the current study (June to September 2007), many of the measures of cognitive processing

that were outlined in the previous literature review chapter had not yet been published and as such, the range of measures available was limited.

4.2.1 Assessing Intrusive Processing

At the time of conducting this study, prior studies of intrusive cognitive processing had largely relied on the Intrusion subscale of the Impact of Event Scale (IES; Horowitz, Wilner & Alvarez, 1979) to assess processing. While the IES was originally developed as a measure of subjective distress following traumatic events, Horowitz (1986) also conceptualised it as a marker of cognitive processing and further research by Creamer et al. (1992) supported its use as a process variable to represent the extent of an individuals' cognitive processing of trauma. Thus, several studies have assessed intrusive processing using the IES Intrusion subscale (e.g. DuHamel et al., 2004; Manne, Glassman & Du Hamel, 2000; Manne et al., 2004; Park & Fenster, 2004; Salsman et al., 2009; Zakowski, Valdimarsdottir & Bovbjerg, 2001). IES intrusion has also been shown to correlate in expected ways with other indices of cognitive processing (e.g. Jind, 2001). Furthermore, the IES is a well validated measure that has been shown to possess good psychometric properties (Joseph, 2000) and is one of the most widely used self-report measures in the field of reactions to trauma (Creamer, Bell & Failla, 2003). In addition, a revised version of the IES, the Impact of Event Scale – Revised (IES-R; Weiss & Marmar, 1997) has been developed, which, amongst other improvements, adapted the scoring procedure from intervals of 0, 1, 3 and 5, to a 5-point format of 0-4 with equal intervals. Good psychometric properties for the IES-R have also been demonstrated (Creamer et al., 2003). The current study therefore used the Intrusion subscale of the IES-R to assess intrusive processing.

4.2.2 Assessing Deliberate Processing

At the time of this study, research assessing more deliberate forms of cognitive processing was noticeably limited and few measures existed that were specifically designed to assess deliberate cognitive processing following trauma. Although Calhoun et al. (2000) had published their paper using the Rumination Inventory, this version did not make the distinction between intrusive and deliberate forms of rumination and as such was not considered suitable for the current study. Manne et al.'s (2004) measure of intentional cognitive processing was also not considered appropriate since it comprised only 3 items and required adaptation for use with samples other than cancer patients.

Given the conceptualisation of deliberate processing as a purposeful reflection on a prior traumatic experience, it was felt that the Reflection subscale of the Ruminative Response Scale (RRS; Nolen-Hoeksema et al., 1993) might appropriately capture the sense of reflectively contemplating the impact of the event and its meaning. The Reflection subscale represents an active cognitive appraisal of one's situation and includes attempts to understand oneself and one's distress or negative feelings (Fresco, Frankel, Mennin, Turk & Heimburg, 2002; Treynor, Gonzalez & Nolen-Hoeksema, 2003). In addition, reflection has been shown to be associated with less depression over time (Treynor et al., 2003), more adaptive coping strategies (Burwell & Shirk, 2007), and reduced suicidal behaviour in depressed individuals (Crane, Barnhofer & Williams, 2007), indicating its potentially adaptive function. The current study therefore used the Reflection subscale of the RRS to assess deliberate processing. The RRS Reflection subscale was selected rather than the Reflection subscale of the Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999), which has previously been used to assess purposeful cognitive processing by Boyraz and Efstathiou (2011) and Boyraz et al. (2010), because RRQ Reflection focuses more on intellectual self-

interest and a curiosity in exploring oneself rather than the tendency to reflect on one's mood and potential sources of distress.

4.2.3 Assessing Ruminative Processing

Numerous definitions and conceptualisations of rumination exist and as a result there is a large literature on self-report measures of rumination (see Siegle, Moore & Thase, 2004 for a detailed review). Many of these measures have focused on depressive rumination and as such focus on responses to dysphoric mood and the possible causes or consequences of those moods. However, several research groups (e.g. Conway, Csank, Holm & Blake, 2000; Roberts, Gilboa & Gotlib, 1998; Segerstrom, Tsao, Alden & Craske, 2000) have expressed concern that traditional measures of rumination, such as the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991), are contaminated by items that essentially assess depressive symptoms rather than rumination. This prompted Treynor et al. (2003) to re-analyse the 22-item Ruminative Responses Scale (RRS) of the RSQ, which resulted in the subsequent removal of 12 depression laden items and separation of the remaining 10 items into two 5 item subscales: reflection and brooding. The reflection subscale is described in the previous section and was used in the current study to assess deliberate processing.

Brooding is characterised by a cognitive focus on the abstract, a passive comparison of one's current situation with some unachieved standard, and focusing on obstacles that prevent one from overcoming problems (Sloan, Marx, Epstein & Dobbs, 2008). In line with the conceptualisation of ruminative processing in this thesis, brooding denotes a process where negative feelings are passively observed or 'dwelled on' as opposed to actively worked through. It was therefore felt that the Brooding subscale of the RRS suitably captured many of the features of ruminative processing whilst ensuring it was not confounded by depression-

laden items. Thus, the brooding subscale was used to assess ruminative processing in the current study.

4.3 Posttraumatic Growth and Sexual Victimization

Epidemiological data have demonstrated that although traumatic events have often been considered to be ‘outside the range of normal human experience’, they are actually widespread and relatively common, with the majority of people experiencing at least one trauma during their lifetime (e.g. Kessler et al., 1995). Clearly prevalence rates for specific trauma types vary considerably, but perhaps one of the most common index traumas is sexual abuse or assault, with estimates suggesting that as many as 1 in 4 women are sexually assaulted in their lifetime (Campbell & Wasco, 2005). Similarly, international epidemiological data indicate that up to 25% of males and 42% of females are victims of childhood sexual abuse (Creighton, 2004), although these prevalence rates can vary considerably depending on the definition of sexual abuse used (Finkelhor, 1994). In addition, because sexual abuse or assault is often a hidden offence that goes undisclosed, it is difficult to establish how many cases actually occur, such that current prevalence rates are likely to be underestimations. Clearly, the problem of sexual victimisation is vast and it is essential that survivors of this type of trauma are studied in order to better understand the factors that influence the adjustment and growth that might occur following these experiences.

Despite the high prevalence of sexual victimisation, comparatively few studies have explored posttraumatic growth as a potential outcome of traumatic sexual experiences (e.g. Borja et al., 2006; Grubaugh & Resick, 2007; Lev-Wiesel, Amir & Besser, 2005; Shakespeare-Finch & De Dassel, 2009; Woodward & Joseph, 2003). Furthermore, many of the studies that have done so have been compromised by methodological limitations. For

instance, McMillan et al. (1995) investigated perceived benefit following childhood sexual abuse and reported that almost 47% of participants perceived at least some benefit from their unwanted sexual experiences as children. However, McMillan et al. (1995) did not use a standardised measure of perceived benefit and their sample was unsound because it consisted of women recruited through Child Protective Services, 57% of whom were known to have maltreated a child. Such women may have a number of additional stressors unrelated to their experience of childhood abuse that may obscure or complicate their reports of growth. More importantly, women who have maltreated a child may not be representative of the general population on a range of dimensions, which reduces the validity of these findings and limits their generalisability to other populations.

Research examining posttraumatic growth following sexual victimisation has also failed to explore the pattern of growth across domains. Thus, many studies in this area only present the total score on the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) and make no reference to nature of the growth reported in terms of domains of change. Calhoun and Tedeschi (2006) have suggested that different kinds of event initiate different patterns of posttraumatic growth, although few studies to date have explored this contention. It is unlikely that growth is uniform across all domains for all people, so the particular pattern and domains of change may be of significance. In addition, there are unique characteristics to sexually traumatic experiences that bring their own challenges to adjustment, which may in turn influence the nature of growth reported by survivors. Further research exploring the prevalence and domains of posttraumatic growth in survivors of traumatic sexual experiences is clearly warranted.

4.4 Aims and Hypotheses

In line with the broad aim of this thesis to identify subtypes of cognitive processing following trauma and explore their association with posttraumatic growth, the current chapter presents a cross-sectional study exploring the potential roles of intrusive, deliberate and ruminative processing in posttraumatic growth using measures of intrusive thought, reflection and ruminative brooding. The aims of this study were threefold. First, the study sought to explore the nature and prevalence of posttraumatic growth in a sample of sexual assault or abuse survivors. Of particular interest was whether certain domains of growth were more highly endorsed than other domains. Second, this study aimed to explore whether the three hypothesised subtypes of cognitive processing can be distinguished using principal components analysis. Thus, although it is theoretically assumed that intrusive, deliberate and ruminative types of processing are distinct, is there empirical evidence for this distinction? Third, the study sought to examine the relationship between these subtypes of cognitive processing and posttraumatic growth, with a particular emphasis on whether the subtypes of processing are differentially related to growth. Based on both theoretical suppositions and prior associations with other indices of adjustment, it was hypothesised that intrusive and deliberate processing would be positively associated with posttraumatic growth while ruminative processing would be negatively associated with posttraumatic growth.

4.5 Method

This study used a cross-sectional survey design. Given that the study required a specific sample of trauma survivors, it was felt that the internet would provide access to this special target population since it has been shown that specialist, hard-to-reach or hidden communities can be accessed via the World Wide Web (e.g. drug dealers in Coomber, 1997; LGBTQ youth in Hoffman, Freeman & Swann, 2009; and infertile couples in Malik &

Coulson, 2008). In addition, Internet samples are presumed to include a broad range of participants with increased heterogeneity of scores on particular constructs, which is desirable for factor analytic studies (Buchanan, 2000). Thus, the current study used the internet as a platform for participant recruitment and survey completion. Further advantages of using an online design over traditional research methods were that it enabled relatively quick and easy access to a large amount of data from geographically diverse locations. It also provided a greater degree of anonymity for research participants, which was considered particularly advantageous when asking about sexually traumatic experiences.

4.5.1 Online Sampling and Recruitment Methods

In line with recommendations by Buchanan and Smith (1999), Reips (2000), and Hiskey and Troop (2002), a ‘targeted recruitment approach’ was adopted. A basic internet search was used to identify trauma-based websites, message boards and support forums with themes of rape, sexual abuse or sexual assault. The ‘Frequently Asked Questions’ or ‘Forum Rules’ page of each website were inspected to determine the site’s rules regarding research requests; websites stating that research recruitment was prohibited were not approached. For the remaining websites, an email was sent to the administrator or moderator asking for permission to post an advert containing information about the study and how to participate (see Appendix A). Five forums gave permission for an advert and link to the study to be hosted on their websites.¹ This multiple site entry technique was used to reduce self-selection bias by sampling from a broad population via several different websites (Reips, 2000).

¹ Hewson (2003) noted that posting research requests on support forums may potentially result in hostile responses from some group members, since many online communities are growing increasingly intolerant of unsolicited communications and research requests. In general, this was not a problem in the current study, although on two forums, group members requested confirmation that the post had been approved by the site moderator, which was then provided. The three subsequent posts to other sites ensured this information was

The current study employed a ‘criterion groups’ approach by deliberately targeting a specific population – in this case, survivors of sexual abuse or assault (Buchanan, 2000). A ‘criterion group’ is a section of the population that has special characteristics or meets specific criteria and can be used to inform research about the characteristics of that specific target group. For example, Maiuro, Vitaliano & Cahn (1987) sampled men with violent and non-violent histories when developing an aggression test. This type of purposive sampling has been shown to be a feasible recruitment strategy in Internet research (Buchanan, 2000) and was implemented in the current study to ensure participants met the criterion of having endured a sexually traumatic experience.

4.5.2 Procedure

Requests for participants were placed on five websites, message-boards and forums devoted to rape, sexual abuse and related issues. Potential participants followed a ‘link’ from these websites to the homepage of the online questionnaire where they read information about the study, inclusion criteria and requirements of participation (see Appendix B). The inclusion criteria stated that participants must be over the age of 18; had endured a sexually traumatic experience; and were willing to answer questions about that experience and its impact on their life. Participants were also given information about ethical matters (see section 4.5.3) including their right to withdraw and voluntary informed consent. Having read this information, participants proceeded to a consent page where they were required to agree with the inclusion criteria, indicate they understood their rights as participants and were then given the options “I consent to take part in this study” or “I do not consent to take part in this study.” Participants who did not consent were thanked for their interest and exited from the study website; participants could not proceed to the questions without selecting the “I consent

included in the initial post. Otherwise, there were many expressions of interest in the study, gratitude for exploring this research area, and good wishes with the project.

to take part in this study” option. Participants who chose to consent were taken to the next page of the site where they were asked to create a personal username. This username ensured anonymity of responses and allowed for retrospective withdrawal from the study if later requested.

Participants completed questions relating to demographic information and the traumatic event they had experienced, followed by assessments of cognitive processing and posttraumatic growth using the measures outlined in section 4.5.4. Following completion of the questionnaire, individuals were taken to a debriefing page (see Appendix C) where they were given information about the study, contact details for sources of emotional support should they require it, and were thanked for their participation.

A progress bar was included on each page so that participants could monitor how much of the questionnaire they had left to complete. All pages of the questionnaire also included the University of Nottingham crest to demonstrate institutional affiliation, add credibility to the project and ensure that participants could verify the researchers’ status as a member of the University. The researcher’s email address was provided on the first and last pages of the questionnaire, as were the contact details of the researcher’s supervisors and the ethics committee that had approved the research.

4.5.3 Ethics

This study was conducted in accordance with the British Psychological Society guidelines for ethical conduct (Ethical Principles for Conducting Research with Human Participants, BPS, 2009) and was subject to approval from the Institute of Work, Health and Organisations’ Ethics Committee. Given the online nature of this study, advice was also

sought from the BPS Guidelines for Ethical Practice in Psychological Research Online (BPS, 2007).

It was recognised that asking participants to think about the most traumatic event of their life might elicit distress and discomfort in some respondents. This is an understandable aspect of trauma research, although there is actually growing consensus that participation in trauma research is *not* distressing to most participants (see Jorm, Kelly & Morgan, 2007, for a review). For research on sexually traumatic experiences in particular, evidence indicates that not only is the level of distress engendered minimal (Edwards, Kearns, Calhoun & Gidycz, 2009), but that many participants also report personal benefits from participation in trauma research, including feeling empowered, valued, and more self-aware (Hutchinson, Wilson & Wilson, 1994). Edwards et al. (2009) also studied women with a history of sexual victimisation and reported that personal benefits to participating in research about their experience significantly outweighed the personal costs, with only 4% of participants reporting negative emotional reactions to the research study. Thus, as Becker-Blease and Freyd (2009) highlight, it is important not to overemphasise the vulnerabilities of survivors of sexual victimisation or to presume that distress is an inevitable consequence of participation in trauma research for all respondents.

Nevertheless, attempts were made to manage the risk of psychological harm to participants, particularly because the online nature of the study made it impossible for the researcher to monitor, support or even terminate the study if the participants' reaction became adverse (BPS, 2007). Participants were informed in the advert placed on the website and prior to giving consent that the study involved answering questions about traumatic sexual experiences and therefore might be distressing for some individuals; those who felt they were

unable to manage this distress were advised not to take part. It was also explained to participants that should they experience an adverse reaction whilst completing the questionnaire, they had the right to terminate their participation and withdraw from the study at any time. Web links and contact details of sources of support and trauma help-lines were also provided at the start and end of the questionnaire that participants could act on if they had concerns about their own well-being (Appendix C).

Obtaining informed consent in internet based research can present an ethical challenge. Based on recommendations by the British Psychological Society (BPS, 2007), participants were provided with an information page on entry to the study and the researcher's contact details were displayed.² Because it was not possible to obtain a signature to indicate informed consent, an "I consent to take part in this study" button was used to signify that participants had consented.

Given the nature of events that participants were likely to disclose, confidentiality and the protection of privacy was considered a priority in this study. The anonymity of the Internet allowed participants' identities to remain undisclosed and a username was employed as an alternative to them having to provide more personal forms of identification. Participants were assured that the data would be kept confidentially and securely. The Internet survey company (SurveyMonkey) used for hosting the study maintains high security standards

² Birnbaum (2001) cautions that information pages may not always be read or understood, since it is common for internet users to skip or ignore pages of text and agree to statements (e.g. consent, terms and conditions) without having read or properly understood them. He notes that this risk can be minimised by avoiding lengthy descriptions of all possible and imaginable harms of the study, which may increase the tendency for participants to consent without reading. Thus, the information given to participants was kept to an acceptable minimum. In addition, Varnhagen et al. (2005) concluded that obtaining informed consent online is not substantially different than obtaining it via paper-and-pencil presentation.

including encrypted data transfer, password-required access to the data, and a secure survey environment. The BPS guidelines (2007) highlight that storing IP addresses can be considered an invasion of privacy. Although storing the IP address of respondents would have allowed the data to be checked for multiple submissions and would thus identify repeat responding, it was decided to prioritise privacy therefore IP addresses were not stored in this study.

4.5.4 Measures

Demographic and Event-Related Information (Appendix D). Self-reported demographics included gender, age, marital/relationship status, ethnicity and education. Self-reported information about the traumatic event they had experienced was also collected. Participants were asked to briefly describe the most traumatic event of their life, state when the event had happened, how old they were at the time of the event, and a rating of how distressing they had found their experience ranging from 0 (*not at all distressing*) to 4 (*extremely distressing*).

Intrusive Cognitive Processing. The Intrusion subscale of the Impact of Event Scale – Revised (IES-R, Weiss & Marmar, 1997) was used to assess intrusive processing. The IES-R is a 22-item self-report measure developed to assess subjective distress after experiencing a traumatic event and is a revised version of the original 15-item Impact of Event Scale (Horowitz, Wilner & Alvarez, 1979). The revised version maintains comparability with the original, although the instructions are modified such that participants are asked to respond in terms of the distress caused by each item, rather than its frequency. The original scoring procedure is also adapted in the IES-R. Since its publication, there has been growing recognition that the IES-R (Weiss & Marmar, 1997) can also be viewed as a measure of

ongoing cognitive and behavioural processes following trauma (Joseph, 2000) and thus its use as a marker of cognitive processing is recommended (Creamer et al., 1992).

The IES-R Intrusion subscale consists of 8 items that assess intrusive cognitions such as nightmares and intrusive thoughts, feelings or images. Respondents rate each item on a 5-point Likert-scale of 0 (*not at all*) to 4 (*extremely*), indicating how distressing each item had been in their life during the past 7 days with respect to the traumatic event they described. Scores for the subscale are derived by calculating the mean; scores can range from a minimum of 0 to a maximum of 4, with higher scores indicating greater intrusive cognitions. Creamer et al. (2003) explored the psychometric properties of the IES-R and demonstrated high internal consistency for the intrusion subscale (.94). In the current study, Cronbach's alpha was .92 for the intrusion subscale.

Deliberate Cognitive Processing. The Reflection subscale of the Ruminative Responses Scale (RRS; Nolen-Hoeksema et al., 1993) was used to assess deliberate processing. This 5-item subscale assesses reflective responses to dysphoric mood that are characterised by active contemplation and purposeful attempts to overcome problems (Treyner et al., 2003). It includes neutrally valenced items such as "Write down what you are thinking and analyse it" and "Go someplace alone to think about your feelings" For the purposes of the current study, items in the original RRS that explicitly refer to depression (e.g. "Analyse recent events to understand why you are depressed") were modified such that 'why you are depressed' was replaced with 'why you feel this way.' Each item is rated on a Likert scale of 1 (*almost never*) to 4 (*almost always*), with scores ranging from 5 to 20 and higher scores indicating greater reflective tendencies. Good internal consistency and test-

retest reliability has been demonstrated for the reflection subscale (Treynor et al., 2003). In the current study, Cronbach's alpha was .79 for the reflection subscale.

Ruminative Cognitive Processing. The Brooding subscale of the Ruminative Responses Scale (RRS; Nolen-Hoeksema et al., 1993) was used to assess ruminative processing. This 5-item subscale assesses ruminative responses to dysphoric mood that are characterised by dwelling or moody pondering on negative emotions and their causes in an evaluative manner (Treynor et al., 2003). It includes items such as "Think 'What am I doing to deserve this?'" and "Think 'Why can't I handle things better?'" Each item is rated on a Likert scale of 1 (*almost never*) to 4 (*almost always*), with scores ranging from 5 to 20 and higher scores indicating greater ruminative tendencies. Treynor et al. (2003) reported good internal consistency and test-retest reliability for the brooding subscale, and in the current study Cronbach's alpha was .76.

Posttraumatic Growth. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996; Appendix E) was used to assess posttraumatic growth. The PTGI is a 21-item scale that assesses self-reported positive change experienced in the struggle with major life crises. It can be used to yield a total score and five subscale scores of Relating to others (7 items), New possibilities (5 items), Personal strength (4 items), Spiritual change (2 items) and Appreciation of life (3 items). Items are rated on a 6-point Likert scale of 0 (*I did not experience this change*) to 5 (*I experienced this change to a very great degree*) with total scores ranging from 0 to 105 and higher scores indicating greater levels of growth. The PTGI has been shown to demonstrate acceptable construct validity, internal consistency (.90), and test-retest reliability over a 2 month interval (.71) (Calhoun et al., 2000). In the current study, Cronbach's alpha was .93 for the total score.

4.5.5 Participants

The page access counter logged 241 'hits' to the study website.³ One hundred and ninety individuals agreed with the consent statements and provided a username, but 51 of those did not proceed further to answer any questions and exited the study. Of the remaining 139 respondents, 16 did not complete all measures, leaving a final sample of 123 participants. Completers and non-completers did not differ in terms of sex ($\chi^2 = 2.134$, $df = 1$, $p = .144$), education ($\chi^2 = 3.932$, $df = 4$, $p = .415$), marital status ($\chi^2 = 2.152$, $df = 3$, $p = .542$), ethnicity ($\chi^2 = 4.421$, $df = 4$, $p = .352$), time since trauma ($t = -1.064$, $df = 122$, $p = .290$) or ratings of event stressfulness ($t = .374$, $df = 133$, $p = .709$). However, individuals who dropped out were significantly younger ($M = 26.67$; $SD = 6.74$) than those who completed all measures ($M = 32.92$; $SD = 10.81$; $t = -3.143$, $df = 23.725$, $p = .004$).

The final sample consisted of 95 females and 28 males, ages ranging from 18 to 67 years ($M = 32.48$, $SD = 10.31$). Participants were mostly Caucasian ($n = 105$; 85.4%), single ($n = 68$; 55.3%), and educated to at least university level ($n = 69$; 56.1%). Index traumatic events included rape, childhood sexual abuse, sexual assault, and ritual abuse. The mean distress rating for these events was 3.74 ($SD = .51$) on the 0 to 4 scale, with 78.6% of participants rating their experience as extremely distressing. The events had occurred within 4 months to 49 years previously ($M = 16.35$ years, $SD = 11.93$). Only 21.1% of cases had experienced the event within the last 5 years, with 29.3% experiencing the event more than 20 years previously. Participants' ages at the time of the trauma ranged from 5 years to 46 years old ($M = 15.65$; $SD = 6.84$) and 55.8% of participants were aged 16 or younger at the time of the event.

³ This figure represents the number of times the homepage of the study site was visited, i.e. how many times the link to the study website was followed from the website where it was advertised. However, it is not possible to detect multiple visits by the same individual, making it inappropriate to calculate a response rate.

4.6 Results

4.6.1 Data cleaning and assumption testing

Data screening revealed no incorrect data or invalid entries. Missing values were infrequent (0.54%) and were identified on the IES-R Intrusion ($n = 4$), RRS Reflection ($n = 2$), RRS Brooding ($n = 4$) and PTGI ($n = 16$). No one item on any of the four subscales had more than two missing values, and no participants had more than 2 missing items overall. Missing values analysis revealed that missing data were completely random (Little's MCAR test $\chi^2 = 1448.95$, $df = 1524$, $p = .915$). Missing data for the IES-R Intrusion, RRS Reflection, RRS Brooding and PTGI were replaced using the Expectation Maximisation (EM) algorithm within the SPSS missing values analysis package (Acock, 2005).

The data were also explored to determine suitability for parametric analyses. Box-plots indicated that the data had no extreme values or outliers for all variables and this was confirmed using the criterion that values should be ≤ 3 standard deviations of the mean (Stevens, 2002). Skewness and kurtosis values were examined for all variables using the criterion that they should fall within two standard errors of skewness or kurtosis, respectively, and were found to be acceptable for all variables except age and age at the time of the trauma, which both showed a positive skew but it was felt that transformation was unnecessary. Inspection of histograms with normal curves demonstrated normal distributions for all variables, which were confirmed by non-significant Komologrov-Smirnov tests.

4.6.2 Descriptive Statistics

Descriptive statistics for the cognitive processing and posttraumatic growth measures are displayed in Table 4.1; scores for the PTGI subscales are presented in Table 4.2. The mean PTGI total score indicates relatively low levels of growth in this population. Similarly,

the mean item rating was 1.92 (on the 0-5 scale), reflecting an average item rating just below ‘*small degree of change*’ and therefore a low level of self-reported posttraumatic growth. This is confirmed when comparing the mean PTGI score for the current study sample with the mean PTGI scores for prior studies using sexual abuse or assault survivors. As shown in Table 4.2, the current sample scored noticeably lower on the PTGI and its subscales than other sexual abuse or assault samples. However, using Polatinsky and Esprey’s (2000) suggestion of a minimum PTGI total score of 42 as indicative of posttraumatic growth, 55 participants (44.7%) in the current sample experienced posttraumatic growth.

Using a similar method to Widows et al. (2005), PTGI items endorsed to a moderate or greater degree (i.e. ≥ 3 on the 0-5 scale) were also computed to determine the frequency of positive change reported. The mean number of PTGI items endorsed was 8.80 ($SD = 5.99$, range 0-21), with 40.7% of participants endorsing at least half of the items and only 2 participants endorsing no items. The most common positive changes endorsed were renegotiating priorities (76.8%), having more compassion for others (73.8%), greater feelings of personal strength (62.6%), and knowing better that one can handle difficulties (58.3%).

Table 4.1 Descriptive Statistics for Study 1 Variables

	<i>M</i>	<i>SD</i>	Observed Range
IES-R Intrusion	2.23	1.04	0 – 4
RRS-Reflection	13.49	3.34	5 – 20
RRS-Brooding	13.70	3.34	6 – 20
PTGI Total	40.36	24.24	0-103

Note. PTGI subscale scores are presented in Table 4.2

Table 4.2 Mean Scores Across Comparison Samples Using the PTGI

Scale	Current study N = 123	Female sexual assault survivors (Miller et al., 2011) N = 144	Female CSA survivors (Shakespeare-Finch & De Dassel, 2009) N = 40	Sexual assault survivors (Shakespeare-Finch & Armstrong, 2010) N = 32	Female physical and sexual assault survivors
					(Grubaugh & Resick, 2007) N = 100
PTGI Total	40.36 (24.24)	51.24 (22.26)	54.30 (22.83)	56.53 (23.60)	64.04 (26.62)
Appreciation of life	6.74 (4.23)	8.10 (4.26)	9.40 (3.99)	9.28 (3.50)	11.29 (4.64)
New possibilities	10.02 (7.24)	11.35 (5.75)	12.98 (6.72)	12.00 (5.99)	14.09 (7.01)
Spiritual change	2.50 (3.17)	3.44 (2.40)	2.93 (3.00)	2.66 (2.91)	5.83 (3.88)
Relating to others	12.07 (8.47)	16.59 (7.98)	16.48 (8.24)	16.69 (7.55)	19.95 (9.44)
Personal Strength	9.02 (5.86)	11.84 (5.6)	12.53 (5.13)	12.09 (4.82)	12.88 (5.87)

Note. Standard deviations are in parentheses

Examining scores on the PTGI subscales indicated that certain domains of growth were more strongly endorsed than others. Comparison across domains for total subscale scores is compromised because each subscale has a different number of items, ranging from 2 items for Spiritual change to 7 items for Relating to others. Mean scores for each subscale were therefore calculated to permit more accurate comparison and revealed that the Personal strength and Appreciation for life subscales showed the highest mean scores ($M = 2.26$ and 2.24 , respectively) whilst the Spiritual change and Relating to others subscales showed the lowest mean scores ($M = 1.25$ and 1.72 , respectively). Thus, individuals in this sample were most likely to report positive changes in their feelings of personal strength and the extent to which they valued their life.

With respect to measures of processing, the mean score of 2.23 ($SD = 1.04$) for the IES-R Intrusion subscale indicates a slightly lower level of intrusive processing in the current sample compared to levels reported in prior studies (e.g. 2.88 for sexual assault survivors in Shakespeare-Finch & Armstrong, 2010; 2.80 for childhood sexual abuse survivors in Shakespeare-Finch and De Dassel, 2009). Nevertheless, a score of 2.23 corresponds with the response anchor of between '*moderately*' and '*quite a bit*' distressing, suggesting an intermediate level of intrusive cognitions in this sample.

In terms of deliberate processing, the mean for the RRS Reflection subscale of 13.49 ($SD = 3.34$) represents a relatively high level of reflective processing in this sample compared to the mean level of 9.83 provided by Treynor et al. (2003) in a community-based sample of adults, and the mean levels of 11.77 for currently depressed and 11.68 for formerly depressed individuals in Watkins (2009). Similarly, the mean for the RRS Brooding subscale was 13.70 ($SD = 3.34$), again representing a relatively high level of ruminative processing in the current

sample compared to mean levels of 9.40 in Treynor et al. (2003). However, the level is more comparable to levels of 13.22 for currently depressed and 13.57 for formally depressed individuals reported by Watkins (2009). In sum, individuals in this study seemed to be engaging in fairly moderate levels of cognitive processing across all three processing subtypes.

4.6.3 Demographic Testing

Before testing the main research questions, the data were explored for potential differences in outcome variables according to demographic characteristics. An independent samples t-test revealed that women scored significantly higher than men on the IES-R Intrusion subscale ($t = 1.992$, $df = 121$, $p = .049$). A one-way ANOVA revealed significant differences for education and IES-R Intrusion ($F(4, 117) = 4.911$; $p = .001$) and RRS Brooding scores ($F(4, 117) = 3.060$; $p = .019$). Post hoc comparisons demonstrated that individuals with postgraduate level education scored significantly lower ($p < .05$) than individuals with secondary school, college or university level education on the IES-R Intrusion. Individuals with postgraduate level education also scored significantly lower than individuals with college or university level education on the RRS Brooding subscale. One-way ANOVA revealed significant differences for marital status and IES-R Intrusion scores ($F(3, 118) = 4.063$; $p = .009$), with divorced/separated and single individuals showing significantly higher scores than individuals with partners or cohabiting. Finally, an independent samples t-test showed that participants that had experienced the event when they were aged 16 or younger scored significantly higher on IES-R Intrusion ($t = 2.335$, $df = 111$, $p = .021$) than participants who had experienced the event as adults.

4.6.4 Factor Analysis of Processing Subtypes

Factor analysis is a statistical technique that can be used to determine meaningful clusters of shared variance such that common factors underlying the responses can be identified. Thus, factor analysis was employed to analyse responses to the three measures of processing in order to empirically examine whether intrusive, deliberate and ruminative processing styles can be distinguished. The component structure of the Intrusion, Reflection and Brooding items was therefore investigated using principal components analysis, since this is recommended as the first step in factor analysis to provide information about the probable number and nature of factors (Tabachnick & Fidell, 1996).

Whilst the current sample size of 123 is somewhat small for factor analytic procedures, it meets the recommendation that the sample size for factor analysis should be a minimum of five times the number of items (i.e. for the 18 items the minimum number of cases should be at least 90). A series of diagnostic checks were also conducted to ensure the assumptions of factor analysis were met. The data were normally distributed and the relationships between variables were linear. The correlation matrix was examined and the majority of correlations were over .3. The diagonals on the anti-image matrix were all over .5. Barlett's Test of Sphericity was significant ($p < .001$) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was acceptable at .830, providing assurance that it was appropriate to proceed with factor analysis of the data.

Using the Kaiser criterion of eigenvalues greater than 1.00 (Kaiser, 1960), four factors with eigenvalues greater than 1.00 (6.216, 2.928, 1.552, 1.194) were identified and together accounted for 66.06% of the variance. However, the eigenvalues-greater-than-one criterion is known to potentially inflate the number of factors to be extracted and does not always result

in components that are reliable (Zwick & Velicer, 1986); in this instance, the four-factor solution was difficult to interpret and did not result in comprehensible factors. The scree test has been promoted as a more reliable indicator of the number of factors to be extracted (Cattell & Vogelman, 1977), and recommends that the number of factors to be extracted is the number of eigenvalues that lie well above the ‘elbow’ of the scree slope. However, the scree plot showed no clear ‘elbow’ (see Figure 4.1). The number of factors to be extracted was therefore decided on theoretical grounds, so a forced 3-factor solution was generated which accounted for 59.43% of the variance.

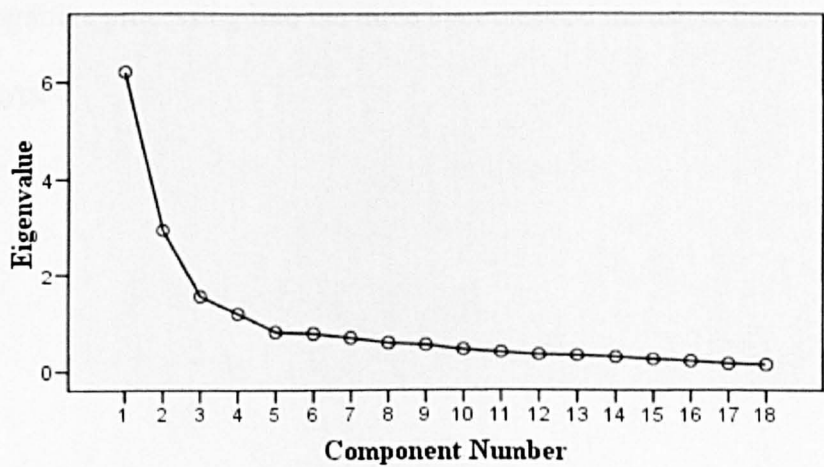


Figure 4.1 Scree plot showing Eigenvalues for the 18 cognitive processing items

Factor rotation is used in principal components analysis to make the output more understandable and facilitate the interpretation of factors by maximising high loadings and minimising low loadings so that the simplest possible structure is achieved. As such, the solution was examined using orthogonal (Varimax) rotation. Items that loaded higher than .45 on a single factor were retained; items that also cross-loaded by greater than .30 on any other factor were discarded. These inclusion criteria were employed to increase factor purity and facilitate the interpretation of factors (Tabachnick & Fidell, 1996).

The items and factor loadings are presented in Table 4.3. The three-factor solution consisted of an 8 item factor that explained 28.73% of the variance (eigenvalue = 6.216), a 5 item factor that explained 15.94% of the variance (eigenvalue = 2.928), and a 5 item factor that explained 14.76% of the variance (eigenvalue = 1.552) based on the rotated components. Inspection of the items revealed that the first component consisted of the 8 IES-R Intrusion items, the second component consisted of the 5 RRS Reflection items, and the third component consisted of the 5 RRS Brooding items. The analyses were also repeated using oblique (Promax) rotation but the pattern and strength of loadings remained comparable, thus orthogonal rotations were retained. These findings provide preliminary support for the separation of cognitive processing into the three hypothesised intrusive, deliberate and ruminative subtypes.

Table 4.3 Three-Component Solution for the 18 Cognitive Processing Items

Item	Factor 1	Factor 2	Factor 3
Factor 1: Intrusive Processing ($\alpha = .92$)			
1. Any reminder brought back feelings about it	.848	.060	.051
2. I had trouble staying asleep	.750	-.055	.217
3. Other things kept making me think about it	.844	.010	.029
4. I thought about it when I didn't mean to	.796	.074	.159
5. Pictures about it popped into my mind	.808	.069	.122
6. I found myself acting or feeling like I was back at that time	.726	.201	.244
7. I had waves of strong feelings about it	.806	.146	.083
8. I had dreams about it	.742	.016	.233
Factor 2: Deliberate Processing ($\alpha = .79$)			
1. Analyse recent events to try to understand why you feel this way	.106	.651	.157
2. Go away by yourself and think about why you feel this way	.053	.780	.177
3. Write down what you are thinking and analyse it	-.010	.585	.111
4. Analyse your personality to try to understand why you feel this way	.051	.743	.146
5. Go someplace alone to think about your feelings	.096	.842	.099
Factor 3: Ruminative Processing ($\alpha = .76$)			
1. Think 'What am I doing to deserve this?'	.180	.142	.717
2. Think 'Why do I always react this way?'	.174	.298	.655
3. Think about a recent situation, wishing it had gone better	.116	.174	.468
4. Think 'Why do I have problems other people don't have?'	.034	.084	.753
5. Think 'Why can't I handle things better?'	.244	.095	.785

Note. Loadings above .45 are highlighted bold.

4.6.5 Correlational Analyses

Having established that the three measures of processing can be distinguished, the next step was to explore the association of subtypes of cognitive processing with posttraumatic growth. Pearson's correlations were calculated between scores on the three cognitive processing measures and the PTGI and are displayed in Table 4.4. Results demonstrated that the three subtypes of cognitive processing were significantly positively correlated, indicating that those who experience more intrusive thoughts also tend to report more deliberate reflection and more ruminative brooding. Similarly, those who deliberately reflect on past traumas are also more likely to engage in ruminative processing.

Given the observed differences in the strength of the correlations between intrusive and deliberate processing ($r = .19$) and intrusive and ruminative processing ($r = .39$), a Fisher's z transformation (Cohen & Cohen, 1983) was calculated to test whether the two correlations were significantly different. Results showed that the association between deliberate reflection and intrusion was significantly smaller than that for ruminative brooding and intrusion ($z = -1.7, p = .04$), suggesting that intrusive and ruminative forms of processing may be more alike than deliberate processing.

In terms of relationships with posttraumatic growth, contrary to expectations and prior research, the IES-R Intrusion and PTGI Total scores were significantly negatively associated, suggesting that intrusive cognitive processing was associated with reduced growth. Also contrary to expectations was the finding that neither reflection nor brooding were significantly associated with posttraumatic growth as predicted, demonstrating that these deliberate and ruminative forms of processing did not relate meaningfully to growth following trauma. As the three subtypes of processing were significantly positively associated, it was speculated

that reflection might be associated with posttraumatic growth when intrusion and brooding were partialled out. However, partial correlation showed that reflection and posttraumatic growth were still not significantly associated ($pr = .13, p > .05$).

Table 4.4 Correlations Between Scores on all Study 1 Measures

	1	2	3	4	5	6	7	8
1. IES-R Intrusion	-							
2. RRS Reflection	.19*	-						
3. RRS Brooding	.39**	.40**	-					
4. PTGI Total	-.19*	.10	-.03	-				
5. Appreciation for life	.05	.07	.02	.79**	-			
6. New possibilities	-.22*	.05	-.06	.92**	.73**	-		
7. Spiritual change	-.15	.14	.02	.56**	.40**	.41**	-	
8. Relating to others	-.18*	.15	.06	.90**	.62**	.77**	.41**	-
9. Personal strength	-.22*	.02	-.16	.83**	.57**	.71**	.40**	.65**

Note. * $p < .05$; ** $p < .01$

4.6.6 Multiple Regression Analyses

Multiple regression analyses were conducted to determine which variables predicted posttraumatic growth. A linear regression was conducted for PTGI total score with Time since trauma, IES-R Intrusion, RRS Reflection, and RRS brooding entered as predictors. Using the enter method a significant model emerged for PTGI total ($F(4, 107) = 2.475, p <$

.05; Adjusted R square = .050) and showed that IES-R Intrusion ($\beta = -.278$, $t = -2.79$, $p = .006$) was the only significant predictor of posttraumatic growth.

4.6.7 Further Analyses

In order to explore whether the levels of processing differed between those who reported posttraumatic growth and those who did not, Polatinsky and Esprey's (2000) cut-off of 42 as a minimum PTGI total score indicative of posttraumatic growth was used to divide participants into those who experienced growth ($n = 55$) and those who did not ($n = 68$). An independent samples t-test was then used to explore whether these groups differed in their levels of each type of processing. Results from the t-test demonstrated that individuals who reported growth scored significantly lower on IES-R Intrusion than those who did not report growth ($t = 1.980$; $df = 121$; $p = .046$). However, scores on the RRS Reflection and RRS Brooding did not significantly differ by posttraumatic growth group.

4.7 Discussion

4.7.1 Posttraumatic Growth and Sexually Traumatic Experiences

The aims of this study were to explore the prevalence of posttraumatic growth in a sample of sexual abuse or assault survivors and to examine the roles of intrusion, reflection and brooding in posttraumatic growth. In line with the first aim, results from this study demonstrated that 44.7% of participants reported a substantial degree of posttraumatic growth. This level is comparable to that found by Grubaugh and Resick (2007), who demonstrated that 45% of their participants reported at least a moderate degree of posttraumatic growth following their experience of physical or sexual assault. The results also showed that only 2 participants in this study did not endorse any aspect of growth, suggesting that the overwhelming majority of participants in this sample were able to identify

at least one positive outcome of their experience of sexual trauma. Thus, the current findings confirm that it is possible for survivors of sexual abuse or assault, like survivors of other traumatic life events, to experience posttraumatic growth. This provides further support for the notion that we should look beyond exclusively negative outcomes of trauma and recognise that even the most devastating abuses may transform some individuals.

However, mean scores on the PTGI suggest that the participants in this sample reported lower growth scores than other samples of sexual trauma survivors (Table 4.2). The reasons for this are unclear, but may relate to the recruitment strategy adopted in this study which potentially accessed only those individuals who were struggling to come to terms with their experiences and as a result were seeking online support from forums and message boards. Other factors that were not assessed in this study but that may have influenced the level of growth reported include characteristics of the abuse such as the use of force or violence, the number of perpetrators, the extent and frequency of the abuse, subsequent revictimisation, the presence of concomitant maltreatment such as neglect, and the victims' relationship to the perpetrator. The latter factor may be particularly important since prior research has shown that victims of intra-familial sexual abuse report higher posttraumatic growth than victims abused by a stranger or non-family member (Lev-Wiesel, Amir & Besser, 2005).

The fact that many of the participants in this study were children when they experienced the event might also have contributed to the low level of growth in this sample, although analyses indicated that there was no significant difference in the level of growth reported by participants that experienced the event as children compared to participants that experienced the event as adults. It is also important to bear in mind that the PTGI asks

participants to indicate the extent to which they have changed on each item since experiencing the traumatic event and therefore requires participants compare their current selves with their pre-trauma selves then indicate the perceived level of change experienced. Given that more than half the participants in this sample were young children at the time of the event, it is likely to be very difficult for them to accurately identify what they were like before the event and thus assess the degree of change. As such, it may not be appropriate to assess posttraumatic growth using the PTGI in individuals traumatised in childhood, and may account for the low levels of growth reported in this sample.

This study was also interested in exploring the domains of growth reported following sexually traumatic experiences, since prior research examining posttraumatic growth following sexual victimisation has often failed to provide data concerning the pattern of growth across domains. Results from this study demonstrated that positive changes in feelings of personal strength and appreciation for life were most strongly endorsed by participants. Thus, the experience of sexual abuse, rape or sexual assault may initiate changes that lead the individual to realise that they are stronger than they thought they were, recognise a new found confidence in their capacity to deal with future difficult experiences and feel “If I can survive this, I can handle anything,” (Aldwin, Levenson & Spiro, 1994). Likewise, such experiences may contribute to major shifts in the way they approach and experience their daily lives, allowing them to appreciate the smaller things in life and recognise the importance of things formerly taken for granted. The finding that survivors of sexually traumatic experiences reported the least amount of positive change in the domain of relating to others makes sense given that sexual traumas are purposefully inflicted by another person and might therefore present a significant challenge to the development of close or intimate relationships with other people.

4.7.2 Posttraumatic Growth and Cognitive Processing

The second aim of this study was to explore the theoretical distinction between intrusive, deliberate and ruminative forms of cognitive processing using the IES-R Intrusion, RRS Reflection and RRS Brooding subscales. Results from the factor analysis appeared to support the subdivision of cognitive processing into these three distinct but related forms of repetitive trauma-focused thought since the subscale items loaded highly and uniquely on the expected components, and, although correlated, were not so highly correlated as to be considered synonymous. However, it is important to acknowledge that factor analysis was theory-driven in this case, since the initial four-factor solution was difficult to interpret therefore the solution that was most theoretically valid was generated. This is in line with the suggestion that researchers should consider theoretical as well as statistical issues when deciding the number of factors to extract (e.g. Fabrigar et al., 1999). As such, findings from this factor analysis provide preliminary support for the separation of cognitive processing into intrusive, deliberate and ruminative subtypes, although further empirical scrutiny is required before drawing any firm conclusions about the structure of cognitive processing.

Expectations concerning the association of the three subtypes of processing with posttraumatic growth were unsupported. It was hypothesised that intrusions and reflection would be positively associated with growth while ruminative brooding, as a marker of the more automatic and distress-focused component of cognitive processing, would be negatively associated with growth. However, results from the study indicated that these hypotheses were not supported because intrusion was negatively associated with growth and the remaining aspects of processing were uncorrelated with growth.

In addition, intrusion emerged as the only significant predictor of posttraumatic growth in the regression analyses, with lower levels of intrusion predicting greater growth. Similarly, individuals whose PTGI scores indicated substantial levels of posttraumatic growth reported significantly lower levels of intrusion than those reporting minimal growth. These findings are somewhat surprising given the large literature supporting the positive role of intrusive cognitive processing in the development of growth following trauma (see section 2.5.1) and the theoretical assumption that intrusive trauma-related thoughts reflect a form of cognitive processing that can facilitate posttraumatic growth (Calhoun, Cann & Tedeschi, 2010).

These unexpected results may be accounted for by the decision to use the IES-R to assess intrusive processing. Whilst it was considered to be the most suitable measure available at the time of conducting this study, the IES-R was not specifically designed to assess posttraumatic processing and it is possible that in the current sample it captured more of a general distress response rather than cognitive processing activity. It has been acknowledged that intrusive thoughts can vary in their intensity, valence and content (Park et al., 2010) and it may be that the IES-R intrusion subscale taps in to more distressing, intense, negatively valenced intrusions than the kind of intrusive thoughts that constitute cognitive processing. In addition, the instructions for the IES-R ask participants to indicate the level of distress caused by their intrusive cognitions, rather than the frequency of those cognitions, suggesting that higher scores on the IES-R do not necessarily indicate that the individual has engaged in *more* cognitive processing, but that that cognitive processing has been distressing. In line with this, the results of the current study suggest that the more distressing the cognitive processing is, the less likely that growth will occur. In order to assess the impact of

the *level* of intrusive cognitive processing, an alternative measure of intrusion is needed that is more neutral in tone and less tied to posttraumatic symptomatology.

The decision to use the RRS Reflection and Brooding subscales to assess deliberate and ruminative cognitive processing may also have accounted for the unexpected non-significant associations between these subtypes of processing and posttraumatic growth. Whilst the Reflection and Brooding subscale items captured both active, purposeful repetitive thoughts and more passive, moody pondering styles respectively, neither processing style was related to growth. The reason for this may be because the RRS assesses a general disposition to reflect or ruminate on past experiences as relatively stable characteristics across situations, rather than more transient, event-provoked processing of past traumas. While there is likely to be a degree of overlap between dispositional reflective or ruminative tendencies and trauma-specific deliberate or ruminative processing, there are also important differences. It is possible that by focusing only on trait aspects of processing, the anticipated relationships were not observed. The use of trauma-specific measures of these transient subtypes of processing in future studies would permit a more accurate assessment of the characteristics and extent of trauma-related processing in posttraumatic growth and may be more predictive of outcomes.

4.7.3 Limitations

This study has built on the existing posttraumatic growth literature by demonstrating the possibility of posttraumatic growth following traumatic sexual experiences such as incest, childhood abuse and rape. At the time of conducting the study, it was also one of the first to operationalise the intrusive and deliberate subtypes of processing that have been theoretically proposed in Tedeschi and Calhoun's (2004) model of growth, as well as expanding the

conceptualisation to include ruminative forms of post-trauma processing. However, it is important to note the study limitations. The main limitation is the cross-sectional design which limits conclusions regarding temporal and causal relationships between types of processing and posttraumatic growth.

A further limitation relates to sampling issues. While Fortson, Scotti, Del Ben and Chen (2006) suggest that it is feasible to conduct trauma focused research over the Internet, concerns remain about the validity of data collected via internet questionnaires. This sampling methodology did not permit the response rate to the study to be determined and it is not possible to know how representative the final sample was of the population it was drawn from. In particular, people who use trauma related websites and forums might not be representative of all trauma exposed people, yet the differences between users and non-users have not been reliably established and are therefore still unknown (Skitka & Sargis, 2006). It is probable that individuals seeking information and support from trauma websites differ in important ways from trauma exposed people that do not consult such websites, but the exact nature of those differences have not yet been determined empirically. It could be argued that visiting trauma websites reflects an active attempt to understand one's experience and emotional response to it, therefore representing a manifestation of the deliberate processing that is under investigation. This is problematic because it suggests that the recruitment strategy used in this study accessed only those individuals already engaged in attempts to make sense of their experience. As a result, participants in this study may have evidenced higher levels of deliberate processing and posttraumatic growth than trauma survivors who do not consult trauma related websites, such that confidence in generalising from the current web-based sample to all trauma survivors is compromised.

In addition, although the average time since the event was comparable to that reported in prior studies of posttraumatic growth in sexual abuse survivors (Grubaugh & Resick, 2007; Shakespeare-Finch & de Dassel, 2009), it is still much higher than that seen in most other studies of posttraumatic growth. This long time frame since the traumatic event is problematic and suggests that those individuals seeking support from trauma related websites 10 or more years later may be experiencing continued distress and remain unable to resolve their experiences, again suggesting that they are not representative of all trauma survivors. However, without studies that directly compare the post-trauma profiles of trauma website users and non-users, it is not possible to know whether there are important differences between them and what those differences might be. As such, the impact of using trauma focused websites to recruit participants on the results obtained in the current study cannot be determined. Consequently, the findings of this study must be interpreted in light of these sample limitations.

The recruitment strategy also did not produce a representative sample in terms of demographic characteristics. The sample comprised predominantly white females and while this is reflective of both the population from which they were drawn (sexual assault, rape and abuse survivors) and the samples typically found in research in this area (e.g. Shakespeare-Finch & De Dassel, 2009), the lack of diversity limits the generalisability of these findings to other traumatised populations. Specific attempts were made to recruit male survivors of sexually traumatic experiences in order to be comprehensive, but uptake to the study amongst this group was low. Nevertheless, most prior studies in this area have used exclusively female samples so the inclusion of males in this study represents a strength of this research.

4.8 Chapter Summary

This study explored the separation of cognitive processing into intrusive, deliberate and ruminative forms of repetitive thought. Although they appear to represent distinct types of posttraumatic thinking, the methods used to assess them in this study were compromised and further research that involves the assessment of more transient, trauma-specific forms of cognitive processing is needed. In addition, although the focus on survivors of sexually traumatic experiences in this study was important because of the gap in this area of the literature, models of post-traumatic processing must apply to all groups of trauma survivors. Thus, in order to further develop the model of posttraumatic cognitive processing in this thesis, it is important to study survivors with a variety of trauma histories.

Chapter 5

Study 2: Event-Related Cognitive Processing Subtypes

5.1 Overview

The results of Study 1 demonstrated that intrusive, deliberate and ruminative forms of repetitive thought following traumatic experiences appear to be empirically distinct. However, due to measurement issues, the conceptualisation of cognitive processing into these three subtypes requires further empirical scrutiny with trauma-specific, as opposed to dispositional, measures. The aim of the study presented in this chapter was to assess intrusive, deliberate and ruminative forms of cognitive processing using state measures and to explore the associations between these subtypes of processing and posttraumatic growth.

5.2 Event-Related Cognitive Processing

Results from the study presented in Chapter 4 provided an initial indication that cognitive processing might be best understood as a multidimensional construct that can be separated into distinct but related subtypes. The hypothesised distinction between intrusive, deliberate and ruminative forms of processing was supported by results from the factor analysis and suggests that the conceptualisation of cognitive processing presented in this thesis provides a useful way of extending current models of processing to incorporate distinct processing subtypes. However, the assessment of each processing subtype was compromised and the anticipated associations with posttraumatic growth were not observed. Although it is useful to understand how dispositional tendencies to engage in particular styles of repetitive

thought relate to growth, it is also important to understand how more transient, event-related types of processing that are specific to the trauma experienced are also associated with growth. The RRS Reflection and Brooding subscales used in Study 1 assessed habitual repetitive thoughts and captured a general response tendency rather than transient repetitive thoughts that are focused on a specific traumatic life event. Given that cognitive processing is initiated by traumatic events and is focused on the impact and meaning of that event, the assessment of subtypes of processing needs to capture cognitive activity that is specifically provoked by the highly stressful experience or major life crisis. Consequently, the goal of this study was to assess and explore the impact of event-related processing subtypes on posttraumatic growth.

5.2.1 Intrusive and Deliberate Processing

Calhoun, Cann, Tedeschi and McMillan (2000) sought to assess event-provoked processing in their study of college students that had experienced a recent traumatic event using a specifically developed measure which they referred to as The Rumination Inventory.⁴ They selected 7 items from existing instruments in order to capture posttraumatic processing, including items relating to the degree to which the individual reported intrusive thoughts, deliberately sought to find benefits in their experience, and the extent to which they had thought deliberately about the event to try and make sense of it (Calhoun et al., 2000). Results from the study demonstrated that event-related processing, as assessed using these items, was positively associated with posttraumatic growth, providing support for the argument that cognitive activity that is specifically provoked by the event is related to

⁴ The terminology used here again reflects Calhoun et al's position that 'rumination' refers to a variety of different types of recurrent thinking about past traumas and does not have the same exclusively negative connotations as when defined in the clinical literatures on depression and PTSD. Thus, from their perspective, rumination is essentially cognitive processing.

increased growth. However, the analyses presented in this paper did not distinguish between intrusive and deliberate types of event-related processing such that it was not possible to explore the impact of each subtype. Thus, whilst findings from Calhoun et al. (2000) indicate that event-provoked cognitive processing is important, they fail to further delineate the particular aspects of processing that are most constructive.

Subsequent work by Taku, Calhoun, Cann and Tedeschi (2008) used a Japanese translation of the Rumination Inventory and made the distinction between intrusive and deliberate subtypes of event-related processing. These were further broken down by time frames into 'soon after the event' and 'recently', generating four subtypes of processing. Results demonstrated that recent intrusive rumination, recent deliberate rumination, and deliberate rumination soon after the event, but not intrusive rumination soon after the event, were significantly positively associated with posttraumatic growth. Further work by Taku, Cann, Tedeschi and Calhoun (2009) used two intrusive processing items and two deliberate processing items from the Rumination Inventory and reported that both types of processing, both soon after the event and recently, were positively associated with posttraumatic growth. Hierarchical multiple regression analyses further indicated that recent deliberate processing most strongly predicted the extent of growth reported.

Both of these studies contribute to the cognitive processing literature by extending the conceptualisation of processing to include intrusive and deliberate subtypes, with results from Taku et al. (2009) indicating that recent engagement in more deliberate, effortful processing might be particularly important in contributing to growth. However, both Taku et al. (2008) and Taku et al. (2009) were limited in that they relied on retrospective reports of processing soon after the event, which may not provide an accurate assessment of the extent of particular

thought processes that occurred in the past. They also used a small number of items to assess each type of processing. Furthermore, evaluation of the original items indicated that they did not provide a clear factor structure, with several items failing to load on the expected dimensions and no clear separation of processing into intrusive and deliberate subtypes (Taku et al., 2009).

Following the publication of these studies, personal communication with a member of the research team revealed that, in response to some of the limitations highlighted, they had made several revisions to the Rumination Inventory (A. Cann, personal communication, November 13, 2008). This included removal of the temporal element from the scale instructions such that participants rate each statement in respect of how often they have engaged in each type of thought in the last seven days, rather than ‘soon after the event’ and ‘recently’. Thirteen new items were also added with the aim of improving the factor structure and more accurately capturing the intrusive versus deliberate processing distinction, producing two 10-item intrusive and deliberate processing subscales.⁵ Although unpublished at the time of conducting this study, preliminary work by Cann and colleagues (personal communication, October 19, 2009) provided good empirical support for the subdivision of the items into the intrusive and deliberate processing subscales.

In light of these revisions, it was felt that the modified version of the Rumination Inventory represented a potentially useful measurement tool for the assessment of intrusive and deliberate forms of cognitive processing following traumatic life events, particularly

⁵ Cann and colleagues actually refer to the subscales as intrusive *rumination* and deliberate *rumination* subscales, but given that a) they use the terms rumination and processing interchangeably, and b) to avoid confusion regarding the third ruminative type of processing studied in this thesis, the subscales were renamed intrusive *processing* and deliberate *processing*.

given that the subscales were designed to capture transient, event-specific processing rather than more stable dispositional tendencies. Furthermore, the intrusive processing subscale appears to represent a superior way of assessing intrusive processing than that provided by the IES-R Intrusion subscale because it assesses the presence and impact of intrusive thoughts more neutrally and without the implication that they are a symptom of posttraumatic distress (Cann et al., 2011). As such, the Intrusive and Deliberate processing subscales of the Rumination Inventory were used to assess intrusive and deliberate processing in this study.

5.2.2 Ruminative Processing

In terms of the ruminative processing style also described in this thesis, a measure was sought that would capture the distress-focused nature of this type of repetitive thought and its cyclical quality that centres on the unchangeable or uncontrollable aspects of the event. The measure also needed to assess rumination as a transient thought process that is specifically provoked by the event rather than as a stable trait related to depressive experiences. Given these specific criteria, it became apparent that no published psychometric measure existed. However, the Rumination Interview (Michael, Halligan, Clark & Ehlers, 2007) is a structured interview designed to assess the nature and impact of ruminative thoughts following a traumatic experience and it was felt that with some minor modifications to translate it into questionnaire format, it represented a promising method for assessing event-provoked ruminative processing.

The Rumination Interview (Michael et al., 2007) assesses the frequency, nature and content of ruminative thoughts about a traumatic experience.⁶ It was developed in light of evidence demonstrating that intrusive memories and ruminative thoughts following trauma

⁶ Note that the Rumination Interview presented in Michael et al. (2007) is distinct from the Rumination Interview presented in Ehling, Frank and Ehlers (2008).

are functionally distinct and should be examined separately (Evans, Ehlers, Mezey & Clark, 2007; Speckens, Ehlers, Hackmann, Ruths & Clark, 2007). The interview lasts approximately 25 minutes and asks a series of questions in a fixed order (see Appendix F). Example questions include “Do you ever dwell on the event and its consequences in your mind, going over and over things?” and “Once you have started, how driven do you feel to continue dwelling on the event and its consequences?” The Rumination Interview also contains questions about a) the content of ruminative thoughts, particularly the presence of ‘Why?’ and ‘What if?’ questions (e.g. ‘I think about why it happened to me’ and ‘I think about what life would be like if the event had not happened’) and b) the nature of ruminative thoughts (e.g. ‘I seem to think in circles, coming back to the same things again and again’ and ‘I find it hard to put a stop to them’). It has successfully been used in samples of assault survivors (Michael et al., 2007), young offenders convicted of serious violent assaults (Evans et al., 2007), and patients with PTSD (Speckens et al., 2007) to examine the characteristics and extent of posttraumatic rumination. However, the Rumination Interview has not previously been used in a psychometric assessment scale format. As such, minor adjustments were required to adapt it for use in the current study. These modifications are further outlined in section 5.4.4.

5.2.3 Assessing Posttraumatic Growth

As the posttraumatic growth literature has developed, the need to more clearly conceptualise the construct and further refine its assessment has become evident. Recognising the need for a clearer theoretical conceptualisation of growth following adversity, Joseph and Linley (2008a) drew on the positive psychology and psychological well-being (PWB) literatures to conceptualise growth as an increase in PWB, as opposed to subjective well-being (SWB). Whereas SWB is based on the hedonic approach to the good life and reflects

affective states and life satisfaction, PWB is based on the eudemonic perspective and reflects engagement with existential challenges and meaning in life (Joseph et al., in press; Joseph & Wood, 2010; Ryan & Deci, 2001). PWB is conceived to comprise six aspects: autonomy, environmental mastery, positive relations with others, personal growth, purpose in life and self-acceptance (Ryff, 1989; Ryff & Singer, 1998), with posttraumatic growth reflecting an increase in these domains of psychological functioning.

In line with this conceptualisation of posttraumatic growth as an increase in PWB, Regel and Joseph (2010) built on the established PWB theoretical architecture to develop the Psychological Well-Being Post-Traumatic Changes Questionnaire (PWB-PTCQ) as a new scale for assessing posttraumatic growth. This scale successfully integrates the concept of posttraumatic growth within the wider literature on well-being and positive psychology, whilst simultaneously having the advantage of allowing the respondent to rate how they have changed in positive as well as negative directions (Joseph et al., in press). It consists of 18 items that assess perceived changes in psychological well-being following traumatic events. Joseph et al. (in press) examined the psychometric properties of the PWB-PTCQ and found evidence for its' six month stability, incremental validity over and above existing measures of posttraumatic growth as a predictor of subjective well-being, convergent validity with existing measures of posttraumatic growth, concurrent validity with personality and coping measures, predictive validity of change in well-being over time, discriminant validity with social desirability, and prediction of clinical caseness. As such, the PWB-PTCQ is seen as a promising new clinical and research tool that uses existing theoretical architecture to provide a much needed framework for the conceptualisation and assessment of growth following adversity. The PWB-PTCQ was therefore employed alongside the PTGI for the assessment of posttraumatic growth in this study.

5.3 Aims and Hypotheses

The aims of this study were fourfold. The first aim was to modify the Rumination Interview (Michael et al., 2007) for use as a questionnaire measure and to examine the efficacy of this adjustment for the assessment of ruminative processing following trauma. The second aim was to subject all of the cognitive processing items from the three subscales to exploratory analyses in order to ascertain whether the three hypothesised subtypes of processing can be empirically distinguished. The third aim was to study the associations between the three forms of cognitive processing and posttraumatic growth, with the expectation that the subtypes would show differential relationships with growth. Specifically, it was hypothesised that intrusive and deliberate processing would be positively associated with posttraumatic growth while ruminative processing would be negatively associated with posttraumatic growth. Finally, the fourth aim of this study was to explore cognitive processing and posttraumatic growth in a sample of individuals exposed to a diverse range of traumatic experiences rather than one specific trauma type.

5.4 Method

This study used a cross-sectional survey design. As in Study 1, data was collected via the Internet in light of the benefits of online research designs previously discussed in section 4.5. The online design was particularly well suited to the current study because accessing and recruiting research participants from the target population (people who have experienced a traumatic event or major life crisis) using traditional methods would have been considerably time consuming and given the limited resources available, web-based data collection represented the most efficient option.

Most prior studies of posttraumatic growth have focused on one specific population that share the same index event (e.g. cancer patients in Sears et al., 2003; bereaved individuals in Polatinsky & Esprey, 2000; survivors of motor vehicle accidents in Zoellner et al., 2008; assault survivors in Kleim & Ehlers, 2009). Although studies such as these allow an in-depth look at growth in a specified population, they do not enable examination of the processes involved in growth across trauma types. Theories of growth following adversity must be applicable to a diverse range of traumas, so for testing the model of posttraumatic cognitive processing presented in this thesis, a sample of participants that had experienced varying traumatic events was required.

5.4.1 Procedure

Announcements about the study were placed on trauma-focused websites, support forums and message boards. This announcement included a brief description of the research and contained a request for individuals who had experienced a traumatic event or major life crisis to take part. Potential participants were encouraged to follow a 'link' from the announcement page to the online questionnaire, where they were provided with further information about the study, inclusion criteria, the requirements of participation and information about ethical matters. The inclusion criteria stated that participants must be over the age of 18; had endured an experience that they considered to have been traumatic; and were willing to answer questions about that experience and its impact on their life.

Having read this information, participants proceeded to a consent page where they were required to agree with the inclusion criteria, indicate that they understood their ethical rights and were then given the options "I consent to take part in this study" or "I do not consent to take part in this study." Participants who did not consent were thanked for their

interest and exited from the study website; participants could not proceed to the questions without selecting the “I consent to take part in this study” option. Participants who chose to consent were taken to the next page of the site where they were asked to create a username; this ensured anonymity of responses and allowed for retrospective withdrawal from the study if later requested.

Participants completed questions relating to demographic information and the traumatic event they had experienced, followed by assessments of cognitive processing and posttraumatic growth using the measures outlined in section 5.4.2. Following completion of the questionnaire, individuals were taken to a debriefing page (see Appendix C) where they were given more information about the study, contact details for sources of emotional support should they require it, and were thanked for their participation. They were also given the opportunity to provide feedback about the study if they wished to.

As with the design of Study 1, a progress bar was included on each page so that participants could monitor how much of the questionnaire they had left to complete. All pages of the questionnaire also included the University of Nottingham crest to demonstrate institutional affiliation and add credibility to the project. The researcher’s email address was provided on the first and last pages of the questionnaire, as were the contact details of the researcher’s supervisors and the ethics committee that had approved the research.

5.4.2 Measures

Demographic and Event-Related Information. Self-reported demographics included gender, age, marital/relationship status, ethnicity and education. Self-reported information about the traumatic event they had experienced was collected. Participants were asked to

briefly describe the most traumatic event of their life, state when the event had happened, how old they were at the time of the event, and a rating of how distressing they had found their experience ranging from 0 (*not at all distressing*) to 4 (*extremely distressing*). In line with the DSM-IV Criterion A for determining whether an event qualifies as traumatic, participants were also asked to respond ‘yes’ or ‘no’ to the following 2 statements: “Did you perceive this experience to have been a threat to your, or to someone else’s, life or physical or psychological well-being?” and “Did your response to this event involve intense fear, helplessness or horror?”

Intrusive Cognitive Processing. The Intrusive Processing subscale of the modified Rumination Inventory (A. Cann, personal communication, November 13, 2008) was used to assess intrusive cognitive processing. This is a 10-item subscale that contains items such as “I thought about the event when I did not mean to” and “Thoughts about the event caused me to relive my experience.” Participants rate each item on a 4 point Likert scale of 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in intrusive processing. Published data on reliability and validity are not yet available, but preliminary analyses by Cann et al. (A. Cann, personal communication, October 19, 2009) using a sample of 323 college students pre-screened for experiencing a recent trauma provide internal consistency reliability of $\alpha = .94$. In the current sample, Cronbach’s alpha reliability for the 10-item scale was .96.

Deliberate Cognitive Processing. The Deliberate Processing subscale of the modified Rumination Inventory (A. Cann, personal communication, November 13, 2008) was used to assess deliberate cognitive processing. This 10-item subscale contains items such as “I thought about whether I could find meaning from my experience” and “I deliberately thought

about how the event had affected me.” Participants rate each item on a 4 point Likert scale of 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in deliberate processing. As with the Intrusive processing subscale, published data on reliability and validity for the Deliberate subscale are not yet available, but preliminary analyses (A. Cann, personal communication, October 19, 2009) provide internal consistency reliability of $\alpha = .88$. In the current sample, Cronbach’s alpha reliability for the 10-item scale was .93.

Ruminative Cognitive Processing. The Rumination Interview (Michael et al., 2007) was modified and used to assess ruminative cognitive processing. Within the interview, 8 items assess the content of ruminative thoughts, with participants rating how frequently they experienced each type of rumination. These 8 items were used to assess the presence of ruminative processing in the current study. An additional 2 items were added that were designed to capture the repetitive, cyclic characteristic of rumination (“I seemed to think in circles, coming back to the same thing over and over again”) and the defeatist, counterfactual thinking element of rumination (“I thought about the fact that I can’t seem to get over this”). Thus, ruminative cognitive processing was assessed using 10 items specifically selected for the current study. Each item was rated on a four point Likert scale 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in ruminative processing. This scoring system was adopted to maintain comparability with those used for the assessment of both intrusive and deliberate processing. Internal consistency as measured by Cronbach’s alpha was .89. The full list of ruminative processing items can be found in Table 5.4.

Posttraumatic Growth. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) is a 21-item scale that assesses positive change experienced in the struggle with major life crises. A short form consisting of 10 items has recently been created (Cann et al., 2010) and was used in the current study to reduce participant burden (Appendix G). Items were rated on a 6-point Likert scale of 0 (*I did not experience this change*) to 5 (*I experienced this change to a very great degree*), with possible scores ranging from 0 to 50 and higher scores indicating greater growth. The PTGI-SF has been shown to have acceptable construct validity and internal consistency reliability in samples of undergraduate students (Cann et al., 2010) and a combat-exposed military sample (Kaler, Erbes, Tedeschi, Arbisi & Polunsky, 2011). In the present sample, Cronbach's alpha was .87. Information concerning mean scores and thresholds indicating the presence of growth has not yet been provided.

Changes in Psychological Well-Being. The Psychological Well-Being Post-Traumatic Changes Questionnaire (PWB-PTCQ; Regel & Joseph, 2010) is a self-report measure designed to assess perceived changes in psychological well-being following traumatic events. It contains 18 items including "I accept who I am, with both my strengths and limitations" and "I feel I am in control of my life", with 3 items tapping each of the dimensions of self-acceptance, autonomy, purpose in life, relationships, sense of mastery, and personal growth. Each item is rated on a 5 point Likert scale of 1 (*Much less so now*) to 5 (*Much more so now*), with possible scores ranging from 18 to 90 and higher scores indicating greater increases in psychological well-being. A score of 54 or over represents at least a minimal level of growth, with scores below 54 indicating decreased psychological well-being. Internal consistency reliability has been shown to be satisfactory (Cronbach's alpha ranged from .87 to .95 for the PWB-PTCQ total and from .60 to .88 for the subscales) and scores showed a moderate level

of consistency over 6 months (Joseph et al., in press). In the current sample, Cronbach's alpha reliability was .95 for the PWB-PTCQ total score.

5.4.3 Participants

The page access counter logged 471 'hits' to the study website. Three hundred and ninety nine individuals agreed with the consent statements, but 98 of those did not proceed further to answer any questions and exited the study. Of the remaining 301 respondents, 18 answered the demographic questions but did not proceed to answer any further questions and exited the study. A further 29 participants did not complete all measures, leaving a final sample of 254 participants with complete responses. Completers and non-completers did not differ in terms of age ($t = -1.910$, $df = 299$, $p = .07$), sex ($\chi^2 = .704$, $df = 1$, $p = .401$), education ($\chi^2 = 3.666$, $df = 4$, $p = .453$), marital status ($\chi^2 = 2.141$, $df = 3$, $p = .544$), ethnicity ($\chi^2 = 2.570$, $df = 5$, $p = .766$), time since trauma ($t = .116$, $df = 297$, $p = .908$), age at trauma ($t = -1.616$, $df = 297$, $p = .107$), ratings of event stressfulness ($t = -1.098$, $df = 295$, $p = .273$), or whether they rated their experience as having met DSM-IV Criterion A ($\chi^2 = .067$, $df = 1$, $p = .796$).

The final participant sample consisted of 224 females and 30 males, ages ranging from 18 to 63 years ($M = 31.40$, $SD = 10.80$). Participants were mostly white ($n = 210$; 82.7%), single ($n = 126$; 49.6%), and educated to at least university level ($n = 133$; 52.4%). A variety of index traumatic events were reported and included traumatic bereavement ($n = 59$), serious illness or injury ($n = 33$), miscarriage ($n = 15$), relationship or family difficulties ($n = 21$), rape or sexual assault ($n = 28$), childhood sexual abuse ($n = 25$), witnessing or being involved in a motor vehicle accident ($n = 15$) or other events that could not be categorised ($n = 58$). The mean distress rating for these events was 3.54 ($SD = 0.75$) on the 0 to 4 scale, with

66.9% of participants rating their experience as extremely distressing. With respect to the DSM-IV A criterion, 59.7% of participants perceived the experience to have been a threat to their life or their physical or psychological well-being; 83.8% of participants agreed that their response to the event had involved intense fear, helplessness or horror; and 55.4% agreed with both statements. The events had occurred within 2 weeks to 31 years previously ($M = 6.32$ years, $SD = 6.06$ years); 43.3% of cases had experienced the event within the last 3 years and 20.4% had experienced the event more than 10 years previously. Participants ages at the time of the trauma ranged from 3 years to 62 years old ($M = 24.65$; $SD = 11.66$), with 21.3% of participants being aged 16 or younger at the time of the event.

5.5 Results

5.5.1 Data cleaning and assumption testing

Data screening revealed no incorrect data or invalid entries. Missing values were infrequent (0.65%). No one item on any of the measures had more than 6 missing values and no participants had more than 3 missing items for each measure or 6 missing items overall. Of the 87 participants with missing values, 55 had only one value missing and a further 20 had only two values missing. Missing values analysis revealed that missing data were completely random (Little's MCAR test $\chi^2 = 6364.07$, $df = 6578$, $p = .970$). Missing data for the Intrusive, Deliberate and Ruminative Processing subscales, PTGI-SF and PWB-PTCQ were replaced using the Expectation Maximisation (EM) algorithm within the SPSS missing values analysis package (Acock, 2005).

The data were also explored to determine suitability for parametric analyses. Box-plots indicated that the data had no extreme values or outliers for the majority of variables and this was confirmed using the criterion that values should be ≤ 3 standard deviations of the

mean (Stevens, 2002). Skewness and kurtosis values were examined for all variables using the criterion that they should fall within two standard errors of skewness or kurtosis, respectively, and were found to be acceptable for all variables. Inspection of histograms with normal curves demonstrated normal distributions for all variables of interest, which were confirmed by non-significant Komologrov-Smirnov tests.

5.5.2 Descriptive Statistics

Descriptive statistics for the cognitive processing and posttraumatic growth measures are displayed in Table 5.1. On average, participants reported a small to moderate degree of posttraumatic growth, as assessed by the PTGI-SF. The mean score of 20.80 ($SD = 12.18$) corresponds with the mean score of 20.40 ($SD = 11.88$) found in a sample of combat-exposed military personnel (Kaler et al., 2011), although to date no further studies have used the PTGI-SF to assess posttraumatic growth. The mean item rating was 2.08 on the 0-5 scale, reflecting an average rating just above the response anchor of '*small degree of change since the traumatic event*' and therefore indicating a reasonably low level of growth in this population. As in Study 1, PTGI-SF items endorsed to a moderate or greater degree (≥ 3 on the 0-5 scale) were also computed to determine how often individuals reported a significant degree of positive change. The modal number of PTGI-SF items endorsed to a moderate or greater degree was 5 and the mean was 4.54 ($SD = 3.05$, range 0-10). Fifty-two percent of participants endorsed at least 5 of the 10 items, while 26 participants (10.2%) endorsed no items. The most common positive changes endorsed were renegotiating priorities (66.1%), greater feelings of personal strength (57.1%), having a greater appreciation for life (55.9%) and knowing that one can handle difficulties (53.1%).

In terms of changes in psychological well-being as assessed using the PWB-PTCQ, the average score indicated a small improvement in psychological well-being. Scores on the response scale for the PWB-PTCQ range from 1 (*Much less so now*) to 5 (*Much more so now*), with scores of 4 or above on each item signifying an increase in that domain and are an indication that positive change for that item has occurred. A total score of 54 or above therefore represents an overall level of positive change. Sixty-three percent of participants scored above 54 on the PWB-PTCQ. The percentage of participants reporting a decrease (score ≤ 2), increase (score ≥ 4) or no change (score = 3) for each PWB-PTCQ item is displayed in Table 5.2 and demonstrates that the percentage of participants reporting an increase in psychological well-being ranged from 32.7% to 65.0%, whilst the percentage reporting a decrease in psychological well-being ranged from 9.8% to 42.1%.

Table 5.1 Descriptive Statistics for Study 2 Variables

	<i>M</i>	<i>SD</i>	Observed Range
Intrusive Processing	15.50	9.12	0-30
Deliberate Processing	14.49	8.64	0-30
Ruminative Processing	15.50	8.22	0-30
PTGI – Short Form	20.80	12.18	0-48
PWB-PTCQ	58.71	16.08	18-90

Table 5.2 Level of Agreement with PWB-PTCQ Items

PWB-PTCQ Item	<i>M</i>	<i>SD</i>	% Scoring ≤ 2	% Scoring 3	% Scoring ≥ 4
1. I like myself	2.96	1.29	34.3	31.8	33.9
2. I have confidence in my opinions	3.15	1.21	25.6	35.4	39.0
3. I have a sense of purpose in life	3.17	1.25	24.8	36.6	38.6
4. I have strong and close relationships in my life	3.22	1.31	28.3	25.2	46.5
5. I feel I am in control of my life	2.82	1.34	42.1	25.2	32.7
6. I am open to new experiences that challenge me	3.28	1.27	23.6	28.7	47.7
7. I accept who I am, with both my strengths and limitations	3.31	1.17	21.3	33.4	45.3
8. I don't worry about what other people think of me	3.18	1.17	23.6	41.7	34.7
9. My life has meaning	3.15	1.22	24.4	40.6	35.0
10. I am a compassionate and giving person	3.58	0.98	9.8	40.2	50.0
11. I handle my responsibilities in life well	3.22	1.13	22.0	37.4	40.6
12. I am always seeking to learn about myself	3.52	0.99	9.8	42.1	48.1
13. I respect myself	3.18	1.89	25.2	37.8	37.0
14. I know what is important to me and I will stand my ground, even if others disagree	3.53	1.10	12.6	37.4	50.0
15. I feel that my life is worthwhile and that I play a valuable role in things	3.17	1.24	26.4	35.0	38.6
16. I am grateful to have people in my life who care for me	3.86	1.12	10.2	24.8	65.0
17. I am able to cope with what life throws at me	3.25	1.29	28.7	21.7	49.6
18. I am hopeful about my future and look forward to new possibilities	3.17	1.31	28.7	32.7	38.6

5.5.3 Demographic Testing

Before testing the main research questions, the data were explored for potential differences in outcome variables according to demographic characteristics. An independent samples t-test revealed that women scored significantly higher than men on the Intrusive Processing subscale ($t = -2.51$, $df = 252$, $p = .013$). A one-way ANOVA revealed significant differences for education and both Ruminative Processing ($F(4, 249) = 3.163$; $p = .015$) and PTGI-SF total scores ($F(4, 249) = 3.693$; $p = .006$). Post hoc comparison demonstrated that individuals with postgraduate level education scored significantly lower ($p < .05$) than individuals with secondary school or college level education on Ruminative Processing, and individuals with college level education scored significantly higher than individuals with secondary school or postgraduate level education on the PTGI-SF. No differences in outcome variable scores were observed for the demographic characteristics ethnicity or marital status.

5.5.4 Impact of Event Characteristics

The data were explored to examine whether event characteristics influenced the extent of posttraumatic growth and changes in psychological well-being reported. Results from these analyses are presented in Table 5.3 and demonstrate that survivors of sexually traumatic experiences (i.e. rape, incest, sexual assault or childhood sexual abuse) reported less growth and lower psychological well being than participants who experienced traumatic events that were not sexual in nature. The results also revealed that participants who perceived their experience to have met the DSM-IV A criterion reported lower PWB-PTCQ scores, but not PTGI-SF scores, than participants who did not endorse both A criterion items. Finally, there was a trend for participants who were aged 16 or younger at the time of the event to report significantly higher PWB-PTCQ scores than participants that were over the age of 16 when they were traumatised, although this finding did not reach the conventional significance level.

Table 5.3 Impact of Event Characteristics on PTGI-SF and PWB-PTCQ Scores for Study 2

Event Characteristic	<i>n</i>	PTGI-SF				PWB-PTCQ			
		<i>M</i>	<i>SD</i>	Statistic	<i>P</i>	<i>M</i>	<i>SD</i>	Statistic	<i>P</i>
<i>Event Type</i>				F(7, 244) = 3.473	.001**			F(7, 244) = 3.230	.003**
Traumatic bereavement	59	22.51	10.99			60.76	13.76		
Serious illness or injury	33	24.93 ^a	13.50			62.24	12.63		
Relationship difficulties	21	24.27	10.66			64.12 ^b	16.42		
Miscarriage	15	25.03	12.35			53.40	18.85		
Rape or sexual assault	28	16.68	12.69			50.18 ^b	16.47		
Childhood sexual abuse	25	15.45 ^a	10.83			51.57	14.86		
Motor vehicle accident	15	26.01	12.91			61.65	16.20		
Other	58	17.83	11.13			61.16	17.22		
<i>Sexual Trauma</i>				<i>t</i> = 3.641; <i>df</i> = 250	< .001**			<i>t</i> = 4.580; <i>df</i> = 250	< .001**
Yes (rape/assault/CSA)	56	15.86	11.49			50.52	15.32		
No	196	22.40	11.94			61.23	15.46		
<i>DSM-IV A Criterion</i>				<i>t</i> = -.311; <i>df</i> = 251	.756			<i>t</i> = 2.729; <i>df</i> = 250	.008**
Yes	139	20.96	12.32			56.22	17.25		
No	114	20.48	12.03			61.59	14.05		
<i>Child at Event</i>				<i>t</i> = 1.097; <i>df</i> = 250	.274			<i>t</i> = -1.904; <i>df</i> = 250	.058
16 years old or younger	54	19.16	11.98			62.44	16.47		
Over 16 years old	198	21.22	12.28			57.75	15.93		

5.5.5 Exploratory Factor Analysis

Exploratory factor analysis was used to analyse responses to the 30 items from the three measures of cognitive processing in order to empirically establish whether intrusive, deliberate and ruminative processing styles can be distinguished. Before proceeding, a number of diagnostic checks were conducted to ensure the assumptions of factor analysis were met. The sample size was adequate for factor analysis. The data were normally distributed and the relationships between variables were linear. The correlation matrix was examined and the majority of correlations were over .3. The diagonals on the anti-image matrix were all over .5. In addition, Barlett's Test of Sphericity was significant ($p < .001$) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .962 and therefore acceptable.

Using the Kaiser criterion of eigenvalues greater than 1.00 (Kaiser, 1960), three factors with eigenvalues greater than 1.00 (15.627, 2.677, 1.245) were identified and together accounted for 65.17% of the variance. The Scree Plot also suggested a three-factor solution. This three-factor solution was examined using oblique (Promax) rotation, since the factors were expected to be correlated. Items that loaded higher than 0.45 on a single factor were retained, but items that also cross-loaded by greater than 0.30 on any other factor were discarded to increase factor purity and facilitate the interpretation of factors (Tabachnick & Fidell, 1996).

The items and factor loadings are presented in Table 5.4. The three-factor solution consisted of a 10 item factor that explained 52.09% of the variance and contained the 10 Intrusive Processing items. The second factor consisted of 8 of the 10 Deliberate Processing items and explained 8.93% of the variance, and the third factor consisted of the 10

Ruminative Processing items plus the 2 Deliberate Processing items that did not load on the Deliberate processing factor and explained 4.15% of the variance, based on the rotated components. These results provide further support for the theoretical separation of cognitive processing into intrusive, deliberate and ruminative subtypes.⁷

⁷ All subsequent analyses for the deliberate and ruminative processing subscales are based on the scores for the original 10 item subscales, rather than the 8 deliberate and 12 ruminative processing items, respectively, since it was more theoretically congruent. Analyses were conducted for both scoring procedures but the pattern and strength of findings were largely comparable so the two 10 item subscales were retained.

Table 5.4 Three Factor Solution for the 30 Cognitive Processing Items

Item	1	2	3
Intrusive Processing Items			
1. I thought about the event when I didn't mean to	.933	-.041	-.083
2. Thoughts about the event came to mind and I couldn't stop thinking about them	.958	.029	-.108
3. Thoughts about the event distracted me or kept me from being able to concentrate	.686	-.035	.255
4. I could not keep thoughts or images about the event from entering my mind	.886	-.008	.041
5. Thoughts, memories or images of the event came to mind even when I did not want them	.874	-.003	.048
6. Thoughts about the event caused me to relive my experience	.777	.084	-.015
7. Reminders of the event brought back thoughts about my experience	.742	.059	.104
8. I found myself automatically thinking about what had happened	.844	.045	.014
9. Other things kept leading me to think about my experience	.738	.107	.070
10. I tried not to think about the event, but could not keep the thoughts from my mind	.857	-.066	.113
Deliberate Processing Items			
1. I thought about whether I could find meaning from my experience	-.038	.767	.073
2. I thought about whether changes in my life have come from dealing with my experience	-.130	.502	.285
3. I forced myself to think about my feelings about my experience	.084	.870	-.155
4. I thought about whether I have learned anything as a result of my experience	-.111	.858	.068

Item	1	2	3
5. I thought about whether my experience has changed my beliefs about the world	-.097	.453	.240
6. I thought about what the experience might mean for my future	-.096	.292	.671
7. I thought about whether my relationships with others have changed following my experience	.030	.194	.658
8. I forced myself to deal with my feelings about the event	.151	.926	-.285
9. I deliberately thought about the event and how it has affected me	.080	.769	.023
10. I thought about the event and tried to understand what happened	.117	.715	.075
Ruminative Processing Items			
1. I thought repeatedly about the long term consequences of the event	.254	.094	.470
2. I thought about what my life would be like if the event had not happened	.003	-.101	.863
3. I thought about what else could have gone wrong or how much worse it could have been	-.135	.292	.452
4. I thought about how unfair it is that I had to go through this	.099	-.095	.721
5. I thought repeatedly about how this has damaged my relationships with other people	.102	-.001	.749
6. I thought about how things could have been, if only I had done something differently	.274	-.033	.501
7. I got absorbed in thinking about why this happened to me	.284	.057	.456
8. I thought about what I would like to say or do to the person who caused this event to happen	.035	-.097	.608
9. I couldn't stop thinking about other bad things that could happen in the future	.140	.057	.453
10. I seemed to think in circles, coming back to the same thing again and again	.261	-.123	.742

Note. Loadings above 0.45 are highlighted bold.

5.5.6 Correlational Analyses

Having established that the three measures of processing can be distinguished, the next step was to explore the association of subtypes of cognitive processing with posttraumatic growth. Pearson's correlations were calculated between scores on the three cognitive processing measures and posttraumatic growth and are displayed in Table 5.5. Results demonstrated that the three subtypes of cognitive processing were strongly positively correlated, indicating that intrusive, deliberate and ruminative processing likely co-occur. As in Study 1, differences in the strength of the correlations between intrusive and deliberate processing ($r = .60$) and intrusive and ruminative processing ($r = .79$) were observed, therefore a Fisher's z transformation (Cohen & Cohen, 1983) was calculated to examine whether the two correlation coefficients were significantly different. Replicating the finding of Study 1, results showed that the association between deliberate processing and intrusive processing was significantly smaller than that for ruminative processing and intrusive processing ($z = -4.24, p < .01$), reiterating the suggestion that intrusive and ruminative forms of processing may be more akin than deliberate processing.

This is also reflected in the pattern of associations between the subtypes of processing and posttraumatic growth, where intrusive and ruminative processing were not significantly associated with PTGI-SF, whilst deliberate processing was positively associated with growth. Similarly, intrusive and ruminative processing were negatively associated with PWB-PTCQ scores, whilst deliberate processing was not significantly associated with PWB-PTCQ. These differential relationships between the subtypes of processing and growth outcomes provide a further indication that intrusive, ruminative and deliberate processing are distinct and influence growth in unique ways. In particular, intrusive and ruminative processing are associated with reduced growth while deliberate processing is associated with greater growth

following trauma. As such, it appears that deliberate processing represents a more adaptive way of processing past traumas than intrusive or ruminative repetitive thoughts about the experience.

As the three subtypes of processing were significantly positively associated, it was speculated that deliberate processing would be associated with PWB-PTCQ when intrusive and ruminative processing were partialled out. Partial correlation supported this hypothesis ($pr = .35, p < .001$). The association between deliberate processing and PTGI-SF was also strengthened when intrusive and ruminative processing were controlled for ($pr = .40, p < .001$), suggesting that deliberate processing has a positive effect on posttraumatic growth in the context of low intrusive and ruminative processing.

Table 5.5 Correlations Between Scores on Study 2 Measures

	1	2	3	4
1. Intrusive Processing	-			
2. Deliberate Processing	.60**	-		
3. Ruminative Processing	.79**	.71**	-	
4. PTGI-SF	.02	.34**	.12	-
5. PWB-PTCQ	-.42**	-.01	-.30**	.58**

Note. ** $p < .01$

5.5.7 Multiple Regression Analyses

Multiple regression analyses were conducted to determine how much variance in PTGI-SF and PWB-PTCQ scores was explained by each of the processing subtypes. Thus,

the intrusive, deliberate and ruminative processing subtypes, as well as relevant demographic and event-related variables, were used in two models to predict PTGI-SF and PWB-PTCQ scores, respectively. The nature of the trauma (sexual or non-sexual) and whether it met DSM-IV A criterion were included in the models because results from the analyses presented in section 5.5.4 demonstrated that these variables influenced the extent of growth reported. It was predicted that deliberate processing would be the strongest predictor in both models.

The results of the regression analyses are presented in Table 5.6. Both models were significant and accounted for 19% of the variance in PTGI-SF, $F(6, 239) = 10.62, p < .001$ and 28% of the variance in PWB-PTCQ, $F(6, 239) = 17.08, p < .001$. Both models supported the prediction for deliberate processing and demonstrate that active, purposeful engagement in trauma processing positively predicts posttraumatic growth. The negative relationship found for intrusive processing in both models suggests that the experience of intrusive trauma-related thoughts may somehow inhibit the development of psychological growth following trauma. The models also demonstrated that the nature of the event experienced, namely whether it was a sexual or non-sexual trauma, significantly predicted posttraumatic growth.

Table 5.6 Regression Model of Processing and Event Variables on PTGI-SF and PWB-PTCQ

Criterion	Variable	<i>R</i>	Adj. <i>R</i> ²	<i>B</i>	<i>SE(B)</i>	β	<i>t</i>	<i>p</i>
PTGI-SF	Intrusive processing	.46	.19	-.33	.13	-.25	-2.61	.010*
	Deliberate processing			.87	.15	.50	5.99	.000***
	Ruminative processing			.03	.16	.02	0.02	.985
	Time since event			.01	.01	.01	.06	.956
	Event type (sexual/non-sexual)			-5.30	1.91	-.18	-2.78	.006**
	A Criterion			1.53	1.50	.06	1.02	.308
PWB-PTCQ	Intrusive processing	.55	.28	-.91	.16	-.52	-5.77	.000***
	Deliberate processing			.95	.18	.41	5.28	.000***
	Ruminative processing			-.26	.20	-.14	-1.34	.183
	Time since event			.01	.01	.02	.37	.710
	Event type (sexual/non-sexual)			-5.16	2.35	-.13	-2.19	.030*
	A Criterion			-.75	1.85	-.02	-.40	.688

5.5.8 Further Analyses

Given the results of the correlational and regression analyses, it was of interest to explore how the combination of intrusive and deliberate processing influenced the extent of growth reported. Median splits were computed for the Intrusive Processing subscale (median = 17) resulting in a High Intrusive Processing group ($n = 125$) and a Low Intrusive Processing group ($n = 129$). Similarly, participants were divided according to their Deliberate Processing scores (median = 11) resulting in a High Deliberate Processing group ($n = 118$) and a Low Deliberate Processing group ($n = 136$). Participants were then further grouped into one of four groups: Low Intrusive Low Deliberate ($n = 100$), Low Intrusive High Deliberate ($n = 29$), High Intrusive Low Deliberate ($n = 36$), or High Intrusive High Deliberate ($n = 89$).

A one-way ANOVA was computed and revealed significant differences in both PTGI-SF, $F(3, 250) = 10.04, p < .001$, and PWB-PTCQ scores, $F(3, 250) = 16.60, p < .001$, according to the processing groups (see Table 5.7). Post hoc analyses (Tukey) revealed that participants in the Low Intrusive High Deliberate processing group reported higher PTGI-SF scores than individuals in the Low Intrusive Low Deliberate or High Intrusive Low Deliberate processing groups. Similarly, post hoc analyses demonstrated that participants in the Low Intrusive High Deliberate processing group reported higher PWB-PTCQ scores than individuals in the High Intrusive Low Deliberate and High Intrusive High Deliberate processing groups. For both the PTGI-SF and the PWB-PTCQ, the combination of High Intrusive and Low Deliberate processing resulted in the lowest level of growth, whilst the combination of Low Intrusive and High Deliberate processing resulted in the highest level of growth. These findings reiterate that deliberate cognitive processing plays a positive role in the occurrence of growth following adversity, particularly when the level of intrusive repetitive thoughts is low.

Table 5.7 Scores on the PTGI-SF and the PWB-PTCQ by Intrusive and Deliberate Processing Groups

	PTGI-SF				PWB-PTCQ			
	Low Deliberate		High Deliberate		Low Deliberate		High Deliberate	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Low Intrusive	19.00 ^a	11.82	26.00 ^b	10.50	63.49 ^c	11.96	66.51 ^c	13.23
High Intrusive	13.44 ^a	9.04	24.12 ^b	12.49	45.51	13.70	56.09	18.13

Note. Means with the same superscript are not significantly different (*p* > .05).

5.5.9 Comparing Cognitive Processing for Increased Versus Decreased Psychological Well-Being Groups

Items on the PWB-PTCQ are rated on a 5 point Likert scale of 1 (*Much less so now*) to 5 (*Much more so now*), such that participants are able to indicate whether they have changed in a positive or negative direction on each item. A score of 54 or over therefore represents at least a minimal level of growth, with scores below 54 indicating decreased psychological well-being and scores of 54 or over indicating increased psychological well-being. An independent samples t-test was conducted to examine whether the subtypes of cognitive processing significantly differed between participants reporting decreased psychological well-being (*n* = 93) and participants reporting increased psychological well-being (*n* = 161). Results are displayed in Figure 5.1 and demonstrate that participants reporting decreased psychological well-being experienced significantly higher rates of intrusive processing (*t* = 7.29, *df* = 252, *p* < .001) and ruminative processing (*t* = 6.39, *df* = 252, *p* < .001), but not deliberate processing (*t* = 1.71, *df* = 252, *p* = .09) than participants reporting increased psychological well-being.

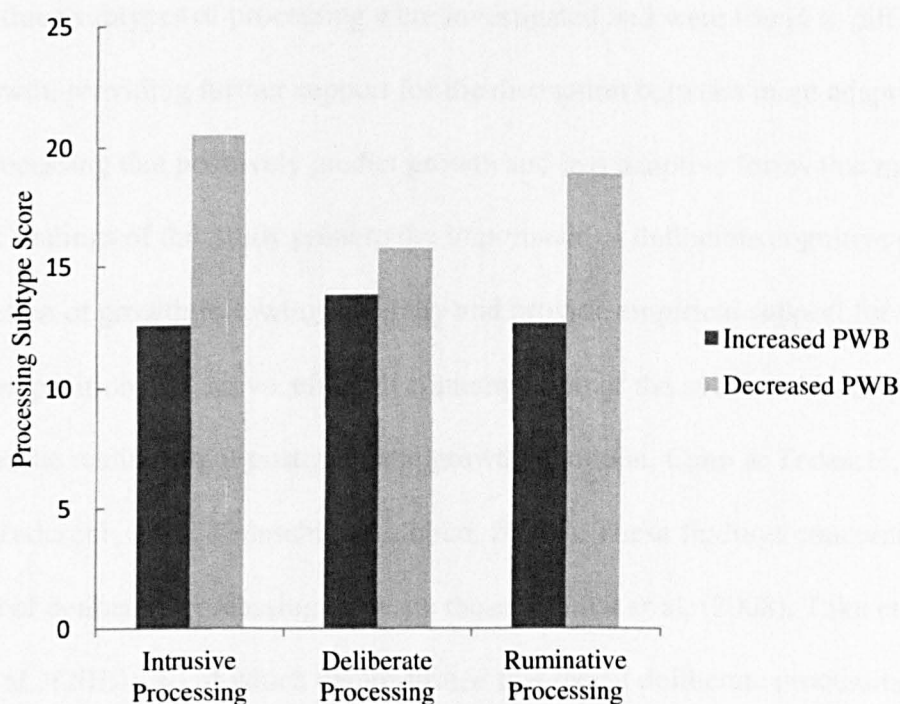


Figure 5.1 Cognitive processing subtypes for increased versus decreased PWB groups

5.6 Discussion

This study provides a comprehensive examination of the role of intrusive, deliberate and ruminative subtypes of cognitive processing in posttraumatic growth and changes in psychological well-being following trauma and adversity. Previous attempts to explore the impact of cognitive processing have been compromised by the use of unsuitable measures for the assessment of processing, but this study is one of the first to assess transient, event-provoked processing that is focused on the traumatic experience and its impact on one's life. Furthermore, the conceptualisation of processing into intrusive, deliberate and ruminative subtypes appears to provide a valuable way of expanding our current understanding of cognitive processing, with results from the factor analysis supporting the subdivision of processing in this way.

The three subtypes of processing were investigated and were found to differentially relate to growth, providing further support for the distinction between more adaptive forms of cognitive processing that positively predict growth and less adaptive forms that may impede growth. The findings of this study point to the importance of deliberate cognitive processing in the prediction of growth following adversity and provide empirical support for the theoretical proposition that active, effortful contemplation of the event and its implications is important for the realisation of posttraumatic growth (Calhoun, Cann & Tedeschi, 2010; Calhoun & Tedeschi, 1998; Tedeschi & Calhoun, 2004a). These findings concerning the positive role of deliberate processing replicate those of Taku et al. (2008), Taku et al. (2009), and Cann et al., (2010), all of which demonstrated that recent deliberate processing positively predicted posttraumatic growth. Taking these findings together, the evidence indicates that engagement in deliberate, effortful confrontation with memories of the trauma and its' impact on one's life can facilitate the schema revision and reconfiguration that signifies growth following adversity. The results from the current study also suggest that deliberate processing might be most effective in the context of low intrusion.

Results from this study also demonstrated that intrusive processing was not positively associated with growth as had been predicted, but that a higher occurrence of intrusive trauma-focused thoughts predicted a lower level of growth. Similarly, individuals reporting levels of intrusive processing above the median scored lower on both assessments of growth than individuals reporting levels of intrusive processing below the median, again indicating that intrusive repetitive thoughts about a past trauma are associated with less growth. Evidence from this study also demonstrated that individuals reporting a decrease in psychological well-being since the traumatic event reported a significantly higher level of intrusive processing than individuals reporting an increase in psychological well-being.

Taken together, these findings are in contrast to results from numerous empirical studies that have demonstrated a positive role of intrusive thoughts in the occurrence of growth following trauma (e.g. Butler et al., 2005; Lurie-Beck et al., 2008; Morris & Shakespeare-Finch, 2010; Mystakidou et al., 2007; Park & Fenster, 2004; Senol-Durak & Ayvasik, 2010; Taku et al., 2008). They also run counter to the theoretical models that have emphasised the importance of intrusive processing in the development of posttraumatic growth (e.g. Tedeschi & Calhoun, 2004a).

However, it is important to note that the occurrence of intrusive thoughts is a signal that processing is incomplete and can therefore be seen to reflect an ongoing attempt to make meaning from the experience (Park et al., 2010). As such, the realisation of growth may preclude the need for continued intrusive processing, whilst an inability to integrate the event and an absence of growth motivates engagement in intrusive processing. Thus, whilst intrusive thoughts are the mechanism through which events are processed, it may only be longitudinally that intrusive processing is positively associated with growth, whilst cross-sectionally intrusion and growth are negatively associated. In line with this, results from several cross-sectional studies have demonstrated negative associations between intrusive processing and posttraumatic growth (Cann et al., 2010; Park et al., 2010) and results from several longitudinal studies have demonstrated positive associations between intrusive processing and subsequent posttraumatic growth over time (Kilmer & Gil-Rivas, 2010; Manne et al., 2004; Sears et al., 2003).

However, not all studies have found that intrusive processing predicts subsequent posttraumatic growth. Carboon et al. (2005) found that the level of intrusive thoughts during treatment for blood cancer did not predict posttraumatic growth at treatment completion

approximately 5 months later. Similarly Wolchik et al. (2008) reported that baseline intrusive trauma-related thoughts did not predict posttraumatic growth at 6 year follow-up in adolescents who had been bereaved of their parents during childhood, and Salsman et al. (2009) found that baseline intrusions were not significantly associated with 3 month posttraumatic growth in colorectal cancer patients. Whilst results from the latter three studies are limited because of the measures used to assess processing, particularly to the extent that they tapped into intrusive negative thoughts that interfered with normal functioning rather than more neutral processing, the mixed findings highlight that the role of intrusive processing in growth following adversity remains poorly understood and further research is clearly warranted to examine the longitudinal influence of intrusive processing. Furthermore, the absence of research exploring the longitudinal impact of deliberate processing, and the finding that intrusive and deliberate processing are closely associated, highlights the importance of studying intrusive and deliberate processing over time simultaneously.

With respect to ruminative processing, results from the current study indicated that ruminative engagement with thoughts and feelings about a past trauma did not significantly influence the extent of growth reported. Whilst correlational analyses demonstrated that ruminative processing was negatively associated with changes in psychological well-being, and further analyses revealed that participants reporting decreased psychological well-being engaged in significantly more ruminative processing than participants reporting increased psychological well-being, results from the regression analyses failed to detect a significant influence of ruminative processing. This lack of relationship is intriguing in light of the existing literature testifying to the more toxic consequences of ruminative thought, which led to the prediction that ruminatively focusing on trauma-related distress and subsequent losses would impede processing and inhibit the experience of growth. A simple explanation for the

null findings might be that the cross-sectional design of this study resulted in a failure to detect a meaningful relationship between ruminative processing and growth, but that when studied longitudinally, early ruminative processing might be negatively associated with later growth. However, it might also be the case that ruminative processing soon after the event is not directly associated with growth but motivates deliberate processing at a later stage and could therefore set the stage for subsequent growth, resulting in positive longitudinal associations between ruminative processing and growth. As such, the longitudinal examination of cognitive processing and posttraumatic growth is a much needed topic of further research.

Other findings from this study merit attention. A number of event characteristics influenced the extent of growth reported; specifically, traumas of a sexual nature resulted in significantly less posttraumatic growth than non-sexual traumas such as bereavement, illness or injury. This finding is in line with previous published research that has indicated that survivors of sexually traumatic experiences report less growth than survivors of non-sexual traumas (e.g. Shakespeare-Finch & Armstrong, 2010), as well as findings from Study 1 of this thesis that demonstrated relatively low levels of posttraumatic growth in the sample of sexual abuse or assault survivors. Research has also documented that survivors of sexual assault report significantly higher levels of PTSD symptomatology than other trauma survivors (e.g. Frans, Rimmo, Aberg & Fredrikson, 2005; Hapke, Schumann, Rumpf, John & Meyer, 2006; Shakespeare-Finch & Armstrong, 2010). Together these results imply that traumas of this type encompass a number of characteristics that are particularly damaging to the adjustment process and may mean that such events are especially difficult to integrate. Further research is needed to explore precisely what those characteristics might be and how they impede the process of recovery and growth. Fruitful lines of inquiry might include

attention to the role of shame, self-blame, secrecy, further victimisation, relationship with perpetrator and the extent of disclosure.

One unexpected finding was that events that were rated as traumatic, in line with the DSM-IV A criterion, were associated with *lower* changes in psychological well-being than events that were not considered to meet the traumatic stressor criterion. A large body of research, discussed in section 1.3.5.1, has demonstrated that greater levels of perceived threat and harm, and greater objective and subjective trauma severity, are associated with higher levels of posttraumatic growth (Helgeson et al., 2006; Linley & Joseph, 2004). As such, it was speculated that events that met the traumatic stressor criterion would be associated with greater growth, but results from the current study indicate that the opposite was true. A possible explanation for this finding is that the relationship between event severity and growth may be curvilinear, such that intermediate rather than high or low levels of trauma exposure produce the highest levels of posttraumatic growth (Calhoun & Tedeschi, 2001; Fontana & Rosenheck, 1994). Thus, in the current study, it is possible that events that met the traumatic stressor criterion were so extreme that they had overwhelmed the individual's ability to cope and consequently impeded growth, while events that were less severe were sufficient to instigate growth without being so intense as to preclude adjustment.

An additional point to note is that results of this study revealed differential findings for posttraumatic growth outcomes depending on the measurement tool used. Thus, intrusive and ruminative processing were negatively associated with PWB-PTCQ, but not PTGI-SF scores, whilst deliberate processing was positively associated with PTGI-SF, but not PWB-PTCQ scores. Similarly, although the PTGI-SF and PWB-PTCQ were positively associated ($r = .58, p < .01$), this correlation was not so high as to suggest the measures are identical.

These findings replicate those of prior studies that have found differential associations between growth and other variables depending on the measurement tool used (e.g. Linley, Joseph, Cooper, Harris & Meyer, 2003) and moderate correlations between different measures of posttraumatic growth (e.g. Joseph et al., 2005). As such, they reiterate the growing recognition within the posttraumatic growth literature that existing measures are not synonymous and each may capture unique elements of the overall phenomenon of positive psychological well-being following trauma and adversity (Joseph & Linley, 2008a). They also provide further support for the recommendation that researchers should employ at least two measures of growth simultaneously (Joseph & Linley, 2008a).

There are important implications of the findings of this study, in terms of both theoretical models of posttraumatic growth and clinical applications. Theoretically, the results reiterate the importance of distinguishing between subtypes of cognitive processing and therefore build on current models of posttraumatic growth by further detailing the characteristics of processing subtypes and testing their associations with growth outcomes. With respect to therapeutic work with trauma survivors, the results of this study suggest that differentiating between cognitions that are adaptive and maladaptive may allow for the possibility of aiding the adjustment and long term well-being of trauma survivors. As such, there may be parallel processes involved in therapy – to reduce intrusive cognitions and to encourage survivors to deliberately engage with trauma material, since deliberate processing may only exert a positive influence in the absence of distressing intrusions. However, these suggestions remain speculative and at this point it is not possible to hypothesise how best to facilitate growth following trauma and adversity. Nevertheless, the results of this study point to the importance of deliberate processing and provide a starting point from which future research can move forward.

Chapter 6

Study 3: Cognitive Processing and Posttraumatic Growth:

A Longitudinal Examination

6.1 Overview

Results from the study presented in Chapter 5 demonstrated that cognitive processing following trauma consists of intrusive, deliberate and ruminative repetitive thoughts and that these subtypes of processing are differentially related to posttraumatic growth. The findings also highlighted that deliberate cognitive processing appears to be particularly important in the development of growth following adversity. However, given the cross-sectional nature of the study, longitudinal research is needed to explore how the associations between subtypes of processing and posttraumatic growth unfold over time. The study presented in the current chapter therefore sought to investigate the question of how cognitive processing subtypes are longitudinally associated with posttraumatic growth over a 6 month period. Results from the cross-sectional analyses are presented first, followed by exploratory analyses of the longitudinal data.

6.2 Introduction

Although progress has been made in our understanding of the positive outcomes that can arise following trauma and adversity, this literature has been characterised by cross-sectional studies examining the characteristics, prevalence and correlates of growth. This is also true of the more specific literature concerning the impact of cognitive processing on

growth, which has generally relied on cross-sectional designs (e.g. Calhoun et al., 2000, Gangstad, Norman & Barton, 2009; Senol-Durak & Ayvasik, 2010). Thus, although longitudinal studies of posttraumatic growth exist (e.g. Davis et al., 1998; Frazier et al., 2001; Park et al., 1996), few have explored the longitudinal course and impact of cognitive processing. Whilst some research has sought to explore how earlier processing activity relates to subsequent growth (e.g. Cann et al., 2010; Taku et al., 2008; Taku et al., 2009), these studies were still cross-sectional in nature since they relied on retrospective reports of early processing. Retrospective assessment, although useful for outlining potential relationships between variables, is limited in that it may not be an accurate recollection of the type of processing activity that occurred soon after the event, and in particular may be influenced by current processing activity. As a result, there is a paucity of research that has examined the longitudinal course of growth and the cognitive processes involved in its development.

Longitudinal research is necessary because theoretical models of growth have suggested that the timing of cognitive processing is a key predictor of adjustment (Calhoun, Cann & Tedeschi, 2010; Tedeschi & Calhoun, 2004a). Specifically, the sequence of early intrusive processing superseded by more effortful, deliberate processing is regarded as the pattern of processing most conducive to growth (Tedeschi & Calhoun, 2004a). In contrast, intrusive processing that does not abate over time but remains high over a prolonged period is seen to exacerbate distress and impede the development of posttraumatic growth (Greenberg, 1995). Similarly, intrusive processing that becomes ruminative in nature, with a passive focus on one's inability to resolve the event or find meaning in the experience, is also believed to inhibit the development of growth (e.g. Michael et al., 2007).

To date, only a handful of studies have tested the predictions of this model longitudinally. Phelps, Williams, Raichle, Turner and Ehde (2008) explored cognitive processing and posttraumatic growth following amputation and reported that deliberate processing within 9 weeks of amputation predicted posttraumatic growth at 12 months. Cognitive processing that was characterised by counterfactual thinking, rumination and denial was unrelated to growth at any time. As such, results from Phelps et al. (2008) provide preliminary support for elements of Tedeschi and Calhoun's (2004a) model of posttraumatic growth. Sears et al. (2003) also explored how cognitive processes influenced subsequent posttraumatic growth and benefit finding in women with early-stage breast cancer. Their results demonstrated that baseline intrusive cognitive processing positively predicted posttraumatic growth at 12 month follow up, providing support for the theoretical assumption that early intrusive processing is positively associated with later growth.

However, Carboon et al. (2005) also sought to examine the contribution of early cognitive processing to reports of growth following treatment for hematologic cancer and demonstrated that, in contrast to findings from Sears et al. (2003), intrusive cognitions in the first 1 to 2 months following diagnosis did not predict posttraumatic growth at treatment completion approximately 6 months later. Similarly, Salsman et al. (2009) sought to explore the longitudinal impact of intrusive and effortful processing on posttraumatic growth in colorectal cancer patients and reported that baseline intrusive processing did not significantly predict posttraumatic growth at 3 month follow-up. With respect to more effortful forms of processing, Salsman et al. (2009) reported a weak positive association between baseline deliberate processing and 3 month posttraumatic growth, but speculated that that association might be strengthened over an extended time period.

Manne et al. (2004) also sought to evaluate the longitudinal associations between cognitive processing and the course of posttraumatic growth over an 18 month period in breast cancer patients. Their results demonstrated that there was a significant increase in posttraumatic growth over time, with deliberate contemplation about the potential reasons why they had developed breast cancer and a search for meaning in the experience predicting an increase in growth over time. However, intrusive cognitive processing was not associated with gains in growth as predicted by Tedeschi and Calhoun's (2004a) model.

Taken together, results from these studies fail to find consistent support for Tedeschi and Calhoun's (2004a) model of cognitive processing, with mixed findings concerning the longitudinal impact of intrusive processing and relatively weak associations for more effortful processing. One factor that may account for these inconsistent results is the use of different, and sometimes inadequate, measures for assessing cognitive processing and its subtypes. For instance, Carboon et al. (2005) used the Re-experiencing subscale of the PTSD Checklist – Civilian version (PCL-C, Weathers, Litz, Huska & Keane, 1994) and Salsman et al. (2009) used the Intrusion subscale of the Impact of Event Scale (IES, Horowitz, Wilner & Alvarez, 1979) to assess intrusive processing. Both measures are more commonly used to capture posttraumatic symptomatology and their limitations as markers of cognitive processing have been previously discussed (see section 4.7.2).

Similarly, the assessment of deliberate processing in Salsman et al. (2009) relied on a 4-item subscale that demonstrated low reliability and in Manne et al. (2004) the deliberate processing subtypes of contemplating the reasons for cancer and searching for meaning in the cancer experience were assessed using single item measures. As such, more comprehensive measures of intrusive and deliberate cognitive processing are needed to further test the model

of growth longitudinally. In addition, all of the studies, with the exception of Phelps et al. (2008), relied on samples of survivors of various types of cancer. Although it is useful to understand the cognitive processes involved in growth following the experience of cancer, for models of growth to be comprehensive they must also be tested in samples of survivors of a diverse range of traumatic events.

As such, the current study sought to examine the longitudinal relationship between subtypes of cognitive processing and posttraumatic growth in a sample of participants that had experienced a range of traumatic events. Ideally, the design would have been a prospective longitudinal study with an initial assessment in the immediate aftermath of the event, followed by multiple assessments over an extended period of time for the measurement of cognitive processing and posttraumatic growth at regular intervals (e.g. every 2 months). However, with limited resources and timescales, designs such as these were unfeasible. Consequently, the current study comprised two assessments of cognitive processing and growth spaced 6 months apart. At a basic level, the study therefore aimed to answer the question of whether levels of cognitive processing at one point in time would predict levels of posttraumatic growth 6 months later. Also of interest was how the dispositional measures of cognitive processing employed in Study 1 of this thesis related to event-provoked processing subtypes. Of particular interest was how stable tendencies to reflect or ruminate influenced the nature and degree of trauma-specific processing. As such, dispositional processing measures were also used in this study. Similarly, in line with recommendations from Joseph and Linley (2008a) regarding the assessment of posttraumatic growth, as well as findings from the previous study concerning the differential findings for different growth measures, two measures of growth were employed.

Given the need for a sample of participants with diverse trauma histories, it was decided to sample from a college student population. There were two main reasons for this. First, college student samples are often used in studies of trauma and growth (e.g. Calhoun et al., 2000; Cann et al., 2010; Park & Fenster, 2004; Tedeschi & Calhoun, 1996) because they allow for a large number of people to be screened for trauma history, such that the resulting sample of trauma survivors is still sufficiently large. A large sample size was particularly important for the current longitudinal study since it had to allow for attrition over the course of the study. Secondly, evidence has demonstrated that the trauma experience of university students is comparable to the general population (Bernat, Ronfeldt, Calhoun & Arias, 1998; Vrana & Lauterbach, 1994), with students reporting more than just relatively benign stressors but significant life crises (Damush, Hays & DiMatteo, 1997). The current study sample was therefore one of university students who had experienced a range of traumatic events, based on their positive response to screening criteria provided in both the request for participants and the eligibility criteria section of the study.

6.3 Study 3a: Cross-Sectional Study

6.3.1 Method

6.3.1.1 Procedure. An announcement was placed on the 'News' section of the University of Nottingham Intranet Portal, which is accessible to all students registered at the University. This announcement included a brief description of the research and contained a request for individuals who had experienced a traumatic event or major life crisis to take part in the study. Potential participants were encouraged to follow a 'link' from the announcement page to the online questionnaire, where they were provided with further information about the study, inclusion criteria, requirements of participation and information about ethical matters. Participants then completed all study measures outlined in section 6.3.1.2. Following

completion of the questionnaire, participants were invited, but not obliged, to indicate whether they would be willing to participate in a follow-up questionnaire after 6 months by providing an email address that they could be contacted on concerning the follow-up study. Individuals were then taken to a debriefing page (see Appendix C) where they were given more information about the study, contact details for sources of emotional support should they require it, and were thanked for their participation.

6.3.1.2 Measures. *Demographic and Event-Related Information.* Self-reported demographics included gender, age, marital/relationship status, ethnicity and education. Self-reported information about the traumatic event they had experienced was also collected. Participants were asked to briefly describe the most traumatic event of their life, state when the event had happened, how old they were at the time of the event, and a rating of how distressing they had found their experience ranging from 0 (*not at all distressing*) to 4 (*extremely distressing*). As in Study 2, participants were also asked to respond ‘yes’ or ‘no’ to the following 2 statements: “Did you perceive this experience to have been a threat to your, or to someone else’s, life or physical or psychological well-being?” and “Did your response to this event involve intense fear, helplessness or horror?” in order to determine whether their experience qualified as traumatic in terms of the DSM-IV Criterion A.

Event-Related Intrusive Processing. The Intrusive Processing subscale of the modified Rumination Inventory (A. Cann, personal communication, November 13, 2008) was used to assess intrusive cognitive processing. It contains 10 items which participants rate on a 4 point Likert scale of 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in intrusive processing. In the current sample, Cronbach’s alpha reliability for the 10-item scale was .95.

Event-Related Deliberate Processing. The Deliberate Processing subscale of the modified Rumination Inventory (A. Cann, personal communication, November 13, 2008) was used to assess deliberate cognitive processing. It contains 10 items which participants rate on a 4 point Likert scale of 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in deliberate processing. In the current sample, Cronbach's alpha reliability for the 10-item scale was .92.

Event-Related Ruminative Processing. The same 10 Ruminative Processing items described in section 5.4.2 were used to assess ruminative cognitive processing. Each item was rated on a four point Likert scale 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in ruminative processing. Internal consistency, as measured by Cronbach's alpha was .86.

Intrusive Thoughts. The Intrusion subscale of the Impact of Event Scale – Revised (IES-R, Weiss & Marmar, 1997) was used to assess intrusive processing. The IES-R is a 22-item self-report measure originally developed to assess subjective distress after experiencing a traumatic event and is a revised version of the original 15-item Impact of Event Scale developed by Horowitz, Wilner and Alvarez (1979). The Intrusion subscale has been viewed as an indicator of ongoing cognitive and behavioural processes following trauma (Joseph, 2000) and was used in the current study as such. It consists of 8 items that assess intrusive cognitions such as nightmares and intrusive thoughts, feelings or images. Respondents rate each item on a 5-point Likert-scale of 0 (*not at all*) to 4 (*extremely*), indicating how distressing each item had been in their life during the past 7 days with respect to the traumatic event they described. Scores for the subscale are derived by calculating the mean score of non-missing items; thus, scores can range from a minimum of 0 to a maximum of 4, with

higher scores indicating greater intrusive cognitions. The IES-R has been shown to demonstrate good psychometric properties (Creamer et al., 2003; Weiss & Marmar, 1997) and in the current study, Cronbach's alpha was .89 for the intrusion subscale.

Trait Reflection. The Reflection subscale of the Ruminative Responses Scale (RRS; Nolen-Hoeksema et al., 1993) was used to assess a stable tendency to engage in reflective thinking. Items in the original RRS Reflection subscale that explicitly refer to depression (e.g. "Analyse recent events to understand why you are depressed") were modified such that 'why you are depressed' was replaced with 'why you feel this way.' Each of the 5 items is rated on a Likert scale of 1 (*almost never*) to 4 (*almost always*), with scores ranging from 5 to 20 and higher scores indicating greater reflective tendencies. Good internal consistency and test-retest reliability has been demonstrated for the reflection subscale (Treynor et al., 2003). In the current study, Cronbach's alpha was .76 for the reflection subscale.

Trait Brooding. The Brooding subscale of the Ruminative Responses Scale (RRS; Nolen-Hoeksema et al., 1993) was used to assess a stable tendency to engage in ruminative thought. Each of the 5 items are rated on a Likert scale of 1 (*almost never*) to 4 (*almost always*), with scores ranging from 5 to 20 and higher scores indicating greater ruminative tendencies. Treynor et al. (2003) reported good internal consistency and test-retest reliability for the brooding subscale, and in the current study Cronbach's alpha was .77.

Posttraumatic Growth. The clinician version of the PTGI (Calhoun & Tedeschi, 1999; Appendix H) was used to assess self-reported posttraumatic growth. The PTGI-CV consists of 13 items selected from the original 21-item Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996) and was developed for more convenient use by clinicians because of the

reduced number of items. In the current study, items were rated on the same 6-point Likert-scale as the PTGI such that 0 = '*I did not experience this change*' and 5 = '*I experienced this change to a very great degree*'. Possible scores range from 0-65, with higher scores indicating a greater degree of self-reported posttraumatic growth. The five PTGI subscales are also captured by the PTGI-CV, although the number of items for each subscale is necessarily reduced: Relating to others (5 items), New possibilities (3 items), Personal strength (2 items), Spiritual change (2 items) and Appreciation of life (1 item). Data concerning reliability and validity for this modified form of the PTGI has not been provided by Calhoun and Tedeschi (1999), but Cronbach's alpha in the present study was .84 for the total PTGI-CV score.

Changes in Outlook. The short form of the Changes in Outlook Questionnaire (CiOQ-SF; Joseph, Linley, Shevlin, Goodfellow & Butler, 2006) was used to assess changes in outlook following trauma. The original Changes in Outlook Questionnaire (CiOQ; Joseph, Williams & Yule, 1993) is a 26-item measure designed to assess positive and negative changes in the aftermath of adversity. The 10-item short form was developed as an efficient alternative and consists of two 5-item subscales, one comprising positive changes (CiOP) and one comprising negative changes (CiON). Respondents rate each item on a 6-point Likert-scale of 1 (*strongly disagree*) to 6 (*strongly agree*). The short form maintains comparability with the original CiOQ, which has been demonstrated to have good internal consistency reliability and convergent and discriminant validity (Joseph, Linley, Andrews, Harris, Howle & Woodward, 2005). In the present sample, Cronbach's alpha reliabilities for the positive and negative subscales were .82 and .85 respectively.

6.3.1.3 Participants. The page access counter logged 397 ‘hits’ to the study website.

Three hundred and sixty-eight individuals agreed with the consent statements and provided a username but 126 of those did not proceed further to answer any questions and exited the study. Of the remaining 242 respondents, 54 did not complete all measures, leaving a sample of 188 participants with complete responses. Completers and non-completers did not differ in terms of age ($t = .297$, $df = 223$, $p = .767$), sex ($\chi^2 = 1.487$, $df = 1$, $p = .223$), education ($\chi^2 = 3.300$, $df = 4$, $p = .509$), marital status ($\chi^2 = 1.263$, $df = 3$, $p = .738$), ethnicity ($\chi^2 = 2.642$, $df = 3$, $p = .450$), time since trauma ($t = .316$, $df = 221$, $p = .753$), age at trauma ($t = .021$, $df = 220$, $p = .983$), or ratings of event stressfulness ($t = -.330$, $df = 223$, $p = .742$).

Responses from 14 participants were removed during data cleaning and assumption testing (see section 6.3.2.1), leaving a final participant sample of 174 participants which consisted of 151 females and 23 males, ages ranging from 18 to 55 years ($M = 25.35$, $SD = 7.68$). Participants were mostly white ($n = 145$; 83.3%), single ($n = 117$; 67.2%), and educated to at least university level ($n = 133$; 76.4%). Index traumatic events included sudden, unexpected or traumatic bereavement ($n = 52$), serious illness or injury ($n = 22$), relationship difficulties ($n = 20$), miscarriage ($n = 16$), rape or sexual assault ($n = 13$), childhood sexual abuse ($n = 9$), witnessing or being involved in a motor vehicle accident ($n = 6$), and a large miscellaneous category ($n = 36$). The mean distress rating for these events was 3.66 ($SD = .48$) on the 0 to 4 scale, with 65.5% of participants rating their experience as extremely distressing. The events had occurred within 2 weeks to 23 years previously ($M = 3.47$ years, $SD = 4.45$); 67.8% of cases had experienced the event within the last 3 years and only 8% had experienced the event more than 10 years previously. Participants ages at the time of the trauma ranged from 5 years to 55 years old ($M = 21.87$; $SD = 8.46$), with 22.4% of participants being aged 16 or younger at the time of the event.

6.3.2 Results

6.3.2.1 Data Screening and Assumption Testing

Data screening revealed no incorrect data or invalid entries. However, one participant had responded to every question with the same response throughout the questionnaire and was therefore removed from all analyses because it was interpreted as a deliberate attempt to disrupt the research by responding to each question with no regard for content.⁸ Missing values were infrequent (1.46%). No one item on any of the measures had more than five missing values, and no participants had more than 2 missing items for each measure or 4 missing items overall. Of the 49 participants with missing values, 37 had only one value missing. Missing values analysis revealed that missing data were completely random (Little's MCAR test $\chi^2 = 3748.184$, $df = 3680$, $p = .213$). Missing data for the Intrusive, Deliberate and Ruminative Processing subscales, IES-R Intrusion, RRS Brooding, RRS Reflection, CiOQ and PTGI-CV were replaced using the Expectation Maximisation (EM) algorithm within the SPSS missing values analysis package (Acock, 2005).

The data were also explored to determine suitability for parametric analyses. Box-plots indicated that the data had no extreme values or outliers for the majority of variables and this was confirmed using the criterion that values should be ≤ 3 standard deviations of the mean (Stevens, 2002). However, outliers were detected for the variable age, where four participants with ages greater than 50 years old were identified as outliers; these individuals were retained in the analyses as they were not regarded to be a threat to the validity of the data. Outliers were also detected for the variable time since trauma, with seven responses

⁸ This type of behaviour has often been referred to as malicious responding, where the individual deliberately submits an invalid response. Such behaviour may arise out of boredom with the questionnaire or mischievous attempts to disrupt the research endeavour. It is important to note that this phenomenon is not exclusive to online questionnaire formats, and that the vast majority of research participants are highly motivated and interested in the research outcome (e.g. Stones & Perry, 1997).

greater than 25 years falling outside of the acceptable range. It was decided to remove these individuals from the analyses. Although not identified as outliers, inspection of the data also revealed that 6 participants rated their event as 'moderately distressing.' Given that this study examined responses to traumatic experiences, it was felt that events considered to have been only moderately distressing did not qualify as traumatic, thus responses from these 6 individuals were removed from the analyses.

Skewness and kurtosis values were examined for all variables using the criterion that they should fall within two standard errors of skewness or kurtosis, respectively, and were found to be acceptable for all variables except age, time since trauma and age at the time of the trauma, which all showed a positive skew and were leptokurtic, but it was felt that transformation was unnecessary. Inspection of histograms with normal curves demonstrated normal distributions for all variables of interest, which were confirmed by non-significant Komologrov-Smirnov tests (all p 's > .05).

6.3.2.2 Demographic Testing

Before testing the main research questions, the data were explored for potential differences in outcome variables according to demographic characteristics. A one-way ANOVA revealed significant differences for ethnicity and PTGI-CV total ($F(3, 169) = 4.450$; $p = .005$), with post hoc comparisons (Tukey's HSD) demonstrating that Indian/Asian participants scored significantly higher ($M = 32.45$; $SD = 16.50$) than White participants ($M = 23.44$; $SD = 11.99$) on the PTGI-CV ($p < .05$). No other significant differences were found for any of the other demographic characteristics and study variables.

6.3.2.3 Descriptive Statistics

Descriptive statistics for all Study 3a measures are displayed in Table 6.1. Results indicate a moderate level of growth and positive change and a relatively low level of negative post trauma change in this sample. PTGI-CV items endorsed to a moderate or greater degree (i.e. ≥ 3 on the 0-5 scale) were computed to determine how often individuals reported a significant degree of positive change. The modal number of PTGI-CV items endorsed was 6 and the mean was 5.43 ($SD = 3.22$, range 0-13). Forty-seven percent of participants endorsed at least six of the thirteen items and only 7 participants (4%) endorsed no items. The most common positive changes endorsed were renegotiating priorities (70.7%), having more compassion for others (59.7%), and greater feelings of self-reliance (55.2%).

In terms of Changes in Outlook Questionnaire scores, the mean score for the CiOP subscale reflected a slightly higher mean level of positive change than that of 19.51 ($SD = 5.35$) found for a sample of college students and that of 20.50 ($SD = 5.40$) found for a sample of clinical participants with PTSD, both reported in Joseph et al. (2006). The CiON subscale mean indicates an average level of negative change higher than that reported in previous student samples ($M = 9.51$; $SD = 4.27$) but lower than that reported in a clinical population ($M = 21.13$; $SD = 6.09$) (Joseph et al., 2006). Overall, the majority of participants agreed that they had experienced positive changes in outlook since the experience, with 84.5% reporting that they no longer took people or things for granted, and 79.9% reporting that they valued their relationships more. Likewise, most participants did not agree that they had experienced negative changes in outlook since their traumatic experience, with only 15.5% reporting that their life had no meaning anymore and 25.9% reporting that they did not look forward to the future.

Table 6.1 Descriptive Statistics for Study 3a Variables

	<i>M</i>	<i>SD</i>	Observed range
Intrusive Processing	15.91	8.21	0-30
Deliberate Processing	15.73	8.16	0-30
Ruminative Processing	16.05	7.48	0-30
IES-R Intrusion	1.76	.95	0-3.88
RRS Reflection	12.19	3.22	5-20
RRS Brooding	12.49	3.38	5-20
PTGI–CV	24.87	12.94	1-58
CiOQ Positive	21.83	5.10	5-30
CiOQ Negative	13.98	6.28	5-29

6.3.2.4 Associations Between Processing and Posttraumatic Growth

In order to explore the association of subtypes of cognitive processing with posttraumatic growth, Pearson’s correlations were calculated between scores on the cognitive processing measures and outcome variables. The results are displayed in Table 6.2 and replicate the results of Studies 1 and 2 by demonstrating that all three subtypes of event-related processing were significantly positively associated, with the strongest correlation between intrusive and ruminative processing and the weakest correlation between intrusive and deliberate processing. With respect to associations between processing subtypes and growth and positive change, intrusive and ruminative processing were not significantly associated with posttraumatic growth or positive change, while deliberate processing was positively associated with posttraumatic growth and positive change. All three subtypes of processing were positively associated with negative changes, although the partial correlation

between deliberate processing and negative change became significantly negative when intrusive and ruminative processing were controlled for ($pr = -.18, p = .03$).

Table 6.2 Pearson’s Correlations Between Study 3a Variables

	1	2	3	4	5	6	7	8
1. Intrusive Processing	-							
2. Deliberate Processing	.62**	-						
3. Ruminative Processing	.80**	.66**	-					
4. IES-R Intrusion	.85**	.50**	.72**	-				
5. RRS Reflection	.15	.26**	.17*	.21**	-			
6. RRS Brooding	.35**	.26**	.46**	.43**	.54**	-		
7. CiO Positive	.06	.25**	.05	.05	.12	.04	-	
8. CiO Negative	.52**	.29**	.57**	.58**	.25**	.57**	-.14	-
9. PTGI-CV	.10	.34**	.14	.07	.13	.01	.54**	-.03

* $p < .05$, ** $p < .01$.

The results also revealed significant positive associations between the state and trait versions of each type of processing. However, the trait processing subtypes were not significantly associated with growth or positive change. Multiple regression analyses were used to further explore how the event-provoked processing subtypes were related to the stable tendencies to reflect or ruminate. Results from these analyses revealed that both models were significant: $F(3, 170) = 3.981, p = .009$ for RRS Reflection ($AdjustedR^2 = .05$) and $F(3, 170) = 15.100, p < .001$ for RRS Brooding ($AdjustedR^2 = .20$), with Deliberate processing

emerging as the only significant predictor of RRS Reflection ($\beta = .26, p < .01$) and Ruminative processing emerging as the only significant predictor of RRS Brooding ($\beta = .52, p < .001$). These findings indicate that, as one would expect, individuals with a stable tendency to reflect on past experiences are more likely to engage in deliberate processing and individuals with a stable tendency to ruminate are more likely to engage in ruminative processing. Furthermore, the shared variances were small enough to indicate that the state and trait processing subtypes are distinct and add weight to the argument that the intrusive, deliberate and ruminative processing subscales captured trauma-specific processing rather than stable tendencies to reflect or ruminate.

6.3.2.5 Multiple Regression Analyses for Posttraumatic Growth and Positive Change

Multiple regression analyses were conducted to determine how much variance in PTGI-CV and CiOQ Positive scores was explained by each of the processing subtypes. Thus, the intrusive, deliberate and ruminative processing subtypes, as well as IES-R Intrusion and the trait ruminative styles Reflection and Brooding, were used in two models to predict PTGI-CV and CiOQ Positive scores, respectively. The variable ethnicity was also included in the models because results from the analyses presented in section 6.3.2.2 demonstrated that it influenced the extent of growth reported. In line with the results from Study 2, it was predicted that deliberate processing would be the strongest predictor in both models. It was also hypothesised that the event-provoked processing styles would predict more variance in the dependent variables than the dispositional processing styles.

The results of the regression analyses are presented in Table 6.3. Both models were significant and accounted for 14% of the variance in PTGI-CV, $F(7, 165) = 5.013, p < .001$ and 8% of the variance in CiOQ Positive, $F(7, 165) = 2.19, p = .03$. Both models supported

the prediction for deliberate processing by demonstrating that event-provoked deliberate processing was the strongest predictor of both growth and positive change. The model for PTGI-CV also demonstrated that participant ethnic origin significantly predicted growth.

6.3.2.6 Multiple Regression Analyses for Negative Change

Multiple regression analyses were also conducted to examine which variables significantly predicted negative change following trauma. Thus, the variables used to predict PTGI-CV and CiOQ Positive were used to predict CiOQ Negative scores, along with the event-related variables of time since trauma, age at trauma and nature of trauma (sexual or non-sexual). It was hypothesised that intrusive and ruminative forms of processing would be significant predictors of negative change because they represent types of repetitive thoughts that elicit distress. It was also predicted that a dispositional tendency to focus on distress and negative events, as measured by RRS Brooding, would significantly predict negative change.

The regression model was significant and accounted for 47% of the variance in CiOQ Negative, $F(9, 162) = 17.83, p < .001$. The results are displayed in Table 6.3 and demonstrate that RRS Brooding was the strongest predictor of negative change. Ruminative processing and IES-R Intrusion, but not intrusive processing, were also significant predictors in the model.

Table 6.3 Regression Model of Processing and Event Variables on PTGI-CV, CiOQ Positive and CiOQ Negative

Criterion	Variable	<i>B</i>	<i>SE(B)</i>	β	<i>T</i>	<i>p</i>
PTGI-CV	Intrusive processing	-.21	.26	-.13	-.81	.417
	Deliberate processing	.67	.16	.42	4.15	.000**
	Ruminative processing	.03	.24	.02	.12	.901
	IES-R Intrusion	-.64	1.94	-.05	-.33	.743
	RRS Reflection	.25	.34	.06	.68	.497
	RRS Brooding	-.27	.38	-.07	-.73	.468
	Ethnicity	2.93	1.24	.17	2.36	.020*
CiOQ Positive	Intrusive processing	-.04	.11	-.07	-.40	.693
	Deliberate processing	.23	.07	.36	3.39	.000**
	Ruminative processing	-.12	.10	-.17	-1.20	.232
	IES-R Intrusion	.18	.80	.03	.22	.824
	RRS Reflection	.07	.15	.05	.49	.623
	RRS Brooding	.01	.16	.01	.06	.954
	Ethnicity	.29	.52	.04	.55	.581
CiOQ Negative	Intrusive processing	.02	.10	.02	.16	.876
	Deliberate processing	-.11	.06	-.15	-1.81	.072
	Ruminative processing	.24	.09	.28	2.59	.010*
	IES-R Intrusion	1.78	.74	.27	2.40	.018*
	RRS Reflection	-.02	.14	-.01	-.14	.887
	RRS Brooding	.69	.14	.37	4.77	.000**
	Time Since Trauma	-.01	.01	-.06	-.96	.337
	Age at Trauma	-.05	.05	-.07	-1.03	.305
	Event type (sexual/non-sexual)	.04	1.18	.02	.04	.971

* $p < .05$, ** $p < .001$

6.3.2.7 Predicting Deliberate Processing

Given that the prior results have demonstrated the importance of deliberate processing in the occurrence of posttraumatic growth and positive change, it was of interest to explore which variables most strongly predicted deliberate processing. Models of posttraumatic growth have suggested that intrusive cognitions initiate deliberate processing (Tedeschi & Calhoun, 2004a). As such, it was hypothesised that IES-R Intrusion and Intrusive processing would significantly predict deliberate processing. A dispositional tendency to purposefully reflect on past experiences might also act as a precursor to engaging in deliberate post-trauma processing, therefore RRS Reflection was expected to be a significant predictor in the model.

The regression model was significant and accounted for 49.6% of the variance in deliberate processing, $F(6, 167) = 29.382, p < .001$. The results are displayed in Table 6.4 and demonstrate that, unexpectedly, ruminative processing was the strongest predictor of deliberate processing whilst IES-R Intrusion was not a significant predictor. RRS Reflection and Intrusive processing also emerged as significant predictors of deliberate processing.

Table 6.4 Regression Model of Processing Variables on Deliberate Processing

	<i>B</i>	<i>SE(B)</i>	β	<i>t</i>	<i>P</i>
Intrusive processing	.34	.12	.34	2.82	.005*
Ruminative processing	.57	.10	.52	5.42	.000**
IES-R Intrusion	-1.39	.92	-.16	-1.51	.134
RRS Reflection	.60	.16	.24	3.67	.000**
RRS Brooding	-.34	.18	-.14	-1.92	.057

* $p < .01$, ** $p < .001$.

6.3.2.8 Factor Analysis of Deliberate Processing and Posttraumatic Growth

Given the consistently positive relationship found between deliberate processing and posttraumatic growth, one must acknowledge the possibility that this relationship is the result of conflation or shared meaning in the items used to capture these processes, since there is an element of conceptual overlap between the two constructs. Thus, one concern might be that the more positively toned deliberate processing and posttraumatic growth items are tapping essentially the same construct, such that their positive association is down to a common element rather than evidence of a potentially causal link between them. While the correlation between deliberate processing and posttraumatic growth was not so high that they appeared synonymous ($r = .34$), factor analysis of the deliberate processing and posttraumatic growth items was conducted to explore whether there was a single underlying factor or whether they emerged as two distinct processes.

Before proceeding with the factor analysis, diagnostic checks were conducted to ensure test assumptions were met. The sample size was adequate for factor analysis. The data were normally distributed and the relationships between variables were linear. The correlation matrix revealed that the majority of correlations were over .3 and the diagonals on the anti-image matrix were all over .5. Barlett's Test of Sphericity was significant ($p < .001$) and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .880 therefore acceptable.

Four factors with eigenvalues greater than 1.00 (7.354, 3.758, 1.178, 1.018) were identified and together accounted for 66.54% of the variance. This four-factor solution consisted of a 10 item factor that explained 36.76% of the variance and contained the 10 Deliberate Processing items. The remaining 3 factors consisted of the 10 PTGI-SF items

spread across the factors in a manner that was difficult to interpret. Four of the 10 PTGI-SF items also cross-loaded on two factors. As such, a forced two-factor solution was generated which explained 55.56% of the variance. The Scree Plot also suggested a two-factor solution. The two-factor solution consisted of a 10 item factor that explained 36.76% of the variance and contained the 10 Deliberate Processing items. The second factor consisted of the 10 PTGI-SF items and explained 18.80% of the variance. No items cross loaded and all items showed strong loadings ($>.60$) on their relevant factors. These results suggest that the Deliberate Processing and PTGI-SF items reflect two separate constructs rather than sharing one underpinning common factor. As such, they go some way towards overcoming concerns about the risk of tautology arising from excessive conceptual overlap between deliberate processing and posttraumatic growth.

6.3.3 Discussion

The findings from this cross-sectional study provide further evidence for the positive role of active, purposeful engagement with trauma memories in the development of growth following trauma and adversity. Specifically, deliberate processing was found to positively predict posttraumatic growth and positive change following trauma. Together with the results of Study 2, these findings provide support for Calhoun, Cann and Tedeschi's (2010) and Tedeschi and Calhoun's (2004a) models of posttraumatic growth as emerging through deliberate engagement in effortful contemplation of the event and its consequences. Furthermore, additional analyses indicate that the positive association found between deliberate processing and posttraumatic growth does not appear to be the product of conceptual overlap or a common underlying factor between the two variables, but that they represent two distinct constructs that are positively associated.

Calhoun, Cann and Tedeschi's (2010) and Tedeschi and Calhoun's (2004a) models emphasise the importance of intrusive cognitive processing, yet results from the current study failed to detect a significant relationship between intrusive trauma-related cognitions and posttraumatic growth. Thus, intrusive processing was neither associated with or predictive of growth in this study. Given the absence of a direct relationship between intrusion and growth, it was speculated that intrusive thoughts would initiate the deliberate processing that is necessary for growth, in line with the theoretical suggestion that automatic, intrusive repetitive thoughts about a past trauma alone are not sufficient for fostering growth but can support psychological adjustment when they are accompanied by a more deliberate contemplation of the event and its meaning (Foa et al., 1989, Janoff-Bulman, 1992). Results supported this hypothesis by demonstrating that intrusive processing was a significant predictor of deliberate processing.

However, of interest was that ruminative processing was a stronger predictor of deliberate processing than intrusive processing. While it has largely been presumed that the repeated activation of trauma-related memories and emotions via intrusive cognitions is the primary precursor to more extended, purposeful processing strategies, results from this study suggested that ruminative engagement with the incomprehensible aspects of the experience might serve as a more important antecedent to deliberate processing and subsequent growth. Thus, repeatedly focusing on abstract issues surrounding the event such as the unchangeable or uncontrollable aspects of the experience, unanswerable questions or an inability to resolve one's distress could motivate the re-interpretation and re-assessment of traumatic material that constitutes deliberate processing.

These results have important clinical implications, since they indicate that a ruminative preoccupation with the incomprehensible aspects of the experience and repetitive engagement with ‘Why me?’ and ‘What if?’ type questions may play an important role in the growth process. As such, although they may be distressing and have been shown in this study to predict negative change following trauma, the elimination of repetitive ruminative thoughts should not necessarily be a goal of therapeutic work with trauma survivors. Similarly, intrusive trauma-focused cognitions appear to contribute to the deliberate processing that is necessary for growth and should therefore not be seen as a ‘symptom’ of PTSD that needs to be eliminated, since doing so might prevent survivors from using those repetitive thoughts to reflect on their experience and attempt to find meaning. The clinician’s role might therefore become more about encouraging the client to make the transition from intrusive or ruminative repetitive thoughts to more deliberate, trauma-focused processing, whilst still recognising the potential value of intrusive and ruminative thoughts.

The current investigation demonstrated that the transitory, event-provoked processing subtypes were meaningfully associated with their corresponding dispositional processing styles. Hence, individuals with a dispositional tendency to purposefully reflect on past experiences and emotions were more likely to engage in deliberate processing. Likewise, individuals with a dispositional tendency to passively dwell on negative events and emotions were more likely to engage in ruminative processing. Furthermore, the shared variances between the event-specific and dispositional processing styles were low enough to suggest that they are distinct but related processes. As such, both the current study and Study 2 can be seen as investigations of event-provoked cognitive processing rather than the more trait-like processes investigated in Study 1.

Other findings from this study merit attention. Results from the demographic analyses demonstrated that Indian and Asian participants scored significantly higher on the PTGI-CV than white participants. Similarly, the participants' ethnic origin emerged as a significant predictor in the regression model for PTGI-CV. Although findings regarding the relationship between ethnicity and extent of posttraumatic growth are mixed, a number of prior studies have also indicated that non-Caucasian ethnicity predicts greater posttraumatic growth (e.g. Kaler et al., 2011; Kleim & Ehlers, 2009; Tomich and Helgeson, 2004). In addition, Helgeson et al.'s (2006) meta-analysis of 87 growth studies demonstrated that people from ethnic minorities are more likely to report growth. Sumalla, Ochoa and Blance (2008) consequently concluded that there is a degree of consensus that belonging to an ethnic minority group correlates positively with posttraumatic growth. Results from the current study lend further support to this suggestion, although attempts to understand *why* this might be remain under-developed.

6.4 Study 3b: Longitudinal Follow-Up

6.4.1 Method

6.4.1.1 Procedure

Participants from Study 3a that had indicated that they would be willing to participate in future research were sent an email 6 months following their initial participation inviting them to take part in the follow-up questionnaire (see Appendix I).⁹ Each email contained a link to the study website and a reminder of the personal username they would require to access the study site (this username ensured participant responses from Times 1 and 2 could

⁹ If after 2 weeks since sending the first email the participant had not completed the follow-up questionnaire, a 'reminder' email was sent to prompt them. If participants still did not respond to this second invitation, no further requests for participation were sent, since it was felt important not to pressurise participants.

be matched). Participants were instructed to follow the 'link' from the email to the online questionnaire site and asked to enter their username when prompted. Upon entry to the study site, information about the study was provided, including information concerning ethical matters and their right to withdraw. The voluntary nature of the study was re-iterated. They were then asked to click the 'I consent to take part in this study' button; participants could not proceed to the questions without providing consent. Participants subsequently completed the measures outlined in section 6.4.1.2. Following completion of the questionnaire, individuals were taken to a debriefing page (see Appendix C) where they were given more information about the study, contact details for sources of emotional support should they require it, and were thanked for their participation.

6.4.1.2 Measures

Event-Related Information. Participants were asked to briefly describe the traumatic event that they had reported in the previous questionnaire. The purpose of this was to ensure that participants were responding with respect to the same event that they had referred to at the first assessment. Participants were also asked to indicate whether they had experienced any subsequent traumatic events since completing the first questionnaire and if so, they were asked to briefly describe the event and provide a rating of how distressing it had been on a scale of 0 (*not at all distressing*) to 4 (*extremely distressing*).

Participants also completed all Time 1 measures: Intrusive processing, deliberate processing, ruminative processing, IES-R Intrusion, RRS Reflection, RRS Brooding, CiOQ – Short form and PTGI-CV. Cronbach's alphas for these measures are displayed in Table 6.5.

6.4.1.3 Participants

Ninety-four individuals (54%) from the baseline assessment indicated that they would be willing to participate in the 6 month follow-up and provided their email address. Individuals that provided an email address did not differ from those that did not provide an email address on any demographic or study variables (all $ps > .15$). All 94 participants were emailed 6 months after they completed the first questionnaire, but eleven emails were undelivered due to expired accounts, incorrect email addresses or full inboxes. Thirty four of the 83 participants receiving the email (41%) returned to the study website and completed the Time 2 measures.

The follow-up sample consisted of 7 males and 27 females, ages ranging from 18 to 52 years ($M = 27.65$, $SD = 10.54$). Participants in this sample were predominantly white ($n = 31$; 91.2%), single ($n = 26$; 76.5%) and educated to at least degree level ($n = 31$; 91.2%). Events had occurred within 1 month to 23 years previously ($M = 5.27$, $SD = 8.31$). Ten participants (29.4%) reported experiencing a subsequent trauma following their participation in the first assessment. The mean distress rating for these additional events was 3.26 ($SD = .67$) on the 0 to 4 scale. In order to assess whether there were any differences between those who returned for the follow-up and those who did not, an independent samples t-test was conducted for all Time 1 study variables. The results showed that participants who returned to complete the follow up reported significantly higher levels of intrusive processing ($M = 18.59$, $SD = 7.36$) than participants who provided an email address but did not return to complete the follow up ($n = 60$, $M = 14.65$, $SD = 7.55$; $t = -2.45$, $p = .016$). There were no other significant differences for the remaining Time 1 variables or demographic characteristics (all $ps > .13$).

6.4.2 Results

6.4.2.1 Descriptive Statistics

Descriptive statistics for all Study 3b variables are shown in Table 6.5. Change scores were also calculated for all study variables by subtracting the Time 1 score from the Time 2 score and are also presented in Table 6.5. Results suggest that over the 6 month study period, on average, the level of all three subtypes of processing reduced, but the level of posttraumatic growth and positive change remained largely the same. However, these mean scores mask a large degree of variability in change scores, with inspection of the observed ranges revealing that some participants' PTGI-CV scores decreased by as much as 17 points and increased by as much as 19 points. Further examination revealed that 50% of participants reported an increase in PTGI-CV over the study period, with a mean increase of 6.87 ($SD = 5.40$). Likewise, the mean decrease in PTGI-CV was 8.85 ($SD = 5.43$). Two participants' PTGI-CV scores did not change over the study period.

Table 6.5 Descriptive Statistics for Study 3b Variables (n = 34)

	Time 1			Time 2				Change Scores (T2 minus T1)		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>α</i>	<i>M</i>	<i>SD</i>	Range
Intrusive Processing	18.30	7.33	0-30	15.03	8.51	0-28	.97	-3.27	6.86	-22-9
Deliberate Processing	17.10	8.69	0-30	14.10	9.42	0-30	.96	-3.00	7.49	-23-12
Ruminative Processing	17.77	6.86	0-30	14.73	7.47	0-27	.89	-3.03	6.16	-16-15
IES-R Intrusion	1.91	.93	0-3.63	1.43	1.00	0-3.63	.93	-.48	.95	-2.25-1.38
RRS Reflection	12.70	2.26	9-18	12.93	2.97	7-20	.69	.23	3.44	-7-7
RRS Brooding	13.00	2.90	7-19	12.43	3.38	6-19	.78	-.57	3.23	-7-8
PTGI-CV	25.30	15.15	1-58	24.90	14.60	4-64	.88	-.40	9.25	-17-19
CiOQ Positive	21.97	5.10	12-29	22.00	4.79	11-29	.83	.03	4.38	-12-10
CiOQ Negative	14.70	7.67	5-29	13.80	7.14	5-29	.92	-.90	3.32	-7-7

6.4.2.2 Exploratory Analyses

Given the unexpected finding that almost half of the participants reported decreases in PTGI-CV scores over the 6 month study period, it was of interest to explore what factors might have influenced this decline in growth.¹⁰ It was speculated that the occurrence of a further traumatic event between the Time 1 and Time 2 assessments might have contributed to a decrease in the level of growth reported. Also of interest was the extent to which the level of growth reported at Time 1 influenced whether individual's PTGI-CV scores increased or decreased over the study period. Finally, the impact of the time since the event on the course of growth was also investigated.

Results of these exploratory analyses demonstrated that the occurrence of an interim event was not significantly associated with whether PTGI-CV scores increased or decreased ($\chi^2 = .021$, $df = 1$, $p = .885$). Similarly, the PTGI-CV change scores did not differ between participants who had experienced a subsequent trauma and participants who had not ($t = -1.09$, $df = 29$, $p = .264$). Further results from the exploratory analyses are presented in Table 6.6 and indicate that participants whose growth score decreased reported a higher level of growth at Time 1 than participants whose growth score increased, although this was only significant at the more liberal level of .10. This finding is displayed graphically in Figure 6.1. The results for time since trauma were not significant.

¹⁰ It should be noted that the large number of statistical analyses performed on this small data set is more than is desirable from a statistical perspective. However, many of the analyses are exploratory in nature and represent an attempt to obtain as much information possible from the limited data available.

Table 6.6 Results of Exploratory Analyses for Increased Versus Decreased PTGI-CV Scores

		<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Time 1 PTGI-CV	Growth Increased	20.93	15.49		
	Growth Decreased	30.93	15.28	1.75	.092 [†]
Time Since Trauma (years)	Growth Increased	7.09	10.30		
	Growth Decreased	4.71	7.10	-.721	.477

[†] *p* < .10.

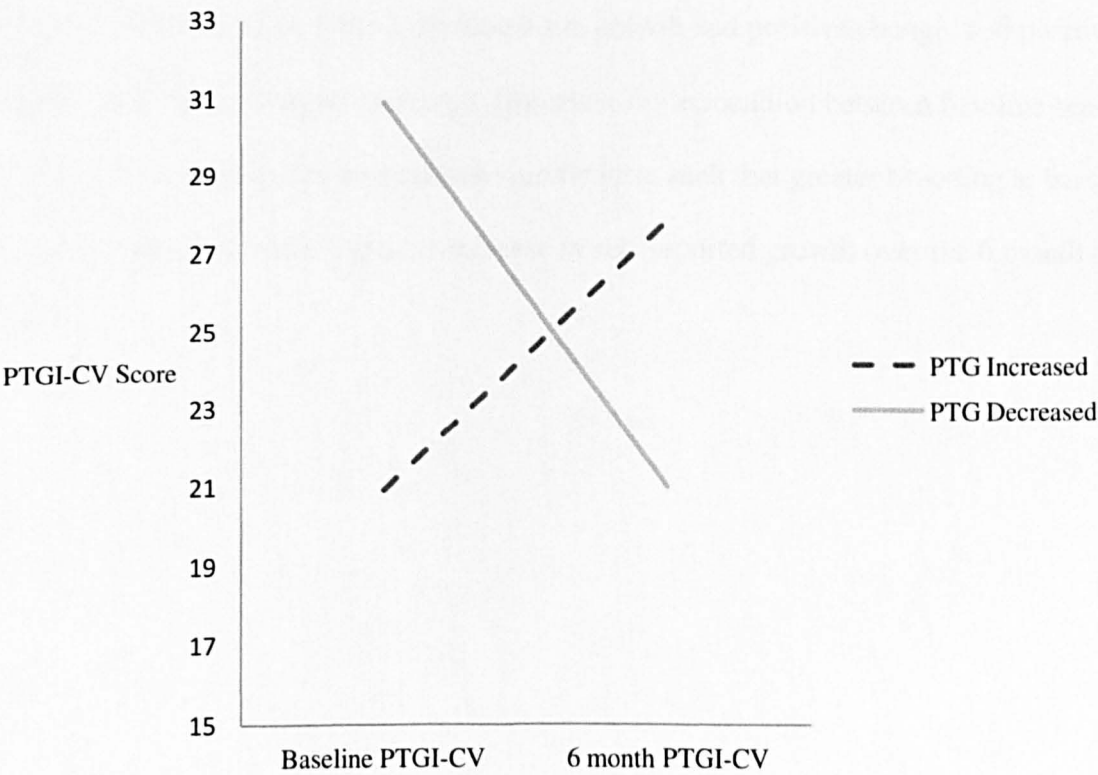


Figure 6.1 Baseline and 6-month PTGI-CV scores by Posttraumatic Growth Change Group

6.4.2.3 Correlational Analyses

Pearson’s correlations were calculated between scores on the Time 1 cognitive processing measures and Time 2 outcome variables. The results are displayed in Table 6.7 and demonstrate that Time 1 deliberate processing was positively associated with posttraumatic growth and positive change at 6 month follow-up. However, contrary to predictions, neither intrusive nor ruminative processing assessed at Time 1 were significantly associated with growth or positive change at Time 2. Rather, baseline intrusive and ruminative processing were positively associated with negative change at Time 2. With respect to the dispositional processing styles of reflection and brooding, only baseline brooding showed significant associations with outcome variables: baseline brooding was negatively associated with Time 2 posttraumatic growth and positive change, and positively associated with Time 2 negative change. However, the association between baseline brooding and PTGI-CV change scores approached significance, such that greater brooding at baseline was weakly associated with a greater increase in self-reported growth over the 6 month study period.

Table 6.7 Correlations between Time 1 Cognitive Processing Variables and Time 2 PTGI-CV, CiOQ Positive, CiOQ Negative and PTGI-CV Change Scores

Time 1 Variables	Time 2 Outcome Variables			
	PTGI-CV	CiOQ Positive	CiOQ Negative	PTGI-CV
				Change
T1 Intrusive Processing	-.03	.09	.55**	.29
T1 Deliberate Processing	.63***	.37*	.06	.18
T1 Ruminative Processing	.17	.08	.54**	.27
T1 RRS Reflection	.04	.04	.06	.25
T1 RRS Brooding	-.38*	-.48**	.58**	.34 [†]

[†] $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

6.4.2.4 Multiple Hierarchical Regression Analyses

Multiple hierarchical regression analyses were used to test for the longitudinal prediction of posttraumatic growth and positive change from Time 1 cognitive processing variables. For the analyses, the Time 1 outcome variable (PTGI-CV or CiO Positive) was entered in the first block to predict the same Time 2 outcome variable. In the second block, the Time 1 outcome variable was entered with the three Time 1 cognitive processing variables (intrusive, deliberate and ruminative processing) to examine whether the addition of the processing variables increased the proportion of variance explained in the Time 2 outcome. However, the small sample size led to concerns that the sample was insufficient for multiple regression analyses, with the possibility that a small number of influential cases may unduly influence the result. In light of these concerns, full assumption testing and residual analyses were conducted and are presented below.

For both the PTGI-CV and CiO Positive models, inspection of the relevant scatterplots demonstrated that the relationships between each of the predictors and the criterion were linear. To test for multicollinearity, correlations between the predictors were examined and were all found to be within the acceptable range ($<.80$). Similarly, the Variance Inflation Factors (VIF) ranged from 1.75 to 2.43 for the PTGI-CV model and 1.18 to 2.46 for the CiO Positive model and are therefore well below the recommended threshold of 10. The Tolerance statistics were above 0.1 for both models (.41 to .57 for PTGI-CV and .41 to .85 for CiO Positive). As such, these results confirm that multicollinearity did not appear to be a problem for either model. Likewise, inspection of the scatterplots of ZRESID by ZPRED revealed a random array of dots evenly dispersed around zero; this pattern is indicative of a situation in which the assumptions of linearity and homoscedasticity have been met (Field, 2009). Values of 2.41 (for the PTGI-CV model) and 2.00 (for the CiO Positive model) for the Durbin-Watson statistic, which is used to test for serial correlations between errors, confirmed that the residuals were uncorrelated, therefore supporting the assumption of independent errors for both models. Inspection of the histograms and normal probability plots (see Appendix J) revealed that the residuals were normally distributed for both models; this was confirmed by non-significant Komologrov-Smirnoff tests of the standardised residuals ($p = .390$ for PTGI-CV and $p = .95$ for CiO Positive).

With respect to the possibility of outliers or influential cases, diagnostic statistics demonstrated that there were no cases where the standardised residuals had an absolute value greater than 1.96 for the PTGI-CV model, and only one case with a standardised residual of -2.65 for the CiO Positive model. Cook's distances (Cook & Weisberg, 1982) can also be used to assess the overall influence of a single case on the model, with values less than 1 acceptable. Cook's distances were all well below 1 for the PTGI-CV model (maximum was

.352) and for the CiO Positive model (maximum was .388), indicating that single cases did not appear to be unduly influencing either model. This was also confirmed by Mahalanobis distances of less than 11 for both models.¹¹

To summarise, the results of these analyses demonstrate that assumptions relating to multicollinearity, singularity and residuals were met and despite the small sample, there was no evidence that the regression models were unduly influenced by extreme cases. Furthermore, they suggest that the models generated for the current sample can be tentatively applied to the population of interest (Field, 2009).

The results of the regression analyses are presented in Table 6.8. The regression model for PTGI-CV was significant $F(4, 29) = 12.67, p < .001$ and reveal that there was a trend for the level of deliberate processing reported at Time 1 to predict greater PTGI-CV at 6 months follow-up when controlling for initial PTGI-CV score, although this finding was only significant at the more liberal level of $p < .10$. The model for CiO Positive was not significant.

¹¹ Barnett and Lewis (1978) suggest that in very small samples ($N = 30$) with only 2 predictors, Mahalanobis values should be less than 11. This same criteria was adopted for the current data.

Table 6.8 Hierarchical Regression Models of Time 1 Processing Variables on Time 2 PTGI-CV and CiOQ Positive Change

Criterion	Predictors	<i>B</i>	<i>SE(B)</i>	β	<i>t</i>	<i>R</i> ²	ΔR^2
Time 2 PTGI-CV	<i>Block 1:</i>						
	T1 PTGI-CV	.72	.11	.78	6.62***	.60	
	<i>Block 2:</i>						
	T1 PTGI-CV	.54	.14	.58	3.84***		
	T1 Intrusive Processing	-.17	.32	-.09	-.54		
	T1 Ruminative Processing	-.06	.35	-.03	-.16		
Time 2 CiOQ Positive	T1 Deliberate Processing	.57	.29	.35	1.96 [†]	.66	.06
	<i>Block 1:</i>						
	T1 CiOQ Positive	.59	.14	.63	4.38***	.40	
	<i>Block 2:</i>						
	T1 CiOQ Positive	.56	.14	.60	3.93***		
	T1 Intrusive Processing	.08	.12	.12	.65		
	T1 Ruminative Processing	.01	.15	.01	.06		
	T1 Deliberate Processing	.12	.10	.22	1.18	.49	.09

Note. [†] *p* = .061, *** *p* < .001.

6.4.2.5 Predicting Deliberate Processing

Given the importance of deliberate processing in both the cross-sectional and longitudinal prediction of posttraumatic growth, it was of interest to explore how baseline cognitive activity predicted deliberate processing at follow-up. In particular, theoretical models have indicated that early intrusive processing might be necessary for stimulating subsequent deliberate processing (Calhoun, Cann & Tedeschi, 2010; Tedeschi & Calhoun, 2004a). To test this prediction, multiple regression analysis was conducted to determine how much variance in 6-month deliberate processing was explained by each of the baseline processing subtypes. Thus, the Time 1 intrusive and ruminative processing subtypes, as well as IES-R Intrusion and the trait ruminative styles Reflection and Brooding, were used to predict time 2 deliberate processing scores.

As with the preceding multiple regression analyses, full assumption testing and residual analyses were conducted and revealed that despite the small sample, the assumptions of multiple regression were largely met. The correlations between predictors were all below .80; the VIF statistics ranged from 1.17 to 5.15; the Tolerances ranged from .20 to .87; the Durbin-Watson statistic was 2.38; and the histogram and normal probability plot confirmed a normal distribution of standardised residuals. Likewise, there was no evidence to suggest that a small number of cases were unduly influencing the overall model: diagnostic statistics demonstrated that only one case had a standardised residual with an absolute value greater than 1.96 (2.18); the maximum Cook's distance was .39; and the Mahalanobis distances were all below 11.

The regression model was significant at the liberal level of $p < .10$ and accounted for 33.3% of the variance in deliberate processing, $F(5, 29) = 2.40, p = .067$. The results are

displayed in Table 6.9 and demonstrate that baseline RRS brooding negatively predicted subsequent deliberate processing, while baseline ruminative processing positively predicted subsequent deliberate processing, although the latter was only significant at the more liberal $p < .10$ level. Contrary to predictions, neither intrusive processing nor IES-R Intrusion significantly predicted subsequent deliberate processing.

Table 6.9 Multiple Regression Analysis of Time 1 Processing Variables on Time 2 Deliberate Processing

	<i>B</i>	<i>SE(B)</i>	β	<i>t</i>	<i>p</i>
T1 Intrusive processing	.20	.47	.16	.43	.674
T1 Ruminative processing	.55	.31	.40	1.81	.083 [†]
T1 IES-R Intrusion	.82	3.61	.08	.23	.822
T1 RRS Reflection	.15	.73	.04	.21	.835
T1 RRS Brooding	-1.44	.64	-.44	-2.25	.034*

[†] $p < .10$, * $p < .05$.

6.4.3 Discussion

The aim of this longitudinal study was to explore the trajectory of posttraumatic growth over a 6 month period and to examine how early cognitive processing impacts subsequent growth. In particular, the study sought to answer the question of whether baseline intrusive processing predicted 6 month posttraumatic growth. However, results from the study failed to find support for this hypothesis. Intrusive processing at the initial assessment was not significantly associated with growth or positive change at the 6 month assessment and did not significantly predict growth or positive change in the hierarchical regression

models. These findings replicate those of Salsman et al. (2009), Carboon et al. (2005) and Manne et al. (2004), all of whom reported that baseline intrusive cognitions did not significantly predict posttraumatic growth at 3 month, 6 month, or 18 month follow up, respectively.

Taking the results from the current study together with those of prior studies, there appears to be accumulating evidence to suggest that early intrusive cognitions might not be as important for subsequent growth as theoretical models have presumed. In addition, intrusive processing at baseline did not predict subsequent deliberate processing, again suggesting that the importance of intrusive processing may have been overstated. Clearly, the small sample size means that results from the current study should be interpreted with some degree of caution because there may have been insufficient statistical power to detect significant effects for intrusive processing. As such, this points to the need for the replication of the current study with a larger sample. Similarly, future longitudinal studies would benefit from a longer follow-up period, since 6 months may be insufficient for intrusive processing to exert a significant effect on subsequent growth. Nevertheless, the extent to which an individual experiences intrusive trauma-focused cognitions does not appear to substantially impact the development of growth following adversity to the extent that it has previously been assumed.

In contrast, deliberate processing appears to be a critical precursor to the development of posttraumatic growth, with results from the current study showing that baseline deliberate processing was positively associated with subsequent growth and emerged as a significant predictor of growth in the regression model. As such, these findings replicate those of Manne et al. (2004), Phelps et al. (2008), and Salsman et al. (2009), all of which indicated that deliberate engagement with trauma memories predicted subsequent growth. Furthermore, the

small sample size of the current study adds to the strength of the findings concerning deliberate processing and re-iterates its important role in growth following adversity.

An additional, and unexpected, finding to emerge from this study is that although half of the participants reported increases in growth over the 6 month study period, likewise half of the participants reported decreases in the level of self-reported growth over time. That posttraumatic growth decreased for so many participants is an interesting finding and one that presents a theoretical quandary, since it is largely presumed that once the shattered assumptions have been rebuilt and positive changes have been recognised, they will either stay the same or improve over time (see O’Leary, Alday, & Ickovics, 1998). Nevertheless, some studies have acknowledged that although on average there is an increase in growth over time, there is some deviation from this trajectory for some individuals (e.g. Frazier, Conlon & Glaser, 2001; Frazier, Tashiro, Berman, Steger & Long, 2004). As such, research has examined the impact of losing positive changes on psychological adjustment. Davis, Nolen-Hoeksema and Larson (1998) found that bereaved individuals who reported an increase in positive changes from 6 to 12 months post-loss reported decreased distress over time, while individuals who reported fewer positive changes at 12 months than they had done at 6 months reported a marked increase in distress over time, such that their eventual distress levels were comparable to those who had never reported positive change. Frazier et al. (2001) reported a similar pattern of findings in their longitudinal study of sexual assault survivors.

The current results, combined with those of Davis et al. (1998) and Frazier et al. (2001), indicate that the trajectory of growth following trauma may not be a linear or cumulative process that increases steadily over time, but one that is characterised by variability and change (Frazier et al., 2001). As such, theoretical models of growth following

adversity must be able to account for fluctuations in the pattern of growth reported by individuals and must be capable of explaining why some individuals might experience a decline in growth over time. Further research into this issue is clearly warranted, but results from the exploratory analyses conducted in the current study indicate that the time since the event or the occurrence of an interim event did not significantly influence whether levels of growth increased or decreased. However, one factor that was found to relate - albeit weakly - to a decline in the extent of growth over time was the level of growth reported at baseline. Thus, participants whose level of posttraumatic growth improved from baseline to follow up were initially lower on growth than participants whose level of growth decreased from baseline to follow up.

The latter finding might be explained by theoretical work from Zoellner and Maercker (2006), who suggest that posttraumatic growth may be 'Janus-faced'; that is, comprising a self-transcending, constructive side and an illusory, self-deceptive or dysfunctional component that serves a short-term palliative function. These two components are assumed to have different time courses and be differentially related to adjustment, with the realistic, self-transforming component believed to grow over time while the illusory component is assumed to decrease over time (Zoellner & Maercker, 2006). This two component model of posttraumatic growth could potentially account for the finding that lower growth at baseline was associated with increased growth over time while higher growth at baseline was associated with a decline in growth over time. Thus, participants reporting elevated growth at baseline may have been experiencing the illusory component of growth that then declined over time as the self-deceptive aspect abated, while participants reporting a lower level of growth that improved over the study period were experiencing the more genuine, authentic component of growth. Without a more sophisticated method for assessing growth that

somehow taps into this distinction between illusory and genuine growth, it is difficult to confirm or refute this hypothesis, but it is clear that the ongoing debate concerning the authentic nature of the phenomenon must be resolved empirically. This represents an important but challenging avenue for future research.

6.5 General Discussion

This study is the first to have explored the longitudinal associations between cognitive processing and posttraumatic growth using measures specifically designed to capture intrusive, ruminative and deliberate forms of event-provoked processing. Furthermore, it is the only study to have longitudinally tested the assumptions of Calhoun, Cann and Tedeschi's (2010) most recent model of posttraumatic growth in a sample of survivors with a range of trauma histories. While the small sample size limited the power of the longitudinal analyses, the results establish the importance of deliberate processing in the development of posttraumatic growth and support the theoretical assertion that engaging in an active, effortful search for meaning can serve as a precursor to the realisation of growth.

The results also failed to find support for the theoretical assumption that intrusive cognitions in the aftermath of trauma are a necessary part of the adjustment process. Rather, ruminative processing appeared to have more adaptive value in the sense that it was associated with deliberate processing both cross-sectionally and longitudinally. Thus, although neither intrusive nor ruminative processing were directly associated with posttraumatic growth, results suggest that ruminative processing might stimulate the subsequent deliberate processing that is necessary for growth.

These findings may lead some to speculate that the ruminative processing captured in this study is equivalent to the intrusive processing assessed in prior studies of cognitive processing and posttraumatic growth, such that it is more a matter of terminology than fundamentally different processes. It is certainly the case that there is a large degree of confusion in the cognitive processing literature about the conceptualisation of intrusions and ruminations, particularly since the terms are often used interchangeably (e.g. Cann et al., 2000; Cann et al., 2010). However, evidence presented in previous sections of this thesis has demonstrated that intrusive and ruminative processes, as assessed by the measures used in the current study, are distinct and represent two separate dimensions of posttraumatic processing. This is in line with phenomenological analyses presented by Speckens et al. (2007), who also demonstrated the distinction between intrusive re-experiencing and rumination. As such, the findings of this study add weight to the argument that it is necessary to expand current conceptualisations of cognitive processing beyond the bi-dimensional model of intrusive and deliberate aspects to a more multi-dimensional model that also includes ruminative forms of posttraumatic processing.

6.5.1 Limitations

Despite the many strengths of this study, including the comprehensive assessment of event-specific cognitive processing, the longitudinal design, and the varied sample with respect to index traumatic events, it is not without limitations. The first limitation relates to the small sample size for the longitudinal analyses. This is a problem common to research in this area (e.g. Kilmer & Gil-Rivas, 2010; Norris, 1996; Wolchik et al., 2008) but makes the testing of longitudinal predictions difficult. The problem of low statistical power also makes it difficult to detect small effects and it is not possible to conduct more complex statistical analytic procedures such as mediation or moderation analyses. Nevertheless, the statistically

significant results that were detected in this study indicate the robustness of these findings, particularly concerning the positive role of deliberate processing in posttraumatic growth.

The low uptake and high attrition rate is also of concern. At the baseline assessment, only 54% of participants expressed an interest in the next stage by providing their email address, and only 41% of participants receiving the email actually completed the longitudinal follow-up. Thus, less than 20% of participants from the baseline assessment went on to complete the 6 month assessment. Although reminder emails were sent to those individuals that had not completed the follow-up within 2 weeks of receiving the email invitation to do so, these attempts at retention were largely unsuccessful. Understanding why so many eligible participants failed to complete the follow-up is important, since they had previously made their mind up about taking part in principle and as such the invitation for further participation should not have been unexpected.

While it is not possible to establish why so few participants were willing to complete both phases of this study, the internet-based design may be one factor that influenced the high rate of study attrition. It is possible that the online nature did not appeal to participants and raised their concerns about the emotional risks of participating, given the focus on traumatic life events. Likewise, the lack of direct contact between experimenter and participant may have made it easier to not take the research seriously and withdraw from the study. This potential sense of apathy and disinterest may have been intensified by the fact that this was a university student sample. Such samples are regularly called upon to participate in research projects and are often offered incentives for extended participation such as course credit, book tokens or high street vouchers. The absence of such incentives in the current study may have contributed to the high attrition rate.

It is also important to note that while participants from the baseline assessment that expressed an interest in further participation by providing an email address did not significantly differ on any demographic or study variables from those that did not express such interest, participants receiving this email but not returning to complete the 6 month follow-up reported significantly lower levels of intrusive processing at baseline than participants that did return to complete the follow-up questionnaire. These findings suggest that those individuals completing all assessments were more motivated to take part because of a desire to find a way to deal with distressing intrusive cognitions.

The final limitation to be considered relates to the timing of event-related cognitive processing and the ability of this study to test theoretical predictions concerning ‘early’ versus ‘later’ cognitive processing. Calhoun, Cann and Tedeschi’s (2010) model speculates that the sequence of early intrusive processing followed by later deliberate processing is most conducive to growth, and the current study sought to test this assumption by examining the longitudinal relationships between intrusive processing, deliberate processing and posttraumatic growth. However, for many participants in this study, the traumatic event had occurred several years previously, so even at the baseline assessment they were not necessarily in the ‘early’ cognitive processing phase. As such, many participants may have already made the progression from intrusive to deliberate processing, but it is not possible to determine from the data where in the adjustment trajectory each participant is. To do so would require a large sample of very recent trauma survivors that could be periodically assessed using the current study’s measures over an extended period of time in order to longitudinally track their early cognitive processing activity and subsequent growth.

Chapter 7

Study 4: Expressive Writing and Posttraumatic Growth: The Role of Cognitive Processing

7.1 Overview

This chapter presents the findings of an internet-administered expressive writing intervention for individuals who have experienced a range of traumatic events. The study explores whether disclosure writing can increase reports of posttraumatic growth from baseline to 2 week and 8 week follow-up and addresses how cognitive processing might influence these changes. The results of the study are discussed in the context of Calhoun, Cann and Tedeschi's (2010) model of posttraumatic growth and the conceptualisation of cognitive processing provided in this thesis.

7.2 Introduction

Calhoun, Cann and Tedeschi's (2010; Tedeschi & Calhoun, 2004a) theory of posttraumatic growth posits that greater engagement in trauma-focused cognitive processing, particularly deliberate cognitive processing, is associated with the development of growth following trauma, such that individuals who actively work to make sense of the event and its implications are more likely to experience subsequent growth. The studies presented in Chapters 4, 5 and 6 of this thesis sought to test this model and their results provide empirical support for Calhoun et al.'s (2010) theory by demonstrating that greater engagement in deliberate cognitive processing is associated with greater growth both cross-sectionally and

longitudinally. A further and more rigorous test of the model is to investigate whether experimental manipulation of the extent of cognitive processing has the theoretically anticipated impact on subsequent posttraumatic growth. In simple terms, does increasing cognitive processing lead to increased growth?

One potentially useful method for manipulating the extent of cognitive processing is by using the expressive writing or written emotional disclosure intervention. This paradigm, first developed by Pennebaker and Beall in 1986, is a technique that encourages participants to write about their deepest thoughts and feelings surrounding a traumatic experience and has been shown to have a positive impact on a variety of physical and psychological health outcomes (see Frattaroli, 2006, for a review). It has been suggested that cognitive processing is one of the primary underlying mechanisms accounting for the success of the writing intervention (Pennebaker, 1993) because writing about a traumatic experience can encourage confrontation with negative or painful thoughts and feelings and provides opportunities for individuals to actively analyse and process their experience.

Based on the assumption that expressive writing can facilitate cognitive processing, one might also assume that expressive writing could potentially facilitate posttraumatic growth, given that growth is assumed to be a product of cognitive processing. As such, it is of interest to explore whether the expressive writing intervention can contribute to increases in the extent of posttraumatic growth reported by survivors of traumatic experiences. Before proceeding to discuss the topic of expressive writing and posttraumatic growth in further detail, a review of the expressive writing literature is provided in the following sections. Although a fully comprehensive review of the expressive writing literature is beyond the

scope of this thesis, the relatively brief review provided is designed to cover the areas of the literature most relevant to this work.

7.2.1 Expressive Writing: A Review

The expressive writing technique was developed by Pennebaker and Beall (1986), who sought to investigate the relationship between disclosing traumatic events and subsequent physiological and psychological adjustment. In the first disclosure writing study, Pennebaker and Beall (1986) randomly assigned healthy participants to one of four writing groups: a trauma-emotion group, in which participants were instructed to write only about the emotions surrounding their trauma; a trauma-facts group, in which participants were instructed to write only about the facts surrounding their trauma devoid of any emotion; a trauma-combination group, in which participants were instructed to write about both the facts and their emotions surrounding their trauma; and a control group, in which participants were instructed to write about a neutral or 'trivial' topic (e.g. a description of the room they were in). All participants wrote for a total of 15 minutes each day on four consecutive days, seated within a private cubicle in the psychology laboratory.

The participants were followed-up 6 months later and the results demonstrated that emotional writing about traumatic experiences was associated with short-term increases in physiological arousal and negative mood, but long-term decreases in health problems and health care utilisation. These effects were most pronounced for individuals in the trauma-combination group, who demonstrated a significant reduction in physical health problems and illness-related doctor visits in the 6 months following the writing sessions. Interestingly, individuals who wrote only about the facts surrounding their experience, devoid of any

emotions, were similar to control group participants on most physiological, health and self-report measures.

Since its publication, this landmark study has inspired a plethora of similar experiments and has led to the emergence of a relatively uniform 'Pennebaker Paradigm.' This standard research procedure, whereby participants are randomly assigned to write about a traumatic event (experimental group) or a neutral topic (control group) for 15-20 minutes on three to five occasions, has been used to generate a vast literature attesting to the significant physical and psychological health benefits of disclosure writing. Writing about stressful or traumatic experiences has been associated with a variety of objective health outcomes such as a reduction in health centre visits (e.g. Pennebaker & Francis, 1996), improved immune system functioning (e.g. Petrie et al., 1995), reduced blood pressure (Davidson et al., 2002), improved response to hepatitis B vaccination (Petrie et al., 2004) and improved wound healing (Weinman, Ebrecht, Scott, Walburn & Dyson, 2008).

Subjective physical health outcomes of expressive writing have included reduced self-reported physical symptoms (Sloan & Marx, 2004a) and reduced self-reported sick days (e.g. Sheese, Brown & Graziano, 2004). Expressive writing has also been explored in the context of psychological health and well-being, with self-reported outcomes including reduced distress (Donnelly & Murray, 1991), improved mood (Páez, Velasco & Gonzalez, 1999), reduced symptoms of depression and/or anxiety (Epstein, Sloan & Marx, 2005; Hemenover, 2003; Schoutrop, Lange, Hanewald, Davidovich & Salomon, 2002) and reduced trauma-related intrusion and avoidance symptoms (Klein & Boals, 2001). Behavioural outcomes such as faster re-employment following job loss (Spera, Buhrfeind & Pennebaker, 1994), improved working memory capacity (Klein & Boals, 2001), higher grade point average

(Pennebaker & Francis, 1996) and improved sporting performance (Scott et al., 2003) have also been documented.

7.2.1.1 Who can benefit from expressive writing? Although many of the early expressive writing studies used samples of healthy individuals - primarily university students - there has been a recent move toward examining the efficacy of disclosure writing in a variety of populations. Thus, while there is substantial evidence to suggest that expressive writing can have a positive effect for physically and psychologically healthy individuals, it has also been important to investigate the therapeutic benefit of writing in medically ill or psychiatric populations. The following sections therefore provide a brief review of studies that have examined the impact of expressive writing in people with physical illness, people with psychological difficulties, and people who have experienced a traumatic event.

7.2.1.1.1 People with physical illness. Expressive writing has been shown to have a positive effect on physical symptoms in patients with chronic illnesses such as improved lung function in asthmatics (e.g. Bray et al., 2003; Smyth et al., 1999), improvements in physician-rated disease activity and symptom severity in rheumatoid arthritis patients (Smyth et al., 1999), reduced pain, fatigue and improved psychological well-being in fibromyalgia patients (Broderick, Junghaenel & Schwartz, 2005; Gillis, Lumley, Mosely-Williams, Leisen, & Roehrs, 2006), reduced pain and fatigue in adults with systemic lupus erythematosus (Danoff-Burg, Agee, Romanoff, Kremer & Strosberg, 2006), and reduced pain intensity in women with chronic pelvic pain (Norman et al., 2004). Other findings for expressive writing in medically ill samples have shown a significant reduction in distress for migraine headache sufferers (McKenna, 1997), better post-operative course and shorter hospital stay in patients following papilloma resection (Solano, Donati, Pecci, Persichetti & Colaci, 2003), reduced

number of hospitalisations for cystic fibrosis patients (Taylor et al, 2003), fewer doctor visits and lower levels of depression for people with type 1 diabetes (Bodor, 2003), improved cardiac status and greater adherence to rehabilitation activities for those recovering from a myocardial infarction (Wilmott, Harris & Horne, 2003) and improved immune function in patients with HIV (Petrie et al., 2004).

A number of writing studies have also been conducted with cancer patients. Stanton et al. (2002) studied the effects of expressive writing in women with early stage breast cancer and found that those who wrote about their experience with cancer had fewer negative physical symptoms and few medical appointments for cancer-related morbidities in the subsequent 3 months than control participants. Other studies of cancer patients have documented that compared to control or non-writing participants, expressive writing participants report greater satisfaction with emotional support (Gellaitry, Peters, Bloomfield & Horne, 2010), improvements in positive affect (Hughes, 2007), less sleep disturbance, better sleep quality and better sleep duration (de Moor, Sterner, Hall, Warneke, Gilani, Amato & Cohen, 2002), higher levels of positive meaning in life (Kallay & Baban, 2008) and improved physical symptoms and reduced use of medication (Rosenberg et al., 2002).

7.2.1.1.2 People with psychological difficulties. The effects of experimental disclosure have also been tested in participants with psychiatric or psychological problems, although fewer studies have been conducted in this population than in patients with physical illnesses. With respect to depression, L'Abate, Boyce, Fraizer and Russ (1992) conducted a series of studies to investigate the impact of expressive writing on individuals who were depressed and found that expressive writing participants reported significant decreases in symptoms of depression compared to control group participants. Similarly, Nitkin-Kaner and

Cruess (2008) reported results from a preliminary study that indicated that depressed women who engaged in expressive writing experienced a significant decrease in symptoms of depression 3 months after the intervention. Finally, Gortner, Rude and Pennebaker (2006) examined expressive writing in depression-vulnerable college students with a history of depression and found that among less expressive participants (i.e. participants with elevated suppression scores), expressive writing lowered depressive symptoms at 6 month follow-up.

A limited number of studies have also explored expressive writing in participants with psychological problems other than depression. Russ (1992) studied expressive writing in students with a history of anxiety and demonstrated that experimental disclosure participants reported a reduction in symptoms of anxiety and fewer visits to the medical centre following the writing intervention. Schoutrop et al. (2002) investigated the use of expressive writing to relieve symptoms of PTSD and found that participants in the expressive writing group experienced reduced symptoms of depression, fewer intrusive thoughts and less avoidance behaviour than participants in the control group at 6-week follow-up. Finally, Richards, Beal, Seagal and Pennebaker (2000) conducted an expressive writing study with psychiatric prison inmates who had been convicted of sex crimes. Their results demonstrated that participants in the expressive writing group evidenced a reduction in illness-related infirmity visits compared to controls

7.2.1.1.3 People who have experienced a traumatic event. Early expressive writing studies were conducted largely with healthy young student samples rather than specifically selected participants with trauma histories. As such, the types of events disclosed in these studies often varied considerably with respect to event severity. Consequently, in some studies the majority of participants wrote about relatively benign events such as the transition

to college, romantic relationship difficulties, fears about exams or other academic-related concerns rather than more emotionally difficult, unresolved life crises. This diversity in event severity may have accounted for some of the inconsistencies in the literature, with some studies suggesting that the benefits of disclosure may be restricted to those individuals who describe subjectively more severe traumas (Greenberg & Stone, 1992; Lutgendorf, Antoni, Kumar & Schneiderman, 1994).

As the expressive writing literature has progressed, there has been more interest in exploring the writing intervention in populations that have experienced specific types of traumatic event. These events include domestic violence (Koopman et al., 2005), sudden bereavement (Range, Kovac & Marion, 2000), sexual abuse (Batten, Follette, Rasmussen, Hall & Palm, 2002), homelessness (de Vincente, Munoz, Perez-Santos, & Santos-Olmo, 2005), natural disaster (Smyth et al., 2002), being the child of an alcoholic parent (Gallant & Lafreneire, 2003), dealing with the diagnosis of cancer in a child (Duncan et al., 2007), being the caregiver of a child with chronic illness (Schwartz & Drotar, 2004), rape (Brown & Heimberg, 2001), and bereavement by suicide (Kovac & Range, 2000).

While it has often been assumed that participants who have experienced a traumatic event have more to disclose and therefore more to gain from the writing intervention (e.g. Frattaroli, 2006), results from studies of trauma survivors have been mixed. Some studies have provided support for the benefits of expressive writing in traumatised samples (e.g. Duncan et al., 2007; Koopman et al., 2005). Sloan and Marx (2004a) demonstrated that participants in the expressive writing group reported fewer physical symptoms and significantly decreased PTSD and depression symptom severity compared to control group participants in a sample of students that were pre-selected for having experienced a major

trauma. Likewise, Greenberg, Wortman and Stone (1996) demonstrated that students pre-selected for trauma history who wrote about their trauma reported fewer illness-related doctor visits and fewer upper-respiratory symptoms than control writing participants, although trauma-writing participants also reported more fatigue and greater avoidance symptoms at follow-up than control writing participants.

Despite these positive findings, other studies have found evidence to suggest that although expressive writing may be beneficial for trauma survivors, it is not significantly more so than control writing. For instance, Range et al. (2000) explored the impact of expressive writing on bereavement recovery following the accidental or homicidal death of a loved one. Their results showed that at 6-week follow-up, both experimental and control group participants reported reduced anxiety and depression and improved grief recovery. Likewise, Deters and Range (2003) found that students pre-screened for a recent traumatic experience reported less severe PTSD symptoms, less dissociation and fewer health centre visits at 6-week follow-up, regardless of whether they had written about their traumatic experience or a neutral topic. Comparable beneficial effects of experimental and control writing were also found in studies of children of alcoholics (Gallant & Lafreneire, 2003), caregivers of children with chronic illness (Schwartz & Drotar, 2004), and suicidal students (Kovac & Range, 2002).

Other studies have failed to find support for the expressive writing intervention in traumatised populations, with disclosure writing participants failing to benefit from the writing exercises. Batten et al. (2002) explored expressive writing in adult survivors of childhood sexual abuse and reported that disclosure writing was not associated with lower health care utilisation, physical symptoms or psychological distress in this sample. Similarly,

Brown and Heimberg (2001) found no physical or psychological health benefits of disclosure for women writing about the facts and emotions surrounding their experience of rape, compared to women writing only about the facts of the rape. However, there were methodological limitations to this study, particularly that there was not a 'true' control condition that wrote about a trivial topic, and participants only wrote on one rather than several occasions. As such, comparing this study with other expressive writing studies that follow the paradigm's design more closely is compromised. With respect to expressive writing following bereavement, Stroebe et al. (2002) failed to find any positive effects of disclosure writing in recently widowed females, both immediately after writing or at 6 month follow up.

One possible explanation for the inconsistent findings concerning the efficacy of expressive writing in traumatised populations is that many of the studies that have failed to detect a beneficial impact of expressive writing instructed participants to write about the event that they had been selected for (e.g. Batten et al., 2002; Range et al., 2000), rather than allowing them to choose their own topic of disclosure. Other studies that allow participants to choose their own writing topic have had more beneficial results (e.g. Smyth et al., 1999). This was also evident in the Spera et al. (1994) study of recently unemployed professionals, where fewer than half of the participants actually wrote about the loss of their job – they wrote about marital problems, financial concerns, and health concerns, amongst other topics. As a result, Pennebaker (1997) cautioned that the most robust findings often occur when participants are allowed to choose their writing topic because constraining the instructions to one particular event may contribute to further inhibition of thoughts and feelings about a different event that is impacting the individual.

Finally, some studies have indicated that expressive writing may actually be detrimental for some populations. Thus, although expressive writing appears to be beneficial for individuals with mild to moderate PTSD symptoms (Sloan & Marx, 2004a; Sloan & Marx, 2006), it has been shown to have a detrimental effect in those with clinical levels of PTSD. Gidron, Peri, Connolly and Shalev (1996) implemented a written disclosure intervention with PTSD patients recruited from a psychiatric trauma clinic. Participants in the disclosure condition wrote for 20 minutes on 3 consecutive days about their most traumatic experience whilst control participants wrote about their daily agenda. The results demonstrated that disclosure writing had a negative effect on physical and psychological health at 5 week follow up, with disclosure participants reporting significant increases in health care utilisation and symptoms of avoidance, relative to controls. As such, the authors concluded that written disclosure may not be recommended for PTSD patients.

However, there were methodological aspects of the Gidron et al. (1996) study that may have contributed to the exacerbation of distress in expressive writing group participants. Specifically, participants in the disclosure condition were required to orally elaborate on the most severe event about which they wrote. This modification changes the disclosure writing activity from one that is private and anonymous to one that is public, which may distort the effects that are specific to private written disclosure (Smyth, Hockemeyer & Tulloch, 2008). In addition, the length and number of writing sessions used in this study may not have been sufficient to allow for effective habituation in this sample and therefore contributed to symptom intensification. Other methodological limitations, including a small sample ($n = 14$) and a significant difference in the time since the event for the disclosure (37.9 months) and control (13.2 months) conditions, reduces the reliability of these findings.

As such, a more recent study with greater methodological rigour has shown that disclosure writing can confer some benefits for PTSD patients, with Smyth et al. (2008) demonstrating that although PTSD symptoms did not significantly decline, disclosure participants reported significantly greater reductions in tension and anger than control participants at 3 month follow up. There was also a trend toward greater reductions in depression for expressive writing participants. As such, the results from Smyth et al. (2008) suggest that more structured writing interventions without aspects of public disclosure may be beneficial for people with clinical levels of PTSD.

7.2.1.2 Meta-analyses of overall effect. While expressive writing is largely considered to be beneficial, many are sceptical of the hype that surrounds the ‘Writing Cure’ and question its efficacy, given the increasing number of studies that have failed to replicate the promising findings of the early writing studies. In order to bring together results from numerous writing studies and establish whether or not it is effective in improving well-being, a series of meta-analyses have been conducted. A meta-analysis is essentially a quantitative literature review that synthesises findings from a research literature to objectively determine how well an intervention works and what its effect size is.

The first meta-analysis of expressive writing was conducted by Smyth (1998) and included 13 experimental disclosure studies that had all used participants that were physically and psychologically healthy, with 10 of the 13 studies based on student samples. The overall effect size of $d = .47$ was significant at the $p < .0001$ level and represents a 23 percent improvement in health for expressive writing participants over control writing participants (Smyth, 1998). Effect sizes were also calculated for the various outcome types of self-reported health, psychological well-being, physiological functioning, general functioning and

health behaviours, all of which showed significant effect sizes ($p < .001$) apart from health behaviours. Results showed that physiological (i.e. immune system) and psychological (e.g. depression, anxiety) functioning outcomes showed the highest effect sizes ($d = .68$ and $.66$, respectively), followed by physical health outcomes (e.g. self-reported symptoms) then general functioning outcomes (e.g. re-employment, cognitive functioning) with effect sizes of $d = .42$ and $d = .33$, respectively. Smyth (1998) therefore concluded that, for non-clinical samples, expressive writing produces significant physical and psychological health benefits that are similar in magnitude to the effects of several other psychological interventions.

With respect to expressive writing in clinical populations, Frisina, Borod and Lepore (2004) conducted a meta-analysis of 9 writing studies that had used participants with physical illnesses or psychiatric disorders. The results showed that there was a significant overall effect for health ($d = .19, p < .05$), although when analysed separately, emotional disclosure was found to be effective for physical health outcomes ($d = .21, p = .01$) but not for psychological health outcomes ($d = .07, p = .17$). Likewise, disclosure writing was found to be beneficial for medically ill participants dealing with physical illness, but largely ineffective for psychiatric populations (Frisina et al., 2004).

Harris (2006) conducted a meta-analysis that focused on the influence of the writing intervention on health care utilisation (HCU). This meta-analysis examined 30 randomised controlled trials which were further separated into studies of healthy people, studies of medically ill samples, and studies of samples pre-screened for stress, trauma or psychological conditions. The results demonstrated that relative to control writing, expressive writing was effective in significantly reducing HCU in healthy samples. However, the overall effect size

was small (Hedge's $g = 0.16$, 95% CI = 0.02 to 0.31).¹² Furthermore, disclosure writing was not effective for people with pre-existing medical conditions or psychological diagnoses.

Although these findings suggest that disclosure writing can be beneficial for healthy populations, Harris (2006) warns that the interpretation of reduced HCU as a desirable outcome may be problematic since it is not clear whether a reduction in HCU can always be considered a proxy for better health. In some areas of health services research, increased HCU is seen as a positive outcome because not going to the doctor when a genuine need exists may reflect poor adherence to treatment regimens and may be related to poorer health. As such, Harris (2006) notes that "the effect of writing interventions on HCU should not be considered identical to their effect on actual health outcomes," (p. 243) and a more fine grained analysis is necessary to explore this issue.

The final meta-analysis to be discussed was conducted by Frattaroli (2006) and is the most comprehensive, including 146 disclosure studies. Frattaroli (2006) reported a positive and significant overall effect of $r = .075$, thus confirming that experimental disclosure has a beneficial effect for participants. Effect sizes were also calculated for six specific outcome types and indicate modest effects of disclosure writing on psychological health ($r = .056$), physiological functioning ($r = .059$), self-reported health ($r = .072$), subjective impact of the intervention ($r = .159$) and general functioning ($r = .046$). Health behaviours was the only outcome type that did not improve as a result of the writing intervention ($r = .007$), although results for the subcategory of healthy diet did approach significance ($r = .074$).

¹² Cohen's d is known to be biased in small samples (Hedges & Olkin, 1985) so Hedge's g gives an effect size that is an unbiased adjustment of Cohen's d (Hedge's $g = [1 - (3/4N - 9)] \times \text{Cohen's } d$).

The results of Frattaroli's (2006) meta-analysis are consistent with those presented by Smyth (1998), who also found evidence for improvements in all outcome types apart from health behaviours. Whilst the overall average effect size of .075 obtained in the Frattaroli (2006) analysis is somewhat smaller than the average effect sizes of .257 found in the Smyth (1998) meta-analysis and .084 found in the Frisina et al. (2004) analysis, Frattaroli (2006) notes that this difference may be due to the higher proportion of unpublished studies (48%) included in her analysis compared to the 23% in Smyth's (1998) analysis and 0% in Frisina et al.'s (2004) analysis, since unpublished studies tend to have smaller effect sizes.

Despite the relatively small effect size, Frattaroli (2006) highlights that the result should nevertheless be considered important and emphasises that given the relative simplicity, brevity and low cost of the intervention, "any effect that is nonzero and in the positive direction is worth noting," (p. 851). Frattaroli (2006) also points out that the effect size of $r = .075$ is an *average* effect size, with further analyses demonstrating that when administered under optimal conditions (e.g. high dosage, privacy during writing), the average effect size increases to $r = .200$. Notably, the effect size of psychotherapy was found to be $r = .322$ in a review of approximately 500 studies of the efficacy of psychotherapy (Smith & Glass, 1977). As such, disclosure writing appears to be a useful and efficient intervention.

7.2.2 Expressive Writing and Posttraumatic Growth

Although these meta-analytic reviews testify to the success of the expressive writing intervention in alleviating symptoms of distress and ill health, few studies have explored whether expressive writing can contribute to increased positive changes in outlook or posttraumatic growth. Most disclosure studies have neglected the positive aspects of psychological functioning, focusing instead on the extent to which writing contributes to

decreased distress. While such studies clearly have value, it is also of interest to explore positive outcomes of expressive writing that reflect more than just a reduction in distress but an increase in positive well-being. This is in line with the tenet of Positive Psychology which emphasises that positive outcomes are more than just an absence of negative outcomes.

To date, only a handful of studies have been conducted that have explored the impact of emotional writing about past traumas on posttraumatic growth or positive psychological change. Ullrich and Lutgendorf (2002) investigated the benefits of journaling about a stressful or traumatic event and found that individuals who wrote about their cognitions and emotions surrounding the event demonstrated significant increases in posttraumatic growth compared to individuals in the emotion-only or control writing groups. As such, this study was one of the first to demonstrate that expressive writing could contribute to increased growth following adversity.

A number of subsequent studies also found evidence for the positive impact of disclosure writing on posttraumatic growth. Smyth et al. (2008) explored the efficacy of expressive writing in patients with posttraumatic stress disorder and demonstrated that expressive writing participants reported improved posttraumatic growth at 3-month follow-up, compared to the control group participants. Gebler and Maercker (2007) also found that individuals in a standard expressive writing condition reported significant increases in posttraumatic growth from baseline to 8-week follow-up. Guastella and Dadds (2008) reported that individuals instructed to write about the benefits they had gained from their experience with trauma reported greater posttraumatic growth than control, unstructured, exposure or devaluation writing groups at 2 month follow-up. Hemenover (2003) explored written disclosure and psychological well-being and found that trauma writing participants

reported significant increases in mastery, personal growth and self-acceptance compared to control writing participants. Finally, Kallay and Baban (2008) explored the impact of expressive writing in a sample of Romanian female cancer patients. Their results demonstrated that participants who wrote about their thoughts and feelings about their experience of cancer reported higher levels of meaning in life and benefit finding at the follow-up assessment.

While these studies provide preliminary evidence for the beneficial effects of expressive writing on posttraumatic growth, each study had methodological limitations that may have compromised their ability to generalise to the wider expressive writing literature. These limitations include the use of journal entries rather than a standard expressive writing design (Ullrich & Lutgendorf, 2002), having participants complete all three writing sessions on the same day with only a 15 minute interval between sessions (Smyth et al., 2008), lack of a control group (Gebler & Maercker, 2007), and small sample sizes (e.g. $n = 25$ in Smyth et al., 2008 and $n = 17$ in Gebler & Maercker, 2007).

Furthermore, other studies have failed to detect a significant effect of expressive writing on posttraumatic growth (e.g. Frantz, 1999; Park & Blumberg, 2002). For example, Rivkin, Gustafson, Weingarten and Chin (2006) studied the impact of expressive writing in a sample of people living with HIV and found no significant differences between the disclosure or control group participants in the extent of posttraumatic growth reported, although in this study there was no baseline assessment of growth which may limit the conclusions that can be drawn from this study. A more recent study by Slavin-Spenny, Cohen, Oberleitner and Lumley (2011) tested the effects of emotional disclosure on posttraumatic growth in students pre-screened for having an unresolved traumatic event and reported that, when compared

with the control writing group, the written disclosure group did not differ on posttraumatic growth at 6 week follow-up. However, one potential explanation for the failure of disclosure writing to improve growth in this study is that participants completed only a single 30 minute disclosure session, which may have been too brief to initiate increases in growth.

Alongside these mixed findings, Frattaroli's (2006) meta-analysis also concluded that there is currently insufficient evidence to support the hypothesis that expressive writing can facilitate posttraumatic growth, but that methodological limitations of the existing studies may account for the failure to detect significant effects. As such, the question of whether emotional writing about a prior traumatic experience can positively influence the extent of posttraumatic growth remains an unanswered one. Further research into this issue is therefore warranted. In addition, the role of cognitive processing as a potential moderator of this relationship is also worthy of study.

7.2.3 Expressive Writing and Cognitive Processing

Several theories have been developed that seek to explain the mechanisms through which expressive writing exerts its effects. These theoretical models include an inhibition-confrontation model (e.g. Pennebaker, 1989), an exposure-based model (Sloan & Marx, 2004a), a model of social integration (Pennebaker & Graybeal, 2001), a model of self-regulation (Lepore, Greenberg, Bruno & Smyth, 2002), and a cognitive processing model (Pennebaker, Mayne & Francis, 1997). Each of these theories has supporting and contradictory evidence (Sloan & Marx, 2004b), making it difficult to single out any individual factor that can account for the success of the writing intervention. However, the cognitive processing model is one that appears to have been most widely written about and supported. In addition, consistent with the notion that posttraumatic growth is largely

understood as a cognitive change that emerges through cognitive processing activity, it makes sense to use the cognitive processing theory of expressive writing as a theoretical framework for the current study.

The origins of the cognitive processing theory of expressive writing stem from work by Pennebaker, Colder and Sharp (1990) where participants that had benefitted from the writing intervention were asked to explain why they thought it had been successful. Their open-ended responses were analysed and revealed that the overwhelming majority of participants reported that they believed the value of the disclosure writing was derived from gaining insight into their experiences and achieving a better understanding of their thoughts, feelings and moods. Consequently, Pennebaker (1990) speculated that the success of the writing exercises may be explained by increased insight and understanding, rather than a catharsis or 'letting go' mechanism.

In order to further explore the possibility that increases in insight and understanding are responsible for the benefits of expressive writing, Pennebaker (1993) pooled the results of three of his first disclosure studies and used the Linguistic Inquiry and Word Count (LIWC) computerised text analysis program to examine the patterns of word use amongst disclosure participants that had benefitted from the intervention and those that had not. These analyses revealed that participants whose health improved demonstrated an increase in the use of causal reasoning words (e.g. *because, why, reason*) and words suggesting insight or self-reflection (e.g. *realise, understand, thought, knew*) from the first to the final writing session. Participants whose health did not improve used these cognitive mechanism words at a consistent rate across the writing sessions. Based on these findings, Pennebaker (1993) concluded that writing about a traumatic event provides an opportunity for the individual to

organise and integrate the event into their schemata, which allows them to make sense of the experience and derive subsequent physical and psychological health benefits.

As such, current cognitive processing theories of expressive writing, much like trauma theories in general, maintain that memories of stressful or traumatic life events are organised at the perceptual level and consist of predominantly sensory representations of the event. These sounds, images, and emotional states are typically fragmented and disorganised, and are poorly integrated within the persons' schemata. Cognitive processing is seen as the activity that transforms these perceptual-level memories into cohesive, integrated narrative accounts that have meaning. Expressive writing is believed to assist this process by transforming fragmented trauma memories into linguistic structures that can be organised, integrated and made sense of (Pennebaker, 1993; Pennebaker & Francis, 1996). As such, disclosure writing imposes structure and meaning on previously chaotic memories which changes the way the trauma is represented. This cognitive structuring makes the event more understandable to oneself and others, facilitating the integration of thoughts and feelings related to an experience. The linguistic representation of the event thus enables the individual to have a changed perspective of the experience, promoting insight and assimilation (Lutgendorf & Antoni, 1999).

The cognitive processing model has typically been tested by examining language use across the writing sessions using the LIWC computer text analysis program developed by Francis and Pennebaker (1992). Pennebaker and Seagal (1999) have argued that the use of causal words provides an index of the extent to which an individual is attempting to put together causes and reasons for the events and emotions being described in their essays. Likewise, insight words are seen to reflect the degree to which an individual is referring

specifically to cognitive processes associated with thinking about the event and its meaning. As such, the LIWC causal and insight word categories are taken as markers of cognitive processing in many expressive writing studies. Evidence from these studies have replicated the initial findings of Pennebaker (1993) by demonstrating that participants are most likely to benefit from expressive writing if their essays contain an increasing number of causal and insight words over the course of the writing sessions (e.g. Petrie et al., 1998; Rivkin et al., 2006), providing support for Pennebaker's (1993) emphasis on cognitive processing as the main mechanism underlying the success of the expressive writing intervention.

However, evidence concerning the role of these linguistic changes is equivocal, with several studies demonstrating increases in causal and insight word use in the absence of any physical or psychological improvements (e.g. Batten et al., 2002; Park & Blumberg, 2002; Walker et al., 1999) and others failing to detect a significant association between health improvements and cognitive word use (e.g. Graybeal, Sexton & Pennebaker, 2002). Critics have also highlighted that studies using LIWC categories to capture cognitive processing do not provide *causal* evidence to demonstrate the link between cognitive processing and outcomes because they are correlational in nature and "it is possible that the changes observed in the language used to describe and discuss traumatic and stressful events may be associated with some other mechanism of change," (Sloan & Marx, 2006, p. 126). Thus, although linguistic indices are informative to some extent, it is unclear whether they are able to accurately capture the nuances of cognitive processing.

Smyth, True and Souto (2001) sought to conduct a more direct test of the cognitive processing model of expressive writing by manipulating the writing instructions to increase cognitive engagement with the event. Thus, experimental group participants were randomly

allocated to write about their thoughts and feelings regarding the most traumatic event of their life in either a narrative, story-like way, or in a fragmented, list-like way, with the former assumed to facilitate cognitive processing and the latter assumed to disrupt cognitive processing. Results demonstrated that individuals in the narrative writing condition reported significantly less restriction of activity because of illness than the fragmented or control writing groups and as such, suggest that structuring the writing instructions to increase cognitive engagement increases the efficacy of the intervention. Whilst this study provides a more direct test of the cognitive processing mechanism than studies using linguistic categories to capture cognitive processing, the beneficial effects observed in the narrative writing group may be the result of some other process, such as exposure, that was not elicited when participants wrote in a fragmented manner (Sloan & Marx, 2006).

As has been demonstrated, difficulties with accurately capturing cognitive processing have meant the cognitive processing model has been difficult to test empirically. As Guastella and Dadds (2006) highlight, there has been an “absence of clear operational definitions of the processes within the writing sessions, and therefore, poorly targeted assessment of the expected changes according to these processes of change,” (p. 559). Thus, because to date appropriate measures of event-related cognitive processing have not existed, cognitive changes have been inferred from analysis of the linguistic characteristics of the essays. More direct investigations of the role of, and changes in, cognitive processing during and after expressive writing are important. Findings from the studies reported in prior chapters of this thesis have demonstrated the empirical utility of the intrusive, deliberate and ruminative processing subscales for assessing cognitive processing. It is timely for the current study to employ such a measure to test the impact of expressive writing on cognitive processing and

in turn to examine the role of expressive writing - and therefore cognitive processing - on posttraumatic growth.

7.2.4 Methodological considerations

Over the years, the expressive writing paradigm has been subject to multiple variations in method. It is beyond the scope of this chapter to conduct a comprehensive review of methodological variations in the expressive writing literature, but it is important to give due consideration to the methodological factors that might impact the design and efficacy of the current study, since procedural alterations are not inconsequential (Nazarian & Smyth, 2010). The following issues will therefore be discussed: internet-based delivery; typing versus handwriting; and home versus laboratory setting.

7.2.4.1 Internet-based delivery. Recent developments in internet-based research and intervention delivery (e.g. Knaevelsrud & Maercker, 2007; Lange et al., 2002) have contributed an increase in studies that have conducted expressive writing using web-based designs. The first study to do so was conducted by Sheese, Brown and Graziano (2004), who demonstrated that emotional disclosure participants reported significantly fewer days of illness in the five weeks following the intervention than control writing participants and concluded that internet implementation is a viable tool for administering the disclosure intervention. Johnston, Startup, Lavender, Godfrey and Schmidt (2010) explored the impact of internet-based expressive writing for individuals with bulimia nervosa and found that although emotional writing participants reported significant reductions in symptoms of bulimia and anxiety, comparable symptom decreases were also observed in the control writing group. A recent study by Possemato, Ouimette and Geller (2010) examined the feasibility and impact of internet-administered expressive writing among kidney transplant

recipients and found that participants in the expressive writing group reported significantly greater increases in their transplant-related quality of life compared to the control writing group.

Whilst these online writing studies have demonstrated the possibility of internet-based disclosure writing, no study to date has compared the relative effectiveness of internet-based delivery with traditional laboratory-based delivery. As such, it is premature to draw any conclusions about which delivery method is superior, but findings from the three studies reviewed here support the use of the internet as a viable platform for conducting an expressive writing intervention. As such, the current study adopted this delivery method.

7.2.4.2 Handwriting versus typing. Given the decision to use internet-based delivery, participants would be required to type their essays on a computer. The standard expressive writing task is conducted in the laboratory context using a pen and paper for longhand writing and the majority of writing studies have adopted this protocol. As such, it is important to understand whether differences in writing modality (typing vs. handwriting) might influence the effectiveness of the writing intervention. Several studies have deviated from the standard handwriting protocol by having participants type their disclosure essays onto personal computers in the laboratory setting (e.g. Booth, Petrie & Pennebaker, 1997; Burton & King, 2008; Hemenover, 2003; Petrie et al., 1995). Findings from these studies have indicated that computer-based typing appears to be an acceptable format for the completion of disclosure essays. However, only a few studies have directly compared the effects of typing versus handwriting in the laboratory context.

In the earliest study to do so, Brewin and Lennard (1999) found that writing longhand about a stressful event, compared to typing, was associated with greater negative affect immediately after the writing task. Participants who wrote longhand also reported greater disclosure and greater perceived benefit, based on their subjective experience, than participants who typed. Brewin and Lennard (1999) suggested that these differential effects for writing modality might occur because typing places an additional cognitive load on working memory which reduces the capacity to engage more deeply in the disclosure writing task, therefore leading to lower subjective distress. However, this assumption that typing impedes cognitive engagement because it is not an automated activity has not been subject to empirical scrutiny. In addition, it is likely that the increasing use of computers in recent years means that the process of typing is more routine and less likely to place the cognitive demands on working memory that it was assumed to do over 10 years ago.

In line with this latter suggestion, findings from a more recent study were in contrast to those provided by Brewin and Lennard (1999). Sharp and Hargrove (2004) reported that there were no significant differences in the level of post-writing positive or negative affect between the writing modalities. Likewise, participants that wrote longhand or typed about an emotional event reported comparable levels of self-disclosure during the writing tasks and comparable levels of perceived benefit. The authors concluded that this null effect of writing modality is due to the now widespread use of word processing and email, with most people now adept at typing. Sharp and Hargrove (2004) also examined the impact of modality on writing content using the LIWC and demonstrated that there were no differences in the linguistic profile of disclosure essays as a function of writing modality. These findings replicate those of an earlier study by Wood et al. (2001), who also demonstrated that the extent of emotional disclosure and linguistic content is equivalent across the two writing

modalities. Taken together, the findings from these studies suggest that the modality through which disclosure writing is produced appears to have no impact on the outcome of the intervention and suggest that computer-based administration of expressive writing is an acceptable delivery format, especially if participants are comfortable with typing.

7.4.2.3 Home versus laboratory setting. Internet-based administration of the expressive writing intervention would also require participants to complete the writing exercises outside of the laboratory setting and it is therefore important to consider the impact of the location of disclosure sessions on the potential therapeutic properties of the intervention. Several researchers have conducted the writing intervention in non-laboratory settings such as the hospital room (Schwartz & Drotar, 2004), out-patient clinic (de Moor et al., 2002; Duncan et al., 2007), and prison (Richards, Beal, Seagal, & Pennebaker, 2000), but of greatest relevance to the current study is writing interventions conducted in the home setting (e.g. Graybeal et al., 2002; Langens & Schöler, 2005; Rosenberg et al., 2002; Sheffield et al., 2002; Wetherell et al., 2005). Although many studies of home-based expressive writing interventions exist, very few have directly compared home-based writing with laboratory-based writing. As current evidence stands, it is therefore not possible to establish whether one delivery context is superior. Nevertheless, existing evidence does appear to indicate that adapting the standard Pennebaker paradigm to one that is delivered in the home is feasible.

Some have questioned whether adjusting the standard protocol to a home-based setting may limit its effectiveness (Schwartz & Drotar, 2004; Sheffield et al., 2002; Smyth & Catley, 2002) because the more controlled setting of the laboratory allows for greater compliance and less room for error or distractions. However, it has also been suggested that

being able to write at home in a more comfortable setting might allow individuals to relax and become more engaged in the disclosure process. Supporting the latter position, Frattaroli's (2006) meta-analysis concluded that although the location of the disclosure sessions did not significantly moderate the effect of expressive writing on overall effect size, self-reported health effect size or subjective impact of the intervention effect size, greater psychological health effect sizes were produced when the writing was completed at home rather than in a controlled laboratory setting.

Nevertheless, one concern about home-based expressive writing is the experimenter's inability to monitor and provide support for participants that may experience increased negative emotions during and immediately after the writing tasks. Both laboratory-based (e.g. Batten et al., 2002; Pennebaker & Seagal, 1999) and home-based (e.g. Sheffield et al., 2002) writing studies have demonstrated short term increases in negative mood immediately following writing sessions, and as such it is important for home-based interventions to take into account the distress that may be elicited. This issue is further addressed in section 7.4.3.

7.3 Aims and Hypotheses

There were four main aims to this study. The first aim was to test the efficacy of an internet-based expressive writing intervention in a sample of survivors of traumatic life events. Whilst prior studies have conducted expressive writing using web-based designs (e.g. Possemato, Ouimette & Geller, 2010; Sheese, Brown & Graziano, 2004), the feasibility of this delivery format has not yet been tested in samples that have been pre-selected for having experienced a traumatic event. As such, the current study sought to explore some of the methodological issues relating to internet-administered expressive writing in this population and to examine their subjective experience of participating in the intervention.

The second aim was to explore whether participation in an expressive writing intervention influenced the extent of posttraumatic growth and positive psychological change reported at study follow-up. A growing number of studies have recently been conducted that recognise the possibility of using the expressive writing intervention to foster growth (e.g. Hemenover, 2003; Smyth et al., 2008), yet mixed findings and methodological limitations mean the role of disclosure writing in posttraumatic growth remains poorly understood. This represents an important direction for the progression of the growth literature. This study therefore sought to test the hypothesis that individuals in the expressive writing group would experience a significantly greater increase in posttraumatic growth from baseline to 8 week follow-up than individuals in the control writing group.

The third aim of this study was to test the impact of expressive writing on intrusive, deliberate and ruminative cognitive processing and to explore how these cognitive processing subtypes influenced growth outcomes. Prior research has indicated that an increase in cognitive processing over the course of the writing sessions, when captured using LIWC causal and insight words, is predictive of improvement (e.g. Petrie et al., 1998; Rivkin et al., 2006). It was therefore hypothesised that an increase in cognitive processing activity from baseline to follow-up, when assessed using the cognitive processing measure tested in prior studies of this thesis, would be associated with increased posttraumatic growth. However, differential effects were predicted for the cognitive processing subtypes. Thus, it was hypothesised that an increase in deliberate processing from baseline to follow-up would be associated with an increase in posttraumatic growth, given the positive role of deliberate processing demonstrated in prior chapters of this thesis.

With respect to intrusive processing, it was hypothesised that a decrease in intrusive processing from baseline to follow-up would be associated with an increase in posttraumatic growth, since expressive writing provides an opportunity to organise and process intrusive memories more constructively. Prior studies have demonstrated significant reductions in intrusive trauma-related thoughts following disclosure writing (e.g. Duncan et al., 2007; Sloan & Marx, 2004a) and it has been suggested that expressive writing contributes to a decrease in intrusive re-experiencing because the writer is able to develop a more coherent narrative about the experience. This anticipated decline in intrusive processing from baseline to follow-up was therefore hypothesised to be associated with improved posttraumatic growth. Finally, it was hypothesised that a reduction in ruminative processing from baseline to follow-up would also be associated with an increase in posttraumatic growth because expressive writing is assumed to facilitate the restructuring of maladaptive cognitions that are ruminative in nature (Sloan et al., 2008) and has been shown to reduce rumination (Gortner, Rude & Pennebaker, 2006). It is hypothesised that this reduction in ruminative processing will be associated with increased posttraumatic growth.

The fourth aim of this study was to examine whether particular patterns of word use, as assessed using the LIWC text analysis program (Francis & Pennebaker, 1992), would be meaningfully associated with study outcomes. Specifically, it was hypothesised that participants were most likely to benefit from the writing intervention if their essays contained an increasing number of causal (e.g. *because, why, reason*) and insight (e.g. *understand, realise, thought*) words from the first to the third writing session, since these patterns of word use are presumed to reflect increased cognitive processing. Only one writing study to date has examined the association between cognitive mechanism word use and posttraumatic growth (Ullrich & Lutgendorf, 2002) and further exploration of this issue is therefore warranted. A

related hypothesis was that deliberate cognitive processing would be positively associated with cognitive mechanism words, since both are presumed to provide a marker of adaptive cognitive processing activity.

7.4 Method

7.4.1 Design

This Internet-based study used an experimental, repeated measures design. Participants were randomly allocated to either a control or disclosure writing group. The overall study design consisted of a baseline assessment, a 7 day intervention period of three 15 minute writing exercises spaced 3 days apart, a 2 week post-intervention assessment and an 8 week follow-up assessment. Baseline and follow-up measures were identical and assessed intrusion, reflection, brooding, intrusive processing, deliberate processing, ruminative processing, posttraumatic growth and posttraumatic changes in psychological well-being.

7.4.2 Procedure

Participants were recruited from a pool of volunteers that had taken part in a previous study (Study 2, reported in Chapter 5) and had responded that they would be willing to take part in further research. All participants that had provided an email address following completion of this prior questionnaire were emailed and invited to take part in the current writing study. Emails were sent on average 1.21 days ($SD = 1.09$) after the participant completed the first questionnaire. Each email contained information about the writing study, the link to the writing study website, and reminded participants of their unique username that they had created when completing the baseline assessment (see Appendix K). If the

participant was interested in taking part, they were encouraged to return to the study website as soon as possible to complete the scheduled writing exercises.

Participants were randomly allocated, based on order of presentation to the study, to one of two writing groups: an experimental disclosure group or a control writing group. The link in the email therefore varied depending on which group the participant had been allocated to; control group participants received the link to the section of the website containing the control writing instructions and experimental disclosure group participants received the link to the section of the website containing the disclosure writing instructions. The website was otherwise identical.

On arrival at the study website, participants were provided with further information about the study, the requirements of participation and information about ethical matters. Having read this information, participants proceeded to a consent page where they were asked to indicate that they understood what they were being asked to do and their rights to withdraw or withhold information had been explained to them. They were then given the options “I consent to take part in this study” or “I do not consent to take part in this study.” Participants who did not consent were thanked for their interest and exited from the study website; participants could not proceed to the writing exercises without selecting the “I consent to take part in this study” option. Participants who chose to consent were taken to the next page of the site where they were asked to enter their username; this ensured anonymity of responses and allowed for the writing responses to be matched with the responses provided at baseline (Study 2).

Participants were then instructed to complete their writing task, writing continuously in the text box provided for 15 minutes. Writing instructions for each condition and session were replicated from the protocol used by Pennebaker (1997), although minor adjustments were made in line with the design of the current study.¹³ The control and disclosure writing instructions were roughly the same length and of a similar format to ensure comparability. Participants in the disclosure condition were asked to write continuously for 15 minutes on three separate occasions about the most traumatic or distressing experience of their life with as much emotion and feeling as possible. Participants were free to write about either the same or different experiences at each session. Those assigned to the control writing condition were instructed to write continuously for 15 minutes on three separate occasions about how they spent their time, without reference to their emotions or opinions and being completely objective. All participants were assured of the confidentiality of their writing.

Following completion of each writing task, participants completed the Essay Evaluation Measure. Each participant was then sent a personalised email which acknowledged receipt of their completed writing, thanked them for their continued participation, notified them of the date for their next writing session, and contained details of sources of emotional support should they require it. On the fourth and seventh day of the study, participants were emailed with the link to the website requesting that they log back on and complete their next writing exercise. Two weeks after completing the third and final writing exercise, participants were emailed with the link to the post-intervention questionnaire site, which contained all measures included at baseline. Participants also

¹³ Specifically, the instructions provided by Pennebaker (1997) were for a study where participants wrote for 20 minutes over four consecutive days. As such, references to the timing or number of writing sessions were changed to fit the design of the current study. The instructions were otherwise the same.

completed these measures again 8 weeks after the final writing session. Upon completion of the 8 week follow-up questionnaire, participants were directed to a debriefing page where the nature of the study was explained to them.¹⁴ Participants were thanked for their continued participation throughout the study and were given the opportunity to provide feedback or comments about their experience of taking part. Once all study tasks had been completed, participants were emailed a £5 voucher for Amazon.com.

7.4.3 Ethics

This study was conducted in accordance with the British Psychological Society guidelines for ethical conduct (Ethical Principles for Conducting Research with Human Participants, BPS, 2009) and was subject to approval from the Institute of Work, Health and Organisations' Ethics Committee. Given the online nature of this study, advice was also sought from the BPS Guidelines for Ethical Practice in Psychological Research Online (BPS, 2007).

It was recognised that asking participants to write about the most traumatic event of their life might elicit distress and discomfort in some respondents. As such, attempts were made to manage the risk of psychological harm to participants, particularly because the online nature of the study made it impossible for the researcher to monitor, support or even terminate the study if the participants' reaction became adverse (BPS, 2007). Participants in the expressive writing group were informed prior to giving consent that the study involved writing about their thoughts and feelings surrounding a traumatic experience and therefore

¹⁴ Participants that withdrew from the study before completing all writing sessions or assessments were also sent an email to debrief them about the goals of the study and to ensure they did not suffer any adverse effects from their participation. The contact details of emotional support services were also provided in this email.

might be distressing for some individuals; those who felt they could be unable to manage this distress were advised not to take part.

As is required with all psychological research, participants in this study were made aware of their right to terminate their participation and withdraw from the study at any time. Informed consent was obtained from all participants. Web links and contact details of sources of support and trauma help-lines were provided following each writing task that participants could act on if they had concerns about their own well-being. The researcher's email address was also displayed should participants require assistance locating alternative sources of support, although no participants chose to do this.

Given the nature of events that participants were likely to disclose, confidentiality and the protection of privacy was considered a priority in this study. The anonymity of the Internet allowed participants' identities to remain undisclosed and a username was employed as an alternative to them having to provide more personal forms of identification. Participants were assured that the data would be kept confidentially and securely. The Internet survey company (SurveyMonkey) used for hosting the study maintains high security standards including encrypted data transfer, password-required access to the data, and a secure survey environment. Following completion of the data collection phase, all coded data was maintained in password protected computer files that were only accessible to the research team.

7.4.4 Measures

Demographic and event-related information. At the baseline assessment, participants provided self-reported demographic information including gender, age, marital/relationship

status, ethnicity and education. Information about the traumatic event they had experienced was also collected. Participants were asked to briefly describe the most traumatic event of their life, state when the event had happened, how old they were at the time of the event, and a rating of how distressing they had found their experience ranging from 0 (*not at all distressing*) to 4 (*extremely distressing*).

Participants completed the following measures at baseline (pre-writing), 2-week and 8-week follow up:

Event-Related Intrusive Processing. The Intrusive Processing subscale of the Rumination Inventory (A. Cann, personal communication, November 13, 2008) was used to assess intrusive cognitive processing. It contains 10 items which participants rate on a 4 point Likert scale of 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in intrusive processing.

Event-Related Deliberate Processing. The Deliberate Processing subscale of the Rumination Inventory (A. Cann, personal communication, November 13, 2008) was used to assess deliberate cognitive processing. It contains 10 items which participants rate on a 4 point Likert scale of 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in deliberate processing.

Event-Related Ruminative Processing. The 10 Ruminative Processing items described in section 5.4.2 of this thesis were used to assess ruminative cognitive processing. Each item was rated on a four point Likert scale 0 (*not at all*) to 3 (*often*), with possible scores ranging from 0 to 30 and higher scores indicating greater engagement in ruminative processing.

Intrusive Thoughts. The Intrusion subscale of the Impact of Event Scale – Revised (IES-R, Weiss & Marmar, 1997) was used to assess intrusive thoughts. It consists of 8 items that assess intrusive cognitions such as nightmares and intrusive thoughts, feelings or images. Respondents rate each item on a 5-point Likert-scale of 0 (*not at all*) to 4 (*extremely*), indicating how distressing each item had been in their life during the past 7 days with respect to the traumatic event they described. Scores for the subscale are derived by calculating the mean score of non-missing items; thus, scores can range from a minimum of 0 to a maximum of 4, with higher scores indicating greater intrusive cognitions. The IES-R has been shown to demonstrate good psychometric properties (Creamer et al., 2003; Weiss & Marmar, 1997).

Posttraumatic Growth. The Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) is a 21-item scale that assesses positive change experienced in the struggle with major life crises. A short form consisting of 10 items has recently been created (Cann et al., 2010) and was used in the current study to reduce participant burden. Items were rated on a 6-point Likert scale of 0 (*I did not experience this change*) to 5 (*I experienced this change to a very great degree*), with higher scores indicating greater levels of growth. The PTGI-SF has been shown to have acceptable construct validity and internal consistency reliability (Cann et al., 2010).

Changes in Psychological Well-Being. The Psychological Well-Being Post-Trauma Changes Questionnaire (PWB-PTCQ; Regel & Joseph, 2010) is a self-report measure designed to assess perceived changes in psychological well-being following traumatic events. It contains 18 items, with 3 items tapping each of the dimensions of self-acceptance, autonomy, purpose in life, relationships, sense of mastery, and personal growth. Each item is rated on a 5 point Likert scale of 1 (*Much less so now*) to 5 (*Much more so now*), with

possible scores ranging from 18 to 90 and higher scores indicating greater increases in psychological well-being. A score of 54 or over represents at least a minimal level of growth, with scores below 54 indicating decreased psychological well-being. Internal consistency reliability has been shown to be satisfactory (Cronbach's alpha ranged from .87 to .95 for the PWB-PTCQ total and from .60 to .88 for the subscales) and scores showed a moderate level of consistency over 6 months (Joseph et al., in press).

Response to Participation. At the conclusion of the study participants responded to 6 questions, adapted from Pennebaker, Colder and Sharp (1990), concerning their response to participation in the study and their perception of whether they had found it a valuable experience. Respondents rated each item on a 6-point Likert scale of 0 (*not at all*) to 5 (*a great deal*). The specific questions are presented in Table 7.6.

Essay Evaluation Measure. Immediately following each writing session participants completed three items from a frequently used essay evaluation measure (Greenberg & Stone, 1992) to assess their subjective evaluation of the extent to which they thought their essay was personal, meaningful and revealing of their emotions. Respondents rated each on a 7-point Likert scale of 0 (*not at all*) to 6 (*a great deal*). This served as a manipulation check to test whether participants adhered to their specific writing instructions.

Linguistic Inquiry and Word Count (LIWC). The Linguistic Inquiry and Word Count program (LIWC 2007; Pennebaker, Booth & Francis, 2007) is a text analysis program that searches text files and examines the occurrence of various types of words that fall into specific categories, as well as calculating statistics such as the total number of words or number of words per sentence. Because the focus of the current study was on potential

cognitive processing mechanisms, the specific LIWC categories analysed were causation words (e.g. *because, why, reason*) and insight words (e.g. *understand, realise, knew*). In addition, negative emotion words (e.g. *sad, hate, hurt*) and positive emotion words (e.g. *happy, good, love*) were used as a manipulation check to determine whether writing instructions affected essay content. Pennebaker and King (1999) provided evidence for the reliability and validity of written language analysed by LIWC. Each essay was subjected to a computerised spell check before being analysed by LIWC; any spelling errors were corrected.

7.4.5 Uptake and Attrition

Of the 254 participants that took part in the initial study (presented in Chapter 5), 127 indicated that they would be willing to take part in further research and provided their email address. Email invitations to the writing study were sent to all 127 addresses, but 4 were undelivered due to incorrect addresses or expired accounts. Individuals that provided a valid email address ($n = 123$) did not significantly differ from those that did not ($n = 131$) on any study variables apart from PTGI-SF total: participants that provided an email address scored significantly lower on the PTGI-SF ($M = 18.75$, $SD = 11.11$) than participants that did not provide an email address ($M = 22.73$, $SD = 12.86$), $t = 2.63$, $df = 252$, $p = .009$. In addition, chi-squared analyses revealed a significant relationship between the nature of the traumatic event experienced and whether participants provided an email address ($\chi^2 = 4.65$, $df = 1$, $p = .031$), with examination of the observed and expected frequencies indicating that participants who provided an email address were more likely to have experienced a sexual trauma.

Of the 123 participants receiving the email, 53 participants (43%) visited the writing study website and logged in using their usernames (18 control, 35 expressive). T-tests and Chi-square tests revealed that individuals who logged on to the study website ($n = 53$) were

not significantly different from those who received the email but did not return to the study website ($n = 70$) on any demographic, event-related or study variables (all p 's $> .12$). Of the 53 participants that returned to the writing study website, 14 did not complete the first writing exercise (1 control, 13 expressive), 5 did not return to complete the second writing exercise (2 control, 3 expressive), 1 control participant did not return to complete the 2 week follow-up questionnaire, and 9 did not return to complete the 8 week follow-up questionnaire (4 control, 5 expressive). Overall, 24 participants completed all stages of the study; 10 control and 14 expressive writing participants. Completers and non-completers did not significantly differ on any demographic characteristics (all $ps > .16$), but independent samples t -tests revealed that participants who completed all stages of the study reported significantly greater intrusive thoughts ($t = -2.70, p = .009$), intrusive processing ($t = -2.35, p = .02$) and ruminative processing ($t = -2.23, p = .03$) at baseline than non-completers. Attrition did not significantly differ by writing group ($\chi^2 = .097, df = 1, p = .756$). Figure 7.1 displays the flow of participants through the study.

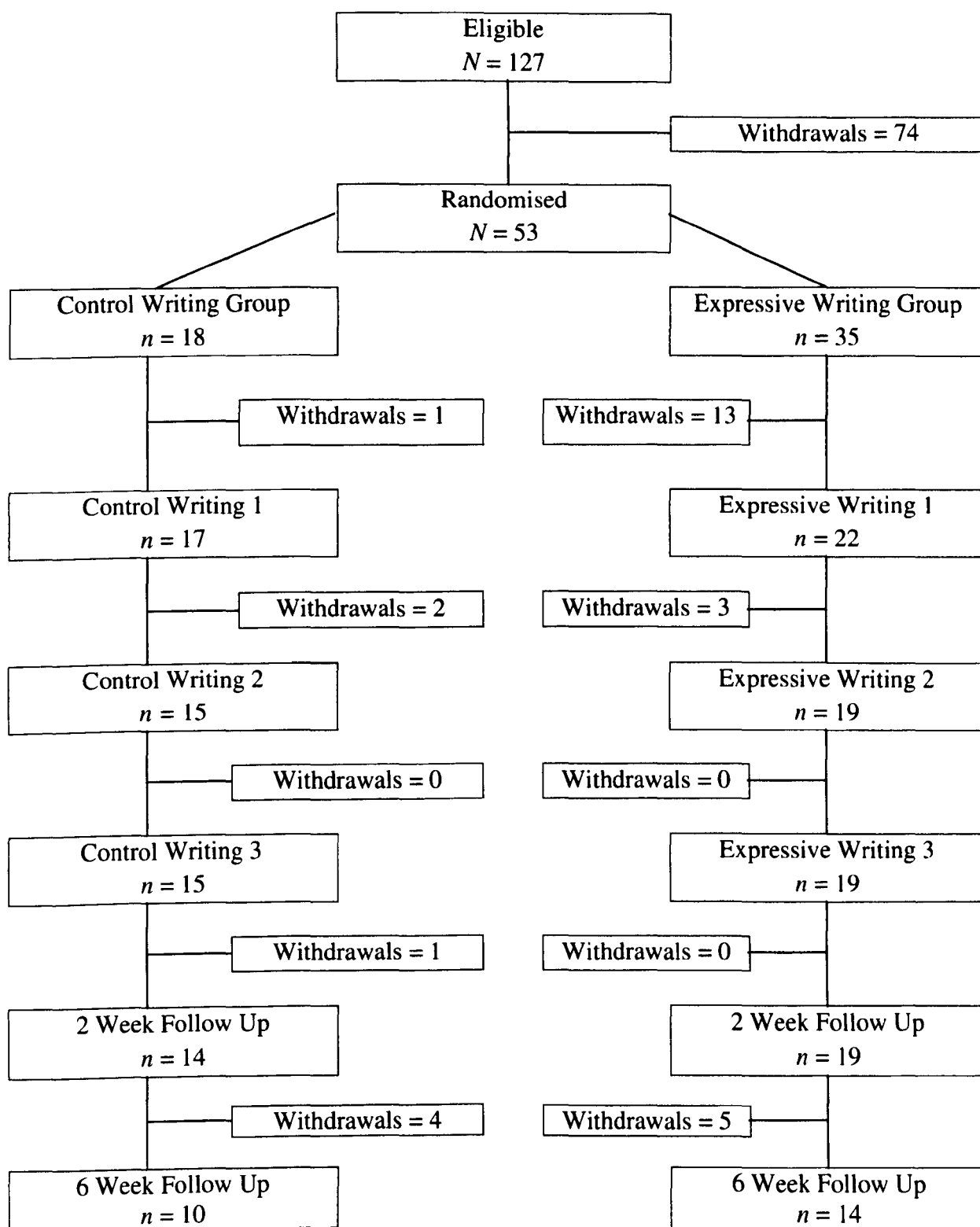


Figure 7.1 Flow of participants and withdrawals through the study

7.4.6 Participants

Complete data was available for 24 participants: 1 male and 23 females, ages ranging from 19 to 63 years ($M = 33.18$, $SD = 12.31$).¹⁵ Participants in this sample were predominantly white ($n = 23$; 95.8%), single ($n = 11$; 45.8%) or married ($n = 5$; 20.8%) and educated to at least degree level ($n = 16$; 66.7%). Events had occurred within 2 months to 31 years previously ($M = 8.82$ years, $SD = 9.81$) and were rated as extremely distressing by 81.8% of participants on the 0-4 scale ($M = 3.73$, $SD = .63$). At the 8 week follow-up, seven participants (29.2%) reported having experienced a subsequent trauma following completion of the writing exercises. The mean distress rating for these additional events was 3.54 ($SD = .51$) on the 0 to 4 scale.

7.5 Results

7.5.1 Description of Events

Participants in the disclosure group wrote about a range of traumatic events, including childhood sexual abuse ($n = 4$), rape ($n = 3$), sudden or traumatic death of a friend or family member ($n = 2$), and diagnosis of a serious illness or injury ($n = 3$). Eleven participants wrote about the same topic for all three writing sessions, whilst 3 participants wrote about a different event for each writing session. Whether participants wrote about the same topic or switched topics was not significantly associated with any baseline or outcome variables (all p 's $> .231$).

¹⁵ The one male participant in this study was randomly allocated to the control writing group. All analyses were repeated with the male participant removed to explore the results in an all-female sample. However, removing this participant's data from the analyses did not alter the results therefore his data was retained in all analyses.

7.5.2 Descriptive Analyses

Descriptive statistics including means, standard deviations and observed ranges for each study variable at pre-writing assessment are presented in Table 7.1 for the total sample and by writing condition. Mean scores demonstrate that at baseline, participants were experiencing a relatively high level of intrusive thoughts, as measured by the IES-R Intrusion subscale. The levels of intrusive, ruminative and deliberate processing were also high in comparison to the mean scores reported by participants in Studies 2 and 3 of this thesis. On average, participants reported a small degree of posttraumatic growth, as assessed by the PTGI-SF. The mean item rating was 1.51 on the 0-5 scale which reflects an average rating between the response anchors of *'small'* and *'very small degree of change since the traumatic event'*. Mean scores for the PWB-PTCQ also represented a low level of growth following adversity in this population at the baseline assessment.

Table 7.1 Means, Standard Deviations and Ranges for Study Variables at Pre-Writing Assessment

	Total (<i>N</i> = 24)			Expressive (<i>N</i> = 14)			Control (<i>N</i> = 10)			<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range		
Intrusive Processing	20.86	7.12	0-30	22.36	5.97	12-30	18.25	8.55	0-26	-1.33	.199
Deliberate Processing	17.23	7.56	0-30	16.21	5.52	6-25	19.00	10.45	0-30	.825	.419
Ruminative Processing	19.27	8.08	2-28	20.21	7.01	7-28	17.63	9.99	2-27	-.715	.483
IES-R Intrusion	2.45	.99	0-4	2.63	.92	1.25-4	2.16	1.11	0-3.38	-1.08	.293
PTGI-SF	15.14	11.26	0-35	13.86	9.42	0-34	17.38	14.36	1-35	.696	.494
PWB-PTCQ	50.82	16.15	27-90	45.71	12.42	27-68	59.75	18.76	30-90	2.12	.047*

* $p < .05$.

7.5.3 Between-Group Differences at Baseline

In order to examine whether there were any pre-existing differences in the expressive writing and control group participants prior to the writing intervention, a series of statistical tests were conducted. In terms of demographic characteristics, independent samples t-tests showed that the groups did not differ in terms of age ($t = -1.65$, $df = 22$, $p = .113$), time since trauma ($t = .009$, $df = 22$, $p = .993$), age at trauma ($t = -1.05$, $df = 22$, $p = .303$), or subjective rating of the events stressfulness ($t = -.711$, $df = 22$, $p = .485$). Chi square tests demonstrated that the groups did not differ with respect to sex ($\chi^2 = 1.46$, $df = 1$, $p = .227$), marital status ($\chi^2 = .362$, $df = 3$, $p = .948$), or educational attainment ($\chi^2 = 1.143$, $df = 3$, $p = .767$). As such, the expressive writing and control groups can be considered comparable with respect to demographic characteristics.

Analysis of study variables revealed that the expressive writing and control groups did not significantly differ at baseline in terms of event-related processing subtypes or intrusive thoughts. Posttraumatic growth did not differ between expressive and control groups at baseline when assessed using the PTGI-SF, but an independent samples t-test demonstrated that control group participants scored significantly higher than expressive writing participants on the PWB-PTCQ. These results are also presented in Table 7.1.

7.5.4 Manipulation Checks

A series of manipulation checks were conducted to ensure that participants adhered to the specific writing instructions. The results of these analyses are presented in Table 7.2 and demonstrate that the experimental manipulation was largely successful. First, results for the Essay Evaluation Measure (Greenberg & Stone, 1992) showed that across the three writing sessions, participants in the expressive writing group rated their essays as more personal,

more meaningful, and more revealing of their emotions than control group participants.

Secondly, results from the LIWC text analyses demonstrated that individuals in the expressive writing group used significantly more negative, but not positive, emotion words in their essays than control group participants. Similarly, expressive writing participants used significantly more insight, but not causation, words than control participants, although by the third writing session the difference in use of causation words became significant, with expressive writing participants using significantly more words signifying causation than control group participants. There were no significant differences in the total number of words used per writing session across the two writing groups.

Table 7.2 Manipulation Checks for Essay Evaluation Measure Scores and LIWC Word Categories by Writing Group

Writing feature	Writing Session 1			Writing Session 2			Writing Session 3		
	Expressive	Control	<i>t</i>	Expressive	Control	<i>t</i>	Expressive	Control	<i>t</i>
	<i>M (SD)</i>	<i>M (SD)</i>		<i>M (SD)</i>	<i>M (SD)</i>		<i>M (SD)</i>	<i>M (SD)</i>	
EEM Personal	5.36 (1.08)	2.70 (2.00)	-4.20***	5.36 (1.01)	3.30 (2.16)	-3.13**	5.14 (1.51)	2.60 (1.90)	-3.66**
EEM Meaningful	3.93 (2.09)	1.90 (1.73)	-2.51*	4.00 (2.04)	2.40 (1.84)	-1.97*	4.21 (2.16)	1.70 (2.06)	-2.87**
EEM Emotional	3.50 (1.95)	1.60 (1.58)	-2.54*	4.21 (0.89)	1.90 (1.91)	-3.99***	4.36 (1.60)	1.70 (2.31)	-3.34**
LIWC Positive	2.21 (.91)	1.93 (1.28)	-.631	2.20 (1.16)	1.76 (.80)	-1.02	2.21 (1.31)	1.49 (1.20)	-1.38
LIWC Negative	4.03 (1.90)	1.25 (.94)	-4.71***	4.44 (1.43)	.78 (.72)	-8.26***	3.54 (1.28)	1.13 (.68)	-5.95***
LIWC Insight	3.14 (1.46)	1.42 (.60)	-3.94**	3.90 (1.52)	1.41 (1.63)	-3.84**	3.69 (1.61)	1.51 (1.52)	-3.35**
LIWC Causation	1.58 (.73)	1.07 (.68)	-1.73	1.43 (.80)	1.06 (.71)	-1.19	2.14 (1.17)	1.22 (.53)	-2.58*
Total Words	461 (170)	409 (42)	-1.10	472 (179)	428 (118)	-.67	474 (157)	414 (146)	-.66

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

7.5.5 Effects of Writing

In order to investigate the effect of the writing exercises on self-reported cognitive processing and posttraumatic growth, a series of 2x3 mixed ANOVAs were conducted with *writing condition* (control vs. expressive) as the between-participant variable and *assessment period* (baseline, 2 week post-writing and 8 week follow-up) as the within-participant variable, separately for the outcome variables of IES-R intrusion, event-related processing, PTGI-SF and PWB-PTCQ. The means and standard deviations of these outcome variables as a function of writing condition and assessment period are presented in Table 7.3.

7.5.5.1 IES-R Intrusion. Analysis of IES-R Intrusion scores showed that there was no significant main effect for writing condition ($F_{(1, 22)} = 1.925, p = .181$) but there was a significant main effect for assessment period ($F_{(2, 40)} = 5.903, p = .006$), with subsequent post hoc comparisons demonstrating that the reduction in intrusion from baseline to 8 week follow-up was significant ($p = .006$), but that the reduction from baseline to 2 week ($p = .151$) and 2 week to 8 week ($p = .819$), was not significant. There was also no significant interaction between writing condition and assessment period ($F_{(2, 40)} = 1.193, p = .314$).

7.5.5.2 Event-Related Processing. For intrusive processing, there was no significant main effect for writing condition ($F_{(1, 22)} = 1.974, p = .175$) but a significant main effect emerged for assessment period ($F_{(1, 40)} = 5.835, p = .006$). Post hoc comparisons showed that the reduction in intrusive processing was significant between the baseline and 8 week follow-up ($p = .017$) but not between the baseline and 2 week ($p = .669$) or 2 week and 8 week ($p = .083$) follow-up assessments, although the latter approached significance. The interaction between writing condition and assessment period was not significant ($F_{(2, 40)} = 1.409, p = .256$).

For deliberate processing, there was no significant main effect for writing condition ($F_{(1, 22)} = .693, p = .415$) but a significant main effect for assessment period ($F_{(2, 40)} = 3.589, p = .037$), with post hoc comparisons demonstrating that the reduction in deliberate processing was significant between both the baseline and 2 week ($p = .043$) and baseline and 8 week follow up assessments ($p = .038$), but not between the 2 week and 8 week assessments ($p = .543$). There was no significant interaction between writing condition and assessment period ($F_{(2, 40)} = .088, p = .916$).

For ruminative processing, there was no significant main effect for writing condition ($F_{(1, 22)} = .247, p = .624$). There was a significant main effect for assessment period ($F_{(2, 40)} = 4.708, p = .015$). Post hoc comparisons showed that ruminative processing reduced significantly between the baseline and 8 week follow up only ($p = .031$). The interaction between writing condition and assessment period was not significant ($F_{(2, 40)} = 1.254, p = .296$).

7.5.5.3 Posttraumatic Growth. Analysis of PTGI-SF scores showed no significant main effect for writing condition ($F_{(1, 22)} = .414, p = .527$). PTGI-SF also did not significantly differ between assessment periods ($F_{(2, 40)} = .045, p = .956$) and the interaction between writing condition and assessment period was not significant ($F_{(2, 40)} = .048, p = .953$). Using the PWB-PTCQ, mean scores indicated an increase in posttraumatic growth for the expressive writing group, but analyses showed that the main effect for writing condition did not reach conventional levels of significance ($F_{(1, 22)} = 3.553, p = .075$). There was no significant main effect for assessment period ($F_{(2, 40)} = .669, p = .518$) and no significant writing condition by assessment period interaction ($F_{(2, 40)} = 1.922, p = .160$).

Table 7.3 Means and Standard Deviations for Processing and Growth Outcomes as a Function of Writing Group and Assessment Period

		Control Group (<i>N</i> = 10)			Expressive Group (<i>N</i> = 14)			Overall Sample (<i>N</i> = 24)		
		Baseline	2 Week	8 Week	Baseline	2 Week	8 Week	Baseline	2 Week	8 Week
IES-R Intrusion	<i>M</i>	1.80	1.24	1.54	2.52	2.38	1.85	2.29	1.90	1.74
	<i>SD</i>	1.24	1.01	1.03	.92	1.12	1.16	1.12	1.20	1.10
Intrusive Processing	<i>M</i>	18.25	15.00	14.38	22.36	22.07	16.86	20.86	19.50	15.95
	<i>SD</i>	8.55	10.13	9.64	5.97	6.49	9.21	7.11	8.51	9.21
Deliberate Processing	<i>M</i>	19.00	16.25	16.00	16.21	13.57	12.29	17.23	14.55	13.64
	<i>SD</i>	10.45	13.31	12.14	5.52	6.57	8.26	7.56	9.35	9.73
Ruminative Processing	<i>M</i>	17.63	15.50	15.38	20.21	18.86	15.14	19.27	17.64	15.23
	<i>SD</i>	9.98	11.56	10.99	7.00	7.54	9.40	8.08	9.24	9.74
PTGI-SF	<i>M</i>	17.38	17.38	17.50	13.86	14.71	14.21	15.14	15.68	15.41
	<i>SD</i>	14.36	12.83	14.72	9.42	10.87	10.30	11.26	11.39	11.85
PWB-PTCQ	<i>M</i>	59.75	58.75	58.00	45.71	46.50	51.21	50.82	50.95	53.68
	<i>SD</i>	18.77	19.55	17.21	12.42	13.01	10.46	16.15	16.39	13.22

7.5.5.4 Summary. Overall, the preceding results indicate that there was a significant decline in the frequency of intrusive cognitions and the extent of event-related processing across the course of the study period. However, these improvements were independent of writing condition, with participants in both the control and expressive writing groups demonstrating overall reductions in the degree to which they experienced intrusive and ruminative trauma-related cognitions. This improvement in intrusive and ruminative processing did not extend to significant increases in the extent of posttraumatic growth reported, although there was a trend for PWB-PTCQ scores to increase in the expressive writing group. One unexpected finding was that there was a significant decline in the extent of deliberate processing over the study period for both control and expressive writing participants, which is in contrast to the predicted increase in deliberate processing from baseline to follow-up.

7.5.6 Analysing Change Scores

Given that at baseline the control group participants scored significantly higher than expressive writing participants on the PWB-PTCQ, change scores were calculated (T3-T1) to analyse the changes in PTGI-SF and PWB-PTCQ over time as a function of writing condition.¹⁶ Independent samples t-tests revealed that there was no significant difference in

¹⁶ Several analytic approaches are viable and were considered, but since writing groups differed at baseline with respect to PWB-PTCQ scores, analysis of change scores was regarded as the most appropriate method. Although there is disagreement about the use of change scores rather than covariance analysis, the strategy of calculating pre- to post-intervention change scores has been recommended as a way to reduce the influence of baseline differences between experimental conditions (Oakes & Feldman, 2001). In addition, analysing change scores provides a more direct test of the question of whether the control and experimental condition improved at the same rate, rather than the question tested by ANCOVA of “whether an individual belonging to one group is expected to change more (or less) than an individual belonging to the other group, *given that they have the same baseline response*” (Fitzmaurice, Laird, & Ware, 2004, p. 124, emphasis in original). As such, change scores indicate how much each group improved, deteriorated or stayed constant, and by how much, thus providing an

PTGI-SF change scores between the control and disclosure writing groups ($t = -.065, p = .949$), with both groups experiencing minimal change on this measure over the course of the study. However, PWB-PTCQ change scores significantly differed between control and expressive writing groups, $t = -2.490, df = 22, p = .022$, with control participants reporting a slight decrease in PWB-PTCQ over the course of the study period ($M = -1.75, SD = 6.27$) and expressive writing participants reporting an increase in PWB-PTCQ from baseline to 8 week follow-up ($M = 5.50, SD = 6.72$).¹⁷

Change scores as a percentage of baseline scores were also calculated to provide an alternative means of analysis. Thus, PWB-PTCQ change scores from baseline to 8 week follow-up were divided by the baseline PWB-PTCQ score and multiplied by 100 to provide a percentage change in PWB-PTCQ from baseline to 8 week follow-up. In the control group, participants experienced a mean decrease in PWB-PTCQ of -1.15% ($SD = 13.64$). In contrast, the disclosure group participants experienced a mean increase of 14.76% ($SD = 16.47$). These change scores were significantly different ($t = -2.286, df = 22, p = .032$). In addition, 7 (50%) participants in the disclosure group experienced an improvement of at least 20%, compared to only 1 (10%) participant in the control group.

“unbiased estimate of true change” (Rogosa, 1988, p. 180). Other work in this area has also relied on change score analysis (e.g. Lutgendorf & Antoni, 1999; Smyth et al., 1999; Smyth et al, 2008).

¹⁷ Since the mean scores indicated a small decrease in PWB-PTCQ for the control group and an increase in PWB-PTCQ for the disclosure group, Paired t tests were conducted and demonstrated that the increase in PWB-PTCQ from baseline to 8 week follow-up was significant for the disclosure group, while the decrease in PWB-PTCQ from baseline to 8 week follow-up was not significant for the control group. Thus, the source of the significant difference in PWB-PTCQ change scores is due to an improvement in the disclosure group, rather than a reduction in the control group.

7.5.7 Correlational Analyses

In order to test the hypotheses concerning the role of cognitive processing, Spearman's correlations were calculated between scores on the baseline cognitive processing measures, cognitive processing change scores, LIWC categories, and posttraumatic growth change scores for the expressive writing group only. The results are displayed in Table 7.4 and demonstrate that baseline intrusive processing was positively associated with PTGI-SF and PWB-PTCQ change scores, such that higher intrusive processing at baseline was associated with greater increases in posttraumatic growth from baseline to 8 week follow-up. Baseline ruminative processing was also positively associated with increases in posttraumatic growth when assessed using the PTGI-SF, but not the PWB-PTCQ. However, the hypothesised negative associations between intrusive and ruminative processing change scores and posttraumatic growth change scores were not observed. Likewise, baseline deliberate processing was not significantly associated with changes in posttraumatic growth as predicted. Nevertheless, the results demonstrated that deliberate processing change scores were positively associated with PTGI-SF change scores, such that an increase in deliberate processing from baseline to 8 week follow-up was associated with an increase in posttraumatic growth from baseline to 8 week follow-up.

With respect to the LIWC cognitive mechanism word categories, results showed that the mean use of insight words across the three writing sessions was positively associated with PWB-PTCQ change score, demonstrating that participants using a greater proportion of insight words in their disclosure essays experienced a greater increase in psychological well-being from baseline to 8 week follow-up. An increase in insight words from the first to the third writing session was also marginally associated with an increase in PTGI-SF, although this was only significant at the $p < .10$ level. Unexpectedly, the results demonstrated that

change in causal word use was negatively associated with posttraumatic growth change scores, with participants demonstrating an increase in causal words from the first to the third writing session showing a decline in posttraumatic growth from baseline to 8 week follow-up, whilst participants who used less causal words at the third writing session relative to the first reported greater improvements in posttraumatic growth. This finding was significant for both the PTGI-SF and the PWB-PTCQ, although for the latter it was only significant at the $p < .10$ level.

Table 7.4 Correlations between Cognitive Processing Variables, LIWC Categories and PTGI-SF and PWB-PTCQ Change Scores

Cognitive Processing Variables	Δ PTGI-SF	Δ PWB-PTCQ
Baseline Intrusive Processing	.59*	.64*
Baseline Deliberate Processing	.15	.08
Baseline Ruminative Processing	.54*	.27
Δ Intrusive Processing	.22	.07
Δ Deliberate Processing	.58*	.35
Δ Ruminative Processing	.18	.05
Mean insight	.40	.54*
Insight change	.47 [†]	.27
Mean causal	-.34	-.36
Causal change	-.59*	-.47 [†]

Δ = Change score (T3-T1); [†] $p < .10$; * $p < .05$.

7.5.8 Response to Participation

Reactions to the writing exercises and the overall process of participating in the study were examined to assess how participants responded to the intervention, as well as possible group differences in reactions to the study as a whole. The 6 items and their mean scores by writing group are presented in Table 7.5. Independent samples *t*-tests revealed that the disclosure and control writing groups did not significantly differ in their responses to any of the 6 items (all *p*'s > .25). Inspection of mean scores indicate that, on average, participants in both conditions indicated that the study had had a small long-lasting positive effect on them and no long lasting negative effect on them. Participants also reported that although completing the writing exercises had only made them marginally happier, they had also only made them marginally more sad. Participants in both writing groups did not rate the intervention as having been particularly meaningful to them, but most did indicate that they would generally be willing to participate again.

Table 7.5 Response to Participation by Writing Group

Item	Control		Expressive		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
This study has had a positive long-lasting effect on me	1.38	1.41	1.29	1.27	.15	.88
This study has had a negative long-lasting effect on me	.00	.00	.36	.84	-1.19	.25
Since writing my essays, I have felt happy	1.75	1.75	1.36	1.15	.64	.53
Since writing my essays, I have felt sad or depressed	1.25	1.67	1.14	1.23	.17	.86
Personally, this study has been very meaningful to me	1.75	1.28	2.00	1.52	-.39	.70
I would participate in this study again	4.25	1.17	3.86	1.83	.54	.59

7.6 Discussion

This study is the first to use an internet-based design to explore the impact of expressive writing on posttraumatic growth in survivors of a range of traumatic life events. While initial analyses failed to detect a main effect of writing condition on posttraumatic growth, subsequent analysis of change scores demonstrated that expressive writing participants reported significantly greater improvements in psychological well-being than control participants. The results suggest that writing about one's thoughts and feelings surrounding a traumatic experience can contribute to statistically significant increases in the extent of growth reported from baseline to 8 week follow-up, relative to writing about neutral topics. As such, these findings support previous work by Gebler and Maercker (2007), Guastella and Dadds (2008), Smyth et al. (2008) and Ullrich and Lutgendorf (2002) in highlighting that expressive writing can facilitate increased growth following adversity.

Given that expressive writing is assumed to facilitate trauma-related cognitive processing (Pennebaker, 1993), these findings appear to provide support for the suggestion that increasing cognitive processing will increase posttraumatic growth, reiterating the theoretical emphasis on cognitive processing as a primary precursor to growth following adversity (e.g. Calhoun, Cann & Tedeschi, 2010). However, it was important to test these theoretical assumptions empirically. As such, this study also sought to examine the role of cognitive processing in expressive writing and subsequent growth outcomes. Specifically, the goal was to provide an alternative means of assessing changes in cognitive processing activity over the course of the writing intervention than that provided by existing methods such as the LIWC.

As hypothesised, the results demonstrated significant reductions in intrusive and ruminative processing from baseline to 8 week follow-up. However, these reductions were observed for study participants irrespective of writing group, with control writing participants also experiencing a decline in intrusive and ruminative processing. Unexpectedly, deliberate processing was also found to significantly decrease from baseline to 8 week follow-up for both expressive and control group participants. Together, these results demonstrate that levels of event-related cognitive processing significantly decreased whether participants wrote about the traumatic event or trivial topics. This suggests that taking part in this study resulted in an overall reduced need to work through the meaning of the event and its impact, regardless of writing condition.

It is possible that the improvements in processing observed in the control group may stem from non-specific study processes, such as repeated assessments focusing on their experience and the attention they received during the intervention. Having control participants focus on their daily activities and plans for the forthcoming week might also have unexpectedly improved their psychological functioning in a way that produced comparable effects to expressive writing. However, the lack of a non-writing control group means that it is not possible to determine the impact of the control writing exercises. Similarly, it is not possible to ascertain whether the reduction in cognitive processing reflects a general improvement over time or one that is tied to participation in the intervention. Findings from the longitudinal study presented in Chapter 6 of this thesis might serve as a rudimentary approximation of a non-writing control group, with results from that study also demonstrating an overall decline in all three subtypes of cognitive processing over the study period. These results suggest that the need for cognitive processing over time shows a natural decline, although it is important to bear in mind that the study presented in Chapter 6 was based on a

6 month, rather than 8 week, follow-up and so is not strictly comparable. Nevertheless, it might be that participation in a psychological intervention accelerated the process of declining trauma-focused cognitive activity over time, although further research is required to test this suggestion. Additional factors that were not assessed in the current study might also have contributed to the observed improvements in cognitive processing amongst both control and disclosure writing groups, including whether participants were taking psychotropic medication or receiving psychotherapeutic input during the study period.

The hypotheses concerning associations between cognitive processing subtypes and changes in posttraumatic growth amongst the disclosure group received mixed support. Reductions in intrusive and ruminative processing were not associated with increased posttraumatic growth as was predicted. Nevertheless, the results did demonstrate that baseline levels of intrusive and ruminative processing were positively associated with improved growth from pre- to post-writing for disclosure writing participants. This finding indicates that the more an individual was grappling with attempts to find meaning in the event prior to writing, reflected in high levels of intrusive and ruminative cognitive activity, the more likely they were to gain from the writing experience. Likewise, participants that entered the study with a low level of intrusive and ruminative processing, likely reflective of less need for meaning, or potentially an unwillingness to engage with trauma-related memories, were less likely to experience improved growth over the study period.

Results from this study also showed that baseline deliberate processing was not significantly associated with changes in posttraumatic growth. Nevertheless, the results demonstrated that increased deliberate processing was positively associated with increased posttraumatic growth over the course of the study. Thus, writing may assist the development

of more deliberate processing by providing an opportunity to actively analyse and contemplate the events' impact on one's life, which in turn supports growth. As such, the results of this study build on the findings of previous studies in this thesis that have also emphasised the key role of deliberate processing in the development of growth following adversity.

Cognitive processing was also assessed using the LIWC cognitive mechanism word categories. Results from these analyses demonstrated that greater overall use of insight words was associated with greater increases in positive psychological change. Prior research has also shown a higher level of insight words to be predictive of improved health and well-being (e.g. Pennebaker et al., 1997). There was also a trend for increases in insight word use from the first to the third writing session to be associated with increased posttraumatic growth, replicating earlier findings from Ullrich & Lutgendorf (2002) and supporting the theoretical suggestion that increased insight word use reflects the construction of a coherent narrative.

However, one unexpected finding from the LIWC analyses was that an increased use of causal words from the first to the third writing session was associated with reductions in posttraumatic growth over the study period. These findings are in contrast to those from numerous prior studies that have found increases in causal words to be predictive of improved health (e.g. Pennebaker et al., 1997; Petrie et al., 1999) and increased posttraumatic growth (Ullrich & Lutgendorf, 2002). However, not all studies have found positive associations between increased causal word use and subsequent health (e.g. Pennebaker, Mayne & Francis, 1997), and Batten et al. (2003) reported that increases in causation words were associated with increased physical symptoms and psychological distress in a sample of childhood sexual abuse survivors. Similarly, Owen, Giese-Davis, Cordova, Kronenwetter,

Golant and Spiegel (2006) found that among people who use emotional suppression as a way to regulate their emotions, increasing levels of cognitive word use were associated with greater levels of mood disturbance.

This latter finding may shed some light on the unexpected results found in the current study for causal words. Owen et al. (2006) suggest that cognitive processing in the context of restricted emotional expression may reflect attempts to intellectualise the experience in order to cope and is therefore insufficient for the resolution of distress. In line with this hypothesis, it is possible that participants in the current study displaying an increased use of causal words were using the writing sessions to intellectualise or rationalise, rather than adaptively process, their experience, and as a result experienced a decline in posttraumatic growth. Alternatively, it might be that the increased causality language reflects a tendency towards unhelpful causal attributions and resultant emotions of anger, guilt, or shame, which might impede cognitive processing (Joseph, 1999). However, these hypotheses could not be tested in the current context and remain speculative.

It seems timely at this point to highlight some of the limitations of the LIWC system for assessing cognitive processing. Thus, although this method provides an objective, efficient and systematic index of the extent to which participants use certain categories of words, it provides only a superficial level of analysis that does not take context into consideration when identifying target words; it simply counts their occurrence. This mechanical and unintelligent system makes it inadequate for assessing the subtle nuances of language, such that most of the meaning of the text is lost (Tausczik & Pennebaker, 2009). The ability of a word-count program to capture as complex a psychological process as trauma-focused cognitive processing is therefore questionable. This is evident in the findings

of the current study, where opposite effects were found for causal and insight word use in relation to posttraumatic growth, despite the assumption that they reflect essentially parallel cognitive processes and are often combined into one 'cognitive mechanism word' variable. The pattern of associations between cognitive processing subtypes and posttraumatic growth outcomes were somewhat more consistent when cognitive processing was assessed using the modified version of the Rumination Inventory (A. Cann, personal communication, November 13, 2008) and the ruminative processing items described in Studies 2 and 3 of this thesis. As such, they indicate that this assessment tool may represent an alternative method for capturing changes in cognitive processing activity besides the LIWC system. It may be that this approach provides a more direct assessment of trauma-focused cognitive activity than that inferred by the use of particular words, although empirical work is necessary to determine which method provides a more accurate way of capturing cognitive processing in expressive writing essays.

An additional aim of this study was to test the efficacy of an internet-based expressive writing intervention in a sample of survivors of traumatic life events. The success of the intervention in lowering intrusive re-experiencing and increasing posttraumatic growth provides one indicator of its efficacy, suggesting that the internet may indeed provide a valid platform for the delivery of a disclosure writing study (Sheese et al., 2004). A further test of the feasibility of the online delivery format was examined by exploring participants' responses to questions concerning their subjective experience of taking part in the study. Overall, participants in both writing groups appeared to have a generally positive attitude about the intervention and reported no long-lasting negative effects or low mood. The majority of participants also indicated that they would be willing to participate again.

Taken together, these responses suggest that the intervention was generally approved of and did not pose a significant risk to participants' well-being. However, more direct questioning concerning the internet-based delivery format would have been beneficial to gauge responses to this delivery technique in particular. In addition, no study to date has compared the relative effectiveness of internet-based delivery with traditional laboratory-based delivery. As such, it is premature to draw any conclusions about which delivery method is superior. Future research comparing the relative effectiveness of web-based and laboratory-based delivery is clearly warranted and would benefit from the inclusion of questions regarding participants' subjective experience of the study (e.g. ease of completion, understanding instructions, adherence to protocol etc.).

7.7 Limitations

Methodological limitations constrain the interpretation of findings from this study. Firstly, the study was based on a small sample, with only 24 participants completing all stages of the research. Whilst other studies in this area have also used small samples (e.g. Gebler & Maercker, 2007, $N = 17$; Smyth et al., 2008, $N = 25$), there was insufficient statistical power to detect smaller effects or conduct further analyses of moderating variables. Many of the interesting findings that approached significance may have proved to be significant with a larger sample size and more statistical power, highlighting the need for replication with a larger sample. The small sample size also precluded more rigorous participant screening. Thus, it would have been desirable to screen out those participants that displayed high levels of posttraumatic growth and low levels of intrusive and ruminative processing at baseline, since they might have already adjusted optimally and therefore were less likely to benefit from the intervention than those with unresolved traumas and lower growth.

The low uptake and high attrition rate is also of concern. It is possible the internet-based design was not appealing to potential participants and raised their concerns about the emotional risks of taking part, particularly given that disclosure participants were being asked to write about deeply traumatic experiences. The high rate of pre-treatment withdrawal may also have emanated from reluctance to engage in the writing exercises, since extended writing exercises may be unsuitable for many people. Thus, although a large proportion of participants expressed interest in further participation following the baseline assessment - potentially because they wanted to see how the study could help them – they withdrew when they discovered the intervention involved writing. A possible implication of this is that the final sample may have been more literate and articulate than those that did not agree to participate, as well as the wider population of trauma survivors.

It is also important to note that study participants were recruited from trauma-related websites, support forums and message boards. Although not all of these websites had the facility for participants to share their experiences - several provided information and advice only - it is possible that participants were already using these resources to write about their thoughts and feelings surrounding their experience with trauma. Supporting this suggestion, research has shown that people primarily use health-related message boards to provide and receive emotional support (e.g. Coulson, 2005; Finn, 1999; Gooden & Winefield, 2007; Ravert, Hancock & Ingersoll, 2004), although requests for information are also common (e.g. Lasker, Sogolow & Sharim, 2005; White & Dorman, 2000). As such, it is possible that many participants in this study were already sharing their emotions about their traumatic experience prior to taking part in this intervention. This suggestion is supported by findings from Alpers et al. (2005) who examined the content of messages on a breast cancer support forum using

the LIWC software and showed that the patterns of word use in the forum postings were similar to those seen in the disclosure essays of expressive writing participants.

In light of these findings, it is possible that the potential for prior written emotional disclosure via the message boards may have impacted the efficacy of the current writing intervention. However, the failure of this study to include any questions pertaining to participants' use of the forums precludes examination of this issue. One possibility is that prior emotional sharing on the support forums might have diluted the impact of the expressive writing intervention, since participants were already obtaining the benefits of disclosure prior to taking part in this study. Conversely, it might have enhanced the effect of the intervention because participants were accustomed to disclosing their thoughts and feelings through writing in an online context and were therefore more able to harness the benefits from expressive writing. It is also worth noting that many people responding to the request for participants may not actively post messages on the forums, but are 'lurkers'¹⁸ and simply read the messages without contributing. Again, because this study did not assess whether participants were active users or passive browsers of the websites they were recruited from, it was not possible to determine their level of prior disclosure. These issues present both interesting and important lines of further inquiry.

A further limitation of this study was the pre-existing differences between writing groups at baseline, with expressive writing group participants reporting significantly lower posttraumatic growth than controls pre-writing. The analysis of change scores attempted to overcome this limitation, but it does not eliminate the problem entirely. In particular, it is possible that the expressive writing group had more scope to improve with respect to

¹⁸ In internet culture, a 'lurker' is a person who reads the messages on a message board, chatroom, forum or other online interactive system but rarely or never participates actively in the discussions.

posttraumatic growth, since they scored lower on the PWB-PTCQ at baseline. Similarly, participants that completed all stages of the study reported significantly greater intrusive thoughts at baseline than non-completers. It is therefore not possible to rule out the possibility that those that took part in this study were more motivated to obtain improvements in psychological well-being than those that did not.

Despite these limitations, it is important to acknowledge the value of the findings from the current study, particularly given the numerous differences between this study and the more traditional expressive writing studies that are largely well controlled laboratory-based experiments that exclude many participants that have characteristics that make them less likely to benefit from the intervention. That a positive effect for expressive writing on posttraumatic growth was observed in this small study of a potentially diverse range of participants conducted in an environment that may be subject to numerous extraneous factors adds to the strength of the findings.

Chapter 8

General Discussion

8.1 Overview

This chapter will briefly review the main findings of each of the preceding chapters, before summarising what has been achieved through this research project as a whole. The contribution of this thesis to the relevant research literature will also be discussed and evaluated, with potential limitations, both theoretical and methodological, acknowledged. Directions for future research and clinical implications will also be comprehensively explored before concluding that: 1) deliberate processing is a strong and consistent predictor of posttraumatic growth; 2) current conceptualisations of cognitive processing would benefit from the inclusion of ruminative processing, which appears to play a role in stimulating more deliberate forms of cognitive processing; 3) it may be inaccurate to incorporate intrusive activity following traumatic events into models of cognitive processing; and 4) expressive writing can contribute to increases in psychological well being following traumatic life events.

8.2 Review of the Thesis

The findings of each of the studies have been discussed in detail in their respective chapters and as such the following sections will provide only a brief summary. Chapter 1 reviewed existing research examining growth following adversity, thus providing a solid foundation to the thesis. It considered the history and development of the positive psychology

movement and the application of this framework to the thesis. It also examined the main theoretical models of growth following adversity and identified elements of those models that remain disputed or unexplored. As such, it was determined that the role of cognitive processing in posttraumatic growth is not well understood, in part due to diversity in the conceptualisation and assessment of cognitive processing. As a result, Chapter 1 concluded by highlighting that the research of this thesis was designed to place an empirical spotlight on the cognitive processing elements of Calhoun, Cann and Tedeschi's (2010) model of posttraumatic growth.

Given the mixed findings and conceptual ambiguities surrounding posttraumatic cognitive processing, Chapter 2 sought to provide a comprehensive examination of the nature of cognitive processing and its relation to posttraumatic growth by reviewing the existing literature. Results from this narrative review demonstrated that there exists no one single measure that has consistently been adopted to capture event-related processing and as such, highlighted the need for improved assessment methods. The review also identified the three main subtypes of cognitive processing that formed the focus of this thesis, namely intrusive, deliberate and ruminative processing.

Chapter 3 outlined the main aims and research questions of this thesis; specifically, to identify and empirically distinguish subtypes of cognitive processing following traumatic life events and to explore the associations between these subtypes of processing and posttraumatic growth. Following on from this, Chapter 4 examined the role of intrusive thoughts, reflection and brooding in posttraumatic growth in a sample of sexual abuse or assault survivors. Whilst the results provided evidence to support the separation of cognitive processing into intrusive, deliberate and ruminative subtypes, the hypotheses concerning the

associations between these processing subtypes and growth were not supported. Thus, intrusive processing was negatively associated with posttraumatic growth whilst deliberate and ruminative processing were not significantly related to the level of growth reported. It was suggested that these unexpected findings were a consequence of using a symptom-focused measure to capture intrusive processing and trait-based measures of dispositional ruminative styles to capture deliberate and ruminative processing.

Recognising the need to assess more transient, trauma-specific forms of cognitive processing, Chapter 5 employed more appropriate measures to capture intrusive, deliberate and ruminative processing in a sample of mixed trauma survivors. Factor analysis provided further support for the proposition that posttraumatic cognitive processing consists of intrusive, deliberate and ruminative subtypes that are related but functionally distinct and differentially associated to posttraumatic growth. Results also demonstrated that deliberate processing plays a positive role in the occurrence of growth following adversity, particularly in the context of low intrusive processing.

As a further test of Calhoun, Cann and Tedeschi's (2010) model of posttraumatic growth, Chapter 6 examined the longitudinal course of event-related processing subtypes and growth following adversity in a sample of university students pre-screened for trauma history. Results from this study presented further evidence to support the importance of deliberate processing, which was shown to predict greater growth both cross-sectionally and longitudinally. The results failed to find support for the hypothesis that baseline intrusive processing would predict 6 month posttraumatic growth and, together with other findings from this thesis, indicate that the role of intrusive processing in posttraumatic growth may

have been overstated. In contrast, ruminative processing appears to play an important role in stimulating the deliberate processing that is necessary for the realisation of growth.

The final study of this thesis sought to use an expressive writing intervention to increase trauma-focused cognitive processing activity in order to explore whether such increases in processing contributed to parallel increases in posttraumatic growth. Findings from this writing study, reported in Chapter 7, showed that emotional writing about a prior trauma can contribute to a significant increase in posttraumatic growth. The results also reiterated the emphasis on deliberate processing as an important factor contributing to the development of posttraumatic growth, with increases in deliberate processing showing a positive association with increases in posttraumatic growth.

8.3 Posttraumatic Cognitive Processing

Existing models of posttraumatic cognitive processing have largely conceptualised it as “a process of frequently returning to thoughts of the trauma and related issues,” which can involve automatic, intrusive cognitions that invade conscious awareness, as well as more deliberate, thoughtful reflection about aspects of the event and its’ impact (Calhoun & Tedeschi, 1998, p. 227). As such, the cognitive processing literature has been dominated by a bi-dimensional conceptualisation of processing as either intrusive or deliberate. The work of this thesis first sought to test this conceptualisation by examining whether these two subtypes of processing can be distinguished and whether they are differentially associated with growth. A second goal was to explore whether there might be more to processing than intrusive and deliberate forms of cognitive activity by expanding the conceptualisation to include ruminative processing.

Together, the findings of the studies presented in this thesis suggest that intrusive, deliberate and ruminative processing appear to be largely distinct constructs, with results from factor analytic procedures indicating that items designed to assess intrusive, deliberate and ruminative trauma-focused thoughts load highly and uniquely on the expected components, thus capturing three distinct processing factors; 2) the three subscales were inter-correlated, but not so strongly that they should be considered synonymous; and 3) differential patterns of associations between processing subtypes and posttraumatic growth were observed in all four studies. As such, these results provide good preliminary evidence that intrusive, deliberate and ruminative subtypes of processing should be examined separately when seeking to understand the impact of cognitive processing following trauma.

Having established that intrusive, deliberate and ruminative processing are best understood as distinct forms of trauma-focused cognitive processing, it is also important to summarise the main findings with respect to their associations with posttraumatic growth. One of the most consistent findings to emerge from the studies presented in this thesis is that deliberate processing is a significant predictor of posttraumatic growth both cross-sectionally (Chapters 5 and 6) and longitudinally (Chapter 6). Likewise, increases in deliberate processing are associated with increases in posttraumatic growth over the course of an 8 week writing intervention (Chapter 7). Taken together, these results suggest that deliberate processing, when conceptualised as intentional trauma-related thoughts that are intended to help one understand, resolve and make sense of the trauma, is consistently linked to the development of growth following adversity. Results from Study 3 also indicate that the positive association between deliberate processing and posttraumatic growth is not the product of conceptual overlap between items designed to assess these two constructs, but that they appear to be distinct phenomena that reflect separate post-trauma processes.

With respect to ruminative processing, the findings from the studies presented in this thesis suggest that ruminative thoughts about the event and its consequences are common following trauma and adversity. The results also demonstrated that although ruminative processing was not directly associated with posttraumatic growth (Chapters 4, 5 and 6), it emerged as the strongest predictor of deliberate processing when examined cross-sectionally (Chapter 6). Similarly, baseline ruminative processing positively predicted deliberate processing at 6 month follow up (Chapter 6). As such, while ruminative processing does not appear to directly influence posttraumatic growth, it plays a role in its development by supporting the deliberate processing that is an important antecedent to growth following adversity. Thus, ruminative engagement with the incomprehensible aspects of the experience and repeatedly focusing on abstract issues surrounding the event such as the unchangeable or uncontrollable aspects of the experience, unanswerable questions ('why me?') or an inability to resolve one's distress could motivate the re-interpretation of traumatic material that constitutes deliberate processing and fosters growth. Preliminary support for this suggestion comes from work with bereaved parents and patients with spinal cord injuries by Davis and Lehman (1995), who suggested that counterfactual rumination, although distressing, is ultimately in the service of making sense of events.

Findings concerning intrusive processing were less positive. Thus, while theoretical predictions and numerous prior studies have suggested that intrusive processing is positively associated with posttraumatic growth, evidence from this thesis demonstrated that intrusive processing was either unrelated to posttraumatic growth (Chapter 6) or negatively associated with posttraumatic growth (Chapters 4 and 5). Similarly, participants reporting at least a minimal level of posttraumatic growth showed significantly less intrusive processing than participants reporting no growth (Chapter 4), and participants reporting an improvement in

psychological well-being since the event experienced significantly less intrusive processing than participants reporting a decline in psychological well-being (Chapter 5). Also contrary to predictions was that early intrusive processing was not associated with subsequent posttraumatic growth or deliberate processing at 6 month follow up (Chapter 6), and reductions in intrusive processing over time were not associated with an increase in posttraumatic growth (Chapter 7). Other findings indicated that deliberate processing might be best able to exert its positive effect in the context of low intrusive processing (Chapter 5). The only positive findings to emerge for intrusive processing were that it cross-sectionally predicted deliberate processing (Chapter 6) and that higher pre-writing intrusive processing was associated with greater increases in growth from baseline to 8 week follow-up in the expressive writing study (Chapter 7).

These findings make it difficult to draw any clear conclusions about the role of intrusive processing in posttraumatic growth, although it appears that the experience of intrusive trauma-focused cognitions is linked to lower levels of growth. Similarly, intrusive processing does not appear to influence deliberate processing or subsequent posttraumatic growth to the extent that has previously been suggested. These findings not only contradict prior research demonstrating positive associations between the experience of intrusions and posttraumatic growth, they also run counter to theoretical models that maintain that intrusive trauma-related activity is important in the development of posttraumatic growth.

Given these negative findings concerning intrusive processing, it is important to examine their implications with respect to the specific model of cognitive processing under investigation. Calhoun, Cann and Tedeschi's (2010) conceptualisation asserts that automatic intrusive recollections are a normal and necessary part of the posttraumatic adjustment

process and are indicative of the cognitive processing activity required for subsequent growth. Their notion that intrusions represent cognitive processing is not new; theorists such as Horowitz (1975; 1986), Janoff-Bulman (1992) and Creamer et al. (1992) have all previously argued that intrusive memories are a form of processing and are the mechanism through which trauma-related information is presented into conscious awareness for integration within the schematic world. Consequently, as is also evident from the literature review presented in Chapter 2, many researchers now operationalise cognitive processing using measures of intrusion (e.g. Park & Fenster, 2004; Senol-Durak & Ayvasik, 2010). As a result, there is a degree of consensus within this literature that intrusive trauma-related activity is a marker of cognitive processing and is important in facilitating subsequent adjustment and posttraumatic growth. However, in light of the findings of this thesis concerning the role of intrusive processing, it is important to consider alternative conceptualisations of intrusion that might better account for the negative associations found between intrusive thoughts and posttraumatic growth.

One such alternative interpretation is that intrusive recollections following traumatic experiences are not adaptive and cannot be considered to constitute cognitive processing because they do not represent cognitions but are simply trauma-based memory phenomena. Cognitions have been defined as higher mental processes that are involved in the acquisition of knowledge and processing of experience, perception and memory (Oxford Dictionary of Philosophy). Intrusive thoughts are most commonly defined as involuntary thoughts or images that are mainly fragmented recollections of the traumatic event and are predominantly sensory in nature (Ehlers et al., 2002), often to the extent that the individual loses the capacity to distinguish the memory from current perceptions such that the event is re-experienced as a flashback (Halligan, Michael, Clark & Ehlers, 2003). In line with the latter definition,

intrusive phenomena might be better understood as unprocessed trauma memories that possess different characteristics from trauma-related cognitions such as ruminations or deliberate thoughts. Thus, while ruminative or deliberate cognitive activity focused on the meaning or implications of the event represents the kind of cognitive work that promotes integration and resolution, intrusive activity is simply a signal that the trauma network has been activated and does not actually constitute processing.

As Hunt (2010) has highlighted, activation of the trauma memory network does not necessarily mean that processing is occurring, since the individual may simply replay the traumatic memory over and over again. This repetitive re-experiencing does not mean that the memory becomes less traumatic or better integrated into the individuals' schematic world, it is simply an indication that unprocessed aspects of the event have been brought into conscious awareness. It is only through more deliberate, conscious cognitive activity that trauma memories are integrated into the individuals' belief system in a way that makes the experience of growth possible. Intrusions may therefore function as potentially helpful signals that point to the specific difficulties that require resolution (Gardner & Ørner, 2009; Ørner, 2009), but are not directly involved in the resolution process in the same way that ruminations and deliberate processing are.

In light of the preceding discussion, there is a clear need to reconsider the conceptualisation of cognitive processing presented in this thesis, specifically with respect to the inclusion of intrusion as a subtype of processing. This presents a challenge to the prevailing view that intrusive thoughts following trauma represent cognitive processing. As such, it may be necessary to reconceptualise intrusive phenomena as a precursor to processing rather than processing itself. Thus, the extent to which an individual experiences

automatic and intrusive recollections of the event should be interpreted as a signal that processing is incomplete and resolution has not been attained, rather than a signal that the individual is cognitively processing the event. From this perspective, intrusion would not be expected to be associated with posttraumatic growth because the occurrence of intrusions is indicative of the individuals' failure to integrate trauma memories and find meaning. Nevertheless, intrusive phenomena do appear to play a role in alerting the individual to the assumptions that have been shattered and require rebuilding. Zakowski et al. (2001) have also argued that intrusive thoughts alone do not represent cognitive processing because they are simply re-presentations of the traumatic material that may be too brief or too anxiety provoking to constitute effective processing, but that they may be necessary for the initiation of subsequent cognitive processing that is more deliberate and under conscious control.

The implications for the model of cognitive processing examined in this thesis is that rather than comprising three subtypes, posttraumatic cognitive processing might be better understood as consisting of the two deliberate and ruminative subtypes that arise in response to intrusive phenomena. Thus, intrusive thoughts would not be considered to constitute cognitive processing per se, but present the 'raw' trauma memories into consciousness for processing and direct the subsequent search for meaning. As such, intrusion can still be seen to have a functional role following trauma; indeed, therapeutic interventions often encourage re-experiencing. However, suggesting that intrusions constitute cognitive processing may be inaccurate.

This revised model generates a considerable range of questions about the nature and function of intrusions, as well as the associations between intrusions and subsequent processing. Is it accurate to suggest that intrusions do not represent cognitions? Are intrusions

essential for stimulating subsequent processing, or can people engage in deliberate and ruminative processing without experiencing intrusion? Is deliberate processing the only route to posttraumatic growth? Do intrusions play a role in meaning-making, or are they simply a manifestation of the beliefs that have been shattered? Part of the difficulty in understanding the function of intrusions following trauma is that there is considerable confusion and uncertainty surrounding the conceptualisation of intrusion, in part because of the variation in intrusive phenomena. This is reflected in the fact that intrusive thoughts are considered a hallmark symptom of PTSD, but can also occur following positive experiences – most people are familiar with intrusive thoughts that invade consciousness following a first encounter with someone they find highly desirable (Cann et al., 2011). As such, there may be subtle differences between different types of intrusion that influence their adaptive significance and impact on growth processes.

Specifically, there may be a need to distinguish between intrusive re-experiencing (e.g. flashbacks, nightmares, hallucinations and repetition phenomena) and intrusive thinking. The former may represent primarily memory-based phenomena that are largely sensory and detailed re-presentations of the event, while the latter may constitute more abstract thought processes that still have an intrusive quality but do not possess the same level of detail and do not involve re-living but include more generic descriptions of the event and broader themes. Within the avoidance literature, distinctions have been made between active and passive forms of avoidance, with more active avoidance involving effortful and deliberate avoidance of thoughts, feelings, conversations or reminders of the event, and more passive avoidance involving a general numbing or blunting of emotions through detachment or estrangement from the external world (e.g. Asmundson, Stapleton & Taylor, 2004). There may be a similar need to explore possible subtypes of intrusion. Such distinctions may be better able to

account for the numerous discrepant findings concerning the impact of intrusions on posttraumatic growth. Finally, when investigating this distinction it might be important to recognise that intrusive memories may be primarily biologically based and therefore require neurophysiological and biochemical approaches.

To summarise, the findings of this thesis have failed to detect a significant positive association between intrusive trauma-related thoughts and posttraumatic growth, which has led to the suggestion that it may be inaccurate to incorporate intrusive activity following trauma into models of cognitive processing. As such, theoretical models of posttraumatic growth may benefit from reconceptualising intrusion as a precursor to processing that signifies activation of the trauma memory network, rather than as a subtype of cognitive processing. With respect to Calhoun, Cann and Tedeschi's (2010) model, such refinements would result in an emphasis on deliberate processing for the facilitation of posttraumatic growth; this would be commensurate with findings of this thesis regarding the importance of deliberate processing. Nevertheless, there is considerable work still to be done in terms of model refinement and in many ways this thesis has generated more questions about the nature and impact of cognitive processing than it has answers.

8.4 Cognitive Processing and Narrative Development

Another way of integrating the findings of this thesis is to look more broadly at cognitive processing as representative of narrative development. Narrative psychology is an approach within psychology that is interested in the way human beings deal with experience by constructing stories and listening to the stories of others (Neimeyer & Mahoney, 1995). It emphasises that we are essentially a meaning-making species that narrates our lives in order to make sense of ourselves and our experiences, with some suggesting that we are innately

predisposed to organise knowledge and experiences into storied form (Barsalou, 1988; Hermans, 2002). Thus, humans seek to impose structure on the flow of experience by constructing a life story (Sarbin, 1986). Traumatic life events are seen as a source of major disruption to the life narrative, which becomes shattered and fragmented in the wake of trauma (Tuval-Mashiach et al., 2004). As Neimeyer (2004) argues, the self-narrative is “profoundly shaken by ‘seismic’ life events, instigating the processes of revision, repair or replacement,” (p. 54). The trauma survivor must therefore reconstruct their narrative in a way that is able to incorporate the event and its meaning. As such, Neimeyer (2001) understands posttraumatic growth as a form of meaning reconstruction in the wake of crisis or loss.

The process of narrative revision and reconstruction following trauma involves both assembling a coherent account of the event itself and considering the significance of that trauma story for the larger life narrative (Neimeyer, 2006; Wigren, 1994). The rebuilt self-narrative can therefore be seen as the end product of a retrospective meaning-making process (Chase, 2005), with posttraumatic growth emerging when the individual is able to construct an ending for the story that provides coherence and resolution. As such, the event is understood within the larger context of the life story, rather than as a defining event that ruptures and fragments the life story. Similarly, Pals and McAdams (2004, p. 65) suggest that “posttraumatic growth may be best understood as a process of constructing a narrative understanding of how the self has been positively transformed by the traumatic event and then integrating this transformed sense of self into the identity-defining life story.”

This narrative perspective on posttraumatic growth suggests that part of the processing fundamental to growth is that of meaning-making through narrative construction. Polkinghorne (1988) emphasises that attempts to understand what happened and to find or

create meaning are largely cognitive processes that organise human experience. As such, the cognitive processing activity studied in this thesis could be understood as being in service of a broader process of narrative development. In particular, deliberate processing, characterised as it is by effortful attempts to contemplate the meaning and significance of the trauma for one's life and future, can be seen as a route to narrative coherence. This type of cognitive processing allows one to openly examine the impact of the traumatic event and one's feelings about it, as well as considering the way that the experience has impacted one's beliefs and understanding of the way the world operates. Such purposeful contemplation of these issues is likely to be very important in assisting the individual to rebuild their life narrative in a way that is able to meaningfully account for the traumatic experience. Likewise, expressive writing about a prior trauma is expected to facilitate the process of narrative construction by enabling the survivor to transform their pre-narrative trauma memories into a linguistic structure that has story-like features such as characters, a plot, and a beginning, middle and end (Neimeyer, 2004). Crossley (2000, p. 541) highlights that "one of the primary mechanisms for attaching meaning to experiences is through story-telling," and as such, the process of writing the story of one's encounter with trauma may fuel the sense-making that allows the person to understand the self as positively transformed by it. The positive impact of deliberate processing and expressive writing on the development of posttraumatic growth may therefore arise because both function to develop, nurture and maintain a constructive life narrative.

8.5 The Social Context of Cognitive Processing

A large body of evidence exists that attests to the important role of social support in psychological adjustment following trauma. For example, perceived social support has been shown to protect trauma survivors from depression, anxiety, stress, and trauma

symptomatology (Green & Pomeroy, 2007; Haden et al., 2007; Yap & Devilly, 2004). Social support also appears to be crucial for the occurrence of posttraumatic growth (e.g. Bozo et al., 2009; Cadell, Regher & Hemsworth, 2003; Frazier et al., 2004; Mohr et al., 1999; Park et al., 1996; Piquart et al., 2007; Weiss, 2004). As such, numerous theoretical models of growth following adversity have included attention to social support processes and emphasise the importance of the social environment in shaping the growth experience (e.g. Schaefer & Moos, 1998; Tedeschi & Calhoun, 2004). Calhoun, Cann and Tedeschi's (2010) model also specifies that social support plays a positive role in the development of posttraumatic growth, largely through its impact on cognitive processing. While the work of this thesis has concentrated solely on the cognitive processing elements of Calhoun, Cann and Tedeschi's (2010) model, it is now important to consider the social context in which that cognitive processing occurs, since the success of cognitive processing in leading to subsequent growth may well depend on a socially supportive environment. As such, cognitive processing may function as the mediating link between social support and posttraumatic growth.

Following traumatic events, social support may facilitate the cognitive processing of trauma-related thoughts and feelings in a number of important ways. Social support can provide the comfort that allows survivors to tolerate the distress necessary for cognitive processing to proceed and may enable survivors to contemplate aversive thoughts for longer than they would on their own (Lepore, Silver, Wortman & Wayment, 1996). Supportive others can also facilitate the disclosure of distressing intrusive recollections and trauma memories. Talking about the traumatic experience in this way can help people to confront, rather than avoid or suppress their intrusive thoughts, which is necessary for integration. Social support can also function to normalise intrusions; many trauma survivors negatively interpret intrusion phenomena as inappropriate, abnormal, or a signal that they are going mad

(Steil & Ehlers, 2000), but supportive loved ones may help to supplant these negative interpretations with more neutral or positive ones.

A positive social network can also support cognitive processing by minimising the more destructive rumination cycles that can become overwhelming; challenging negative or irrational ruminative thoughts; and distracting ruminators when they become cognitively 'stuck' by helping them to cope more actively and effectively (Janoff-Bulman, 1992; Pennebaker & O'Heeron, 1984). Socially supportive interactions can also promote deliberate cognitive processing by allowing the active contemplation and discussion of trauma-related issues and suggesting new and more positive perspectives on a traumatic experience (Clark, 1993). Social support cultivates an environment in which the traumatic event and its meaning can be explored, serving to re-establish a coherent world view, encourage acceptance of the situation, and ultimately make sense of the experience (Silver et al., 1983). The individuals' social network may also provide models of posttraumatic growth that can shape cognitive processing in important ways. This is reflected in the frequent use of bereavement counsellors that have themselves been bereaved.

As such, social support can be understood as the vehicle through which cognitive processing occurs. As Joseph (2012) explains,

"Talking through experiences with supportive others allows us to convert upsetting traumatic experiences into posttraumatic growth. Like hands shaping a piece of modelling clay, conversation transforms the meanings that we make about our experiences. Through conversation, we are able to allocate blame and praise more objectively, seek new perspectives, correct incorrect perceptions, and find new insights," (p. 123).

In the same way that supportive and empathic social networks can enable the cognitive processing necessary for posttraumatic growth, negative or unsupportive social networks can constrain the expression of thoughts and feelings and therefore impede cognitive processing of the event (Cordova et al., 2001; Lepore et al., 1996). Some trauma survivors find that their social network is not able to provide the support they need or expect, perhaps by discouraging attempts at disclosure (e.g. Ingram et al., 2001), responding in a way that is perceived as critical, inappropriate or insensitive (e.g. Wortman, Carnelley, Lehman, Davis, & Juola Exline, 1995), or distancing themselves altogether because they feel helpless and do not know what to say (e.g. Wortman & Lehman, 1985). Likewise, it is not uncommon for traumas to profoundly affect the social network that is so important for healing, where loved ones may be so deeply affected themselves that they cannot offer appropriate support to one another (Lepore et al., 1996). Such negative social interactions can force the individual to deliberately avoid talking or thinking about the trauma, which can interfere with cognitive processing. Similarly, individuals who are unable to confide in supportive loved ones may be more distressed by intrusive or ruminative thoughts, and have less opportunity to deliberately reflect on the ways the event has changed them.

It is possible that certain types of traumatic event lead to greater social constraints than others. Events such as the death of an infant can evoke such powerful and potentially overwhelming emotional responses in other people that they are unable to tolerate the distress associated with talking about it. Other events may be stigmatising (e.g. abortion, miscarriage, bereavement by suicide) and preclude open discussion. Similarly, social or political sanctions may prevent survivors of certain events from sharing their experience with others (e.g. veterans of controversial wars). Sexually traumatic experiences such as rape or incest are often associated with feelings of guilt and shame, which may increase social constraints on

disclosure. As such, the greater social constraints associated with these types of events may interfere with cognitive processing and reduce the likelihood of subsequent growth. Indeed, research has demonstrated that survivors of sexual abuse reported significantly less growth than victims of serious motor vehicle accidents or sudden bereavement (Shakespeare-Finch & Armstrong, 2010). Similarly, Study 2 of this thesis demonstrated that survivors of sexually traumatic experiences reported less growth and lower psychological well being than participants who experienced traumatic events that were not sexual in nature.

Social constraints can also arise through more distal social processes. Thus, not only do immediate social networks (e.g. friends, family) impact the social sharing of traumatic experiences, but broader social contexts can also influence social and cognitive processing of trauma. Such broader social contexts extend beyond the immediate social network to include significant persons (e.g. local authorities, clergy), groups (e.g. colleagues, neighbours, community members) and impersonal expression of opinions (e.g. the media) (Maercker & Müller, 2004). While the wider social environment does not usually provide the more functional aspects of social support (i.e. emotional or tangible support), it can play a significant role in the way survivors cognitively process their traumatic experiences. In particular, negative public opinion and low societal appreciation can impede processing and negatively affect adjustment following traumatic events. Solomon, Mikulincer and Flum (1989) showed that low societal appreciation of Israeli soldiers returning from the Lebanon war was related to more severe PTSD symptomatology, and Fontana and Rosenheck (1994) found that social rejection at the time of homecoming was a significant predictor of PTSD severity in Vietnam veterans.

These findings led to the introduction of the concept of social acknowledgement, proposed by Maercker and Müller (2004), which has been defined as the survivor's perception that individuals or society react positively, show appreciation for their traumatic experiences, and acknowledge the difficulty of their situation (Müller et al., 2008). Thus, in positive cases, social acknowledgement includes unconditional support to victims or survivors and expressions of sympathy for their plight, while in negative cases it involves ignorance, rejection, blaming the victim, invalidation and even outright aggression (Maercker & Müller, 2004). Such social disapproval and criticism can cause trauma survivors to feel unsupported and misunderstood, which can negatively impact post-trauma adjustment: empirical studies have found that a subjective lack of social acknowledgement is positively associated with PTSD symptoms in development aid workers (Jones, Müller & Maercker, 2006), crime victims (Müller, Moergeli & Maercker, 2008), former political prisoners (Maercker & Müller, 2004), and persons bereaved by assisted suicide (Wagner, Keller, Knaevelsrud & Maercker, 2011). Similarly, positive social acknowledgement was associated with adaptive coping, quality of life and perceived positive consequences in Croatian war veterans (Ljubotina et al., 2007) and significantly predicted posttraumatic growth in former child soldiers of WWII (Forstmeier, Kuwert, Spitzer, Freyberger & Maercker, 2009). As such, the degree of social acknowledgement offered to the trauma survivor may be crucial in encouraging trauma-related disclosures, fostering willingness to explore new perspectives or alternative interpretations, and assisting the meaning-making process (Forstmeier et al., 2009).

Beyond social acknowledgement, other aspects of the individual's broader social environment can impact cognitive processing activity. Involvement in religious organisations may provide the comfort required for painful memories to be endured, as well as providing

the frameworks for making sense of the traumatic experience (Meyerson et al., 2011). Thus, religious schemas can provide the scaffolding that supports deliberate contemplation and meaning construction (Overcash et al., 1996). Similarly, cultural traditions, values, and ways of thinking can influence trauma-related cognitions in important ways. For example, some cultures encourage emotional disclosure and the social sharing of distressing experiences while others are more inhibited and emphasise personal responsibility, such that cultural factors and community norms may determine what types of emotional expression are considered appropriate and what type of social support is provided in response to such disclosures. Likewise, some cultures may possess frameworks that involve responding to trauma in an introspective, contemplative manner, while others may turn to more active, problem-solving approaches. Certain cultures may also prioritise narrative processing and activities that involve putting the trauma into words (e.g. talking, writing, praying) more than others. As such, culture and ethnicity determine the frameworks within which cognitive processing occurs. Furthermore, our assumptive worlds are shaped by the socio-cultural context, whereby the meanings assigned and narratives constructed depend on the culture around us. An individual's contextual factors can therefore be seen to influence posttraumatic growth both directly and indirectly through cognitive processing.

Findings from Study 3a of this thesis also point to the importance of culture and ethnicity in the process of posttraumatic growth. Ethnicity emerged as a significant predictor of posttraumatic growth in this study, with Indian/Asian participants reporting significantly higher rates of growth than white participants. This finding replicates those of several prior studies that have also indicated non-Caucasian ethnicity positively predicts posttraumatic growth (e.g. Kaler et al., 2011; Kleim & Ehlers, 2009; Tomich and Helgeson, 2004). One possible explanation for this relationship is that social networks within certain ethnic groups

may foster more helpful cognitive processing such that growth is facilitated. The interpretation of intrusions may also be influenced by socio-cultural factors, with certain ethnic groups having a more pessimistic interpretation of intrusive phenomena than others. Similarly, different cultural theories about the meaning of traumatic events and suffering may influence posttraumatic reactions and cognitive processing in a way that either stifles or supports the growth process.

8.5.1 Summary

This section has considered how both proximate social networks and more distal social contexts can impact cognitive processing following traumatic events. Based on this discussion, it is apparent that the cognitive processing of trauma may be assisted by the disclosure of that internal process to others in socially supportive environments. Therefore, the extent to which an individual engages in cognitive processing activity and the nature of that processing may be determined by, and manifested in, their social context, such that cognitive and social processes are essentially indivisible. As such, studying cognitive processing in isolation from social processes is a limitation of both the wider cognitive processing literature and the work of this thesis. Indeed, only 9 of the 29 studies included in the Chapter 2 literature review assessed social support alongside cognitive processing (Cohen & Numa, 2011; Cryder et al., 2006; Finzi-Dottan et al., 2011; Kilmer & Gil-Rivas, 2010; Manne et al., 2004; Morris & Shakespeare-Finch, 2010; Proffitt et al., 2007; Sears et al., 2003; and Senol-Durak & Ayvasik, 2010), reiterating the literature's exclusive focus on cognitive processing.

This focus is perhaps understandable in light of the overwhelming emphasis on cognitive processing in theoretical models of posttraumatic growth, as well as the apparent

dominance of the cognitive approach to psychology as a whole. However, if we are to comprehensively understand the factors that fuel posttraumatic growth then we must study cognitive processing with respect to the social processes that so strongly influence it. In particular, having established in this thesis that deliberate processing is consistently associated with posttraumatic growth, it is important to empirically consider the social processes that give rise to deliberate processing – what types of social support contribute to the individuals' ability to engage in deliberate processing? Do certain types of social support impede deliberate processing? Do unmet needs for social support lead to greater intrusive and ruminative activity? Does the quality of social interactions determine the type of cognitive processing adopted? Finding answers to these questions is of paramount importance to the developing literature on the determinants of posttraumatic growth.

8.6 Re-Visiting the Construct of Posttraumatic Growth

The topic of posttraumatic growth has seen an explosion of interest in recent years and the literature is advancing rapidly. While growing empirical attention to this phenomenon is welcomed, it is important to continually re-visit and reflect on the concept of posttraumatic growth in order to ensure that research findings and theoretical conceptualisations are aligned. Thus, although the ancient notion of strength following adversity is not being disputed, there is a clear need to subject the relatively new construct of posttraumatic growth to rigorous empirical and conceptual scrutiny in order to more fully understand what, specifically, posttraumatic growth is. The findings of this thesis also raise important questions about the meaning and measurement of posttraumatic growth and draw attention to some of the unresolved issues in this literature. As such, the following discussion will highlight these conceptual ambiguities and attempt to further unpack the concept of posttraumatic growth as a psychological construct with respect to the findings of this thesis. Three main issues will be

addressed: 1) the validity of posttraumatic growth; 2) the measurement of posttraumatic growth; and 3) whether posttraumatic growth is adaptive.

8.6.1 The Validity of Posttraumatic Growth

One of the most controversial issues within the posttraumatic growth literature is the question of whether reports of growth following adversity are real or illusory. Some have argued that because the positive changes reported by survivors are subjective and difficult to validate, it is not possible to establish whether reports of growth reflect genuine life changes or motivated illusions that serve to relieve distress by allowing the survivor to perceive positive change (Sears et al., 2003). Those that understand posttraumatic growth as an illusory phenomenon suggest that it is a cognitive manipulation that enables the survivor to defend or maintain their self-esteem and view their situation more optimistically (Siegel & Schrimshaw, 2000; Sumalla, Ochoa & Blanco, 2009; Taylor & Armor, 1996). Thus, it may be a subconscious process that serves a self-protective mechanism by allowing the individual to perceive improvement. Frazier and Kaler (2006) have also suggested that reports of personal growth could reflect self-presentational concerns, whereby trauma survivors feel obliged to report how they have grown from the experience because they want to appear to be coping well. Reporting benefits may therefore reflect “adherence to a cultural script,” (Frazier & Kaler, 2006, p. 859) because of the widely held perception that people grow from suffering and the tendency, at least in Western cultures, to regard a bad experience retrospectively as a good one (McAdams, 2005). It is plausible that because some survivors feel that they *should* derive growth from their experience, they subsequently report those changes regardless of their sincerity.

These questions over the validity of self-reported posttraumatic growth highlight the need to consider the possibility that not all reports of growth are veridical and for some individuals it may serve a self-protecting or self-enhancing mechanism rather than a reflection of genuine positive change. This issue has been discussed in theoretical work by Maercker and Zoellner (2004), who suggest that posttraumatic growth may be ‘Janus-faced’; that is, comprising a positive, constructive and self-transcending side akin to the type of growth described by Tedeschi and Calhoun (1996), and an illusory, self-deceptive or dysfunctional component that serves a short-term palliative function. These two components are assumed to have different time courses and be differentially related to adjustment, with the realistic, self-transforming component believed to grow over time while the illusory component is assumed to decrease over time (Zoellner & Maercker, 2006).

This distinction has important implications for the work of this thesis. Firstly, this thesis has been based on the assumption that participants’ reports of posttraumatic growth are an accurate reflection of their personal transformation following trauma which involves “deep-seated changes in the person’s sense of self, their views on life, priorities, goals, and their approach to relationships,” (Joseph, 2012, p. 73). However, the preceding discussion has suggested that some reports of growth may be motivated illusions, which leads to the question of whether participants studied in this thesis were reporting genuine change or positive illusions. Without measures that suitably distinguish between these aspects of growth, it is not possible to know whether the changes reported were genuine or illusory.

However, results from the longitudinal study of this thesis (Study 3b) suggest that looking at patterns of growth over time may provide a way of understanding the extent to which the positive changes reported are genuine. In this study, participants whose level of

growth decreased over the 6 month assessment period reported a higher level of growth at the baseline assessment than participants whose growth score increased over time. This finding could be interpreted as reflecting the two distinct aspects of posttraumatic growth, whereby the participants that reported elevated growth at baseline may have been experiencing the illusory component of growth that then declined over time as the self-deceptive aspect abated, while the participants that reported a lower level of growth that improved over the study period may have been experiencing the more genuine, authentic component of growth. While examining the nature of growth in this way may provide an indicator of the authenticity of the positive changes reported, it is clear that a more sophisticated method for assessing growth that somehow taps into the distinction between illusory and genuine growth is required. However, it is important to mention that establishing the veridicality of posttraumatic growth may not only be impossible, but also not particularly important or desirable, since the objective or verifiable nature of posttraumatic growth is of less concern than is the participants' subjective sense that their lives have become more meaningful (Tennen & Affleck, 2002).

The second issue relating to the validity of posttraumatic growth is that the role of cognitive processing in genuine growth may differ from that involved in illusory growth, such that the relationship between processing and growth may depend on the type of growth captured. One might assume that the constructive side to growth develops through the deliberate cognitive restructuring of traumatic information and meaning making processes, while the presence of illusory growth might be considered indicative of a failure to effectively process or integrate the event and as such may be more related to avoidance, denial and palliation than deliberate processing activity. However, it might also be the case that by perceiving positive change and therefore achieving temporary relief, distress levels

may be sufficiently reduced to allow for deliberate processing to proceed. In turn, that deliberate processing may lead to a reduction in the illusory aspect of growth as meanings are constructed and the more genuine elements emerge. Undoubtedly, the associations between cognitive processing and these distinct aspects of the growth process are complex and subject to change over time. Nevertheless, it is important for future research to consider the longitudinal course of cognitive processing and posttraumatic growth, particularly with respect to the separation of growth into its genuine and illusory components.

8.6.2 The Measurement of Posttraumatic Growth

Not only have concerns been raised about the validity of the concept of posttraumatic growth, critics have also questioned our ability to measure posttraumatic growth in a way that is reliable, valid, comprehensive and meaningful. As Park and Lechner (2006) highlight, “measuring growth following stressful or traumatic life events is both one of the most challenging and most important tasks facing growth researchers,” (p. 47). The majority of studies in this field have used the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996); the studies included in this thesis followed that convention and also used the PTGI to assess growth. Although the reliability and validity of the PTGI has consistently been demonstrated, concerns still remain about the ability of this instrument to truly and accurately capture real life changes arising following trauma. These concerns relate to five main issues which will be discussed in turn below. It is important to note that these issues are not specific to the PTGI but apply to all psychometric instruments that attempt to quantify posttraumatic growth (e.g. CiOQ; SRGS).

Firstly, there is evidence to suggest that people struggle to accurately assess the extent to which they believe they have changed over time (e.g. Frazier & Kaler, 2006; Robins,

Noftle, Trzesniewski & Roberts, 2005), which may lead to inaccuracies in participants' self-reported growth. For example Herbst, McCrae, Costa, Feaganes and Siegler (2000) had participants complete a personality inventory on two occasions then asked participants to rate how much they felt their personality had changed over the previous 6 years. By comparing self-perceived changes with actual changes in personality scores, the researchers concluded that "self-perceptions of change are not, by and large, accurate reflections of real change," with participants usually overestimating the amount of change (Herbst et al., 2000, p. 386). Similarly, studies of relationship growth have demonstrated that although couples recall that their relationships have improved over time, prospective ratings reveal no increases and even show declines in relationship strength and quality (e.g., Karney & Coombs, 2000; Kirkpatrick & Hazan, 1994). Research has also suggested that people tend to derogate their past selves in order to feel that they have changed for the better (Robins et al., 2005; Wilson & Ross, 2001). McFarland and Alvaro (2000) asked participants to provide ratings of themselves before and after a traumatic experience and found that "reports of improvements were more strongly linked to perceiving the past worse than it really was than to actual changes that occurred from past to present," (Park & Helgeson, 2006, p. 793). As such, positive responses to the PTGI may be misperceptions rather than accurate indicators of change.

This issue is compounded by the fact that responding to measures such as the PTGI requires complex calculations, as delineated by Frazier et al. (2009, p. 913): "Essentially, participants must (a) evaluate their current standing on a dimension (e.g., closeness to other people), (b) recall their previous standing on the same dimension, (c) compare their current and previous standings, (d) assess the degree of change, and (e) determine how much of that change can be attributed to the traumatic event." The complexity of these calculations, particularly for trauma survivors who are experiencing considerable distress, invites error and

recall bias, which can lead to inaccurate perceptions of positive change. This inability to accurately recall how much one has changed over time explains why most other areas of psychology and health research rely on measures of actual change, as highlighted by Frazier et al. (2009, p. 913): “Clinical investigators would not attempt to substitute recollected change in depressive symptoms for measured change in depression, nor would they suggest a new standard for clinical trials in which recalled change following an intervention replaced standard preintervention, postintervention, and followup measures of symptoms.”

The second concern regarding the measurement of posttraumatic growth, as has already been discussed in section 8.6.1, is that self-protective processes may be at work when people are responding to measures of growth such that reports of growth are inflated due to impression management. People may deliberately exaggerate the extent to which they have grown in an effort to appear well adjusted and present themselves in a positive light to others. In the research context, asking questions about positive change following trauma might elicit demand characteristics where participants endorse growth items because they think it is what the researcher wants to hear. Similarly, because of a natural tendency to perceive positive change, participants may then feel compelled to attribute that change to their traumatic experience when in reality it may be linked to other life events that are independent of the trauma (e.g. a new relationship, a promotion at work). While there is evidence to suggest that posttraumatic growth is not linked to socially desirable responding (e.g. Salsman et al., 2009; Tedeschi & Calhoun, 1996; Wild & Paivio, 2004), it remains a concern.

Nevertheless, one important point to note is that most people who report growth also report significant distress, which challenges the supposition that reports of growth represent a distorted positive bias or deliberate denial of distress. Participants in Study 2 of this thesis

reported simultaneous increases and decreases in well-being on the PWB-PTCQ and participants in Study 3 reported positive and negative changes on the CiOQ, again suggesting that reports of positive change do not solely signify attempts to appear to be well adjusted. It may be that when both benefits and losses are acknowledged, posttraumatic growth is more likely to be authentic than when benefits are reported in the absence of losses. It has also been noted that individuals who are struggling to deal with a traumatic life event are unlikely to have the psychological resources for impression management (Calhoun & Tedeschi, 2004).

The third issue relating to the measurement of posttraumatic growth is that different findings are often observed depending on the measure of growth used (e.g. Linley, Joseph, Cooper, Harris & Meyer, 2003). This was also observed in Study 2, where intrusive and ruminative processing were negatively associated with PWB-PTCQ but not PTGI-SF scores, whilst deliberate processing was positively associated with PTGI-SF but not PWB-PTCQ scores. Similarly, although they were positively associated ($r = .58, p < .01$), the correlations between the different measures of posttraumatic growth were not as high as one would expect of two measures designed to capture the same process. It has previously been suggested that findings such as these demonstrate that existing measures each capture unique elements of the phenomenon of growth following adversity (Joseph & Linley, 2008a). However, such discrepant findings could also indicate that our existing operationalisations of growth are not comprehensive and we have not yet fully captured the process of growth in our measures. Thus, whether someone is considered growthful may depend on how we chose to assess that growth. A related issue is that there is evidence to suggest that one of the most prevalent positive changes arising following health-related traumatic experiences in particular (e.g. HIV, cancer) is the adoption of positive health behaviours and lifestyle changes such as dietary changes, increasing regular exercise, stopping smoking and reducing alcohol intake.

Current growth scales fail to tap into this dimension and as such we may not be comprehensively capturing the entire growth process.

A fourth measurement issue that was raised in this thesis relates to the efficacy of the PTGI for people responding to events that occurred during their childhood. In the first study of this thesis, approximately half of the participants were young children at the time of the event and as such were being asked to compare themselves now with how they were as young children. One must question whether they are able to distinguish the impact of traumatic events from normal maturation and development. Indeed, it was not uncommon for participants in this study to note in the feedback section that they found it difficult to respond to the growth items because they were so young when the event happened that it was not possible for them to recollect how they were before the event or whether they would have developed a certain outlook without having experienced trauma. This is an important issue that is rarely discussed in the wider literature on posttraumatic growth, but indicates that it might be inappropriate to use the PTGI in studies of people traumatised during childhood. One possible recommendation is to request in the instructions of the PTGI that people respond with respect to non-childhood events only.

Fifth and finally, there is the more fundamental question of what scores on measures of posttraumatic growth actually mean and whether it is appropriate – or even useful – to quantify positive change in this way. This is both a measurement issue and a conceptual issue. In this thesis, it has been stated that “44.7% of participants in this study reported posttraumatic growth,” (Study 1), “participants reported a small to moderate degree of posttraumatic growth,” (Study 2), and “results indicate a moderate level of growth in this

sample,” (Study 3), but what exactly do these statistics tell us? What do they mean to the individual? Were the participants in these studies *really* growthful?

Clearly, as with most research in psychology, using average scores masks variability on psychological constructs. This is also true of growth measures, where calculating average scores for each respondent can mean that a large degree of change on a small number of items results in a low growth score overall. Thus, an individual that has reported substantial improvements on a small number of items appears to have been less growthful than someone reporting very small improvements across numerous items. Likewise, existing measures are unable to tap into the significance of those changes to the individual. To illustrate, one participant might report that their relationships have improved ‘to a very great degree’ since the traumatic event, but report no other positive changes, thus scoring at total of 5 on the PTGI. This would be considered a very low level of posttraumatic growth. Yet the individual might experience that one change as so significant and meaningful that it has completely transformed their life. Likewise, another individual might report ‘a moderate degree’ of change on every PTGI item, thus achieving a total score of 63 and therefore indicating a relatively high level of posttraumatic growth. Yet these moderate changes may be considered insignificant and meaningless in relation to the losses and devastation experienced. As such, the meaning of scores on measures of growth may not provide a true reflection of the participants’ experience.

Similarly, using cut-off scores to indicate the presence or absence of growth is not only arbitrary, but implies that growth is an outcome to be achieved rather than a process that develops and changes over time. In essence, what this issue boils down to is that quantifying posttraumatic growth using psychometric scales results in scores that cannot capture the

meaning of those changes to the individual. Wortman (2004) has also highlighted that current conceptualisations of growth fail to take into consideration the impact of simultaneous negative changes: “If a person reports one positive change but is also experiencing significant depression and PTSD symptomology after several years, sees the world as a more dangerous place, is experiencing impaired quality of life, is having trouble at work, cannot keep up with the housework, feels alienated from her husband and is seeking a divorce, has a teenager who has become argumentative and depressed, and is unable to make any sense out of what has happened, is this growth?” (p. 83). Wortman (2004) goes on to state that “we need to think hard about when it is appropriate to conclude that positive changes are indeed indicative of growth,” (p. 83).

In light of these concerns about the assessment of posttraumatic growth, a number of suggestions have been made. One way to establish the validity of self-report data is to obtain significant others’ ratings of participants’ growth in order to corroborate their accounts (Cordova et al., 2001). In a study by Park et al. (1996), participants completed the Stress-Related Growth Scale (SRGS) in relation to the most stressful event of the past 12 months. They then identified a close friend or a family member who also completed the SRGS with respect to the growth of the participant after the specified event. The results showed that the participants’ and the friend or relatives’ ratings of stress-related growth were significantly positively correlated, indicating that the growth experienced by the participants was often verified by their significant others (Weinrib, Rothrock, Johnsen & Lutgendorf, 2006). Weiss (2002) used a similar design to validate reports of growth in a study of women with breast cancer. They completed the PTGI and their husbands completed the measure with respect to their wives’ growth. Again, the results demonstrated a significant positive correlation between the marital partners’ reports of posttraumatic growth, lending support to the

usefulness of using informants to validate the growth experienced by survivors, although it is important to mention that biases may also exist in informants.

A second way to validate self-reported posttraumatic growth is to correlate scores on measures of posttraumatic growth with open-ended written accounts of positive change. In a study by Weinrib, Rothrock, Johnsen and Lutgendorf (2006), women were asked to write essays about the impact of a traumatic event and later completed the PTGI. Themes of posttraumatic growth were identified from the essays and the results demonstrated that ratings of growth from the essays were positively correlated with scores on the PTGI, indicating that “endorsement of growth on questionnaires can be substantiated by personal accounts,” (Weinrib et al., 2006, p. 851).

An extension of this suggestion would be to abandon psychometric measurement altogether and rely solely on personal accounts of posttraumatic growth. Thus, it has been argued that the future of growth research should involve a move away from multi-item assessment tools to qualitative techniques that allow the survivor to provide their own accounts of their experience of growth (Nolen-Hoeksema & Davis, 2004). This allows individuals to spontaneously ‘tell their stories’ in their own way, without prompts that may elicit demand characteristics or the restriction of expression that comes with responding to a predetermined conceptualisation of personal growth. In addition, researchers have argued that richly detailed, emotive, personal accounts are much more persuasive and difficult to discount than boxes ticked on a questionnaire (Weinrib et al., 2006). Such accounts would not only enable researchers to be more confident that the reports of growth provided are meaningful and relevant to the participant, but would also allow the respondent to express the significance of growth in relation to the potentially ongoing negative impact of the event. It

may also allow additional aspects of the growth experience to emerge which are not yet captured using existing growth measures, such as the healthy lifestyle changes noted previously.

The final and potentially most successful strategy for identifying whether self-reported growth is representative of fundamental authentic change is to measure actual change using prospective study designs in which participants are asked questions relevant to the domains of posttraumatic growth prior to a traumatic life event and then again after the event has occurred. Thus, people who become more self-confident, more satisfied with life, more religiously committed and so on might be considered to have demonstrated posttraumatic growth. However, there are well known difficulties in conducting prospective work in the trauma field – namely, you cannot predict when a trauma will happen. Nevertheless, such studies do exist (e.g. Frazier et al., 2009; Ransom, Sheldon & Jacobson, 2008) and indicate that the correlations between perceived growth (as measured by the PTGI) and actual growth are only moderate. Clearly there is an obvious need to proceed with this line of inquiry to further examine the extent to which people's reports of personal growth accurately mirror their actual change.

8.6.3 Is Posttraumatic Growth Adaptive?

One of the most important questions regarding posttraumatic growth is the extent to which the experience of growth translates to positive adjustment following trauma. It is often expected that posttraumatic growth would be reflected in less distress and more adaptive functioning among trauma survivors (Westphal & Bonanno, 2007), with some arguing that the construct and utility of posttraumatic growth is called into question when those reporting growth do not demonstrate a corresponding reduction in distress or improvement in well-

being (Hobfoll et al., 2007; Zoellner & Maercker, 2006). Others have recognised that the perception of growth does not equate to the absence of negative effects, such that posttraumatic stress and depression may also be experienced by individuals reporting growth (e.g. Joseph et al., 1993; Tedeschi & Calhoun, 1996). This is in line with the conceptualisation of growth and distress as co-existing constructs representing separate dimensions rather than opposite ends of a continuum (Calhoun & Tedeschi, 1998; Tedeschi & Calhoun, 2004a; 2004b).

Conflicting research findings mean theorists are still divided on this issue. Thus, studies have found posttraumatic growth to be negatively associated with distress (e.g. Davis et al., 1998; Frazier et al., 2001; Hall et al., 2008; Park et al., 1996), positively associated with distress (e.g. Cadell et al., 2003; Calhoun et al., 2000; Wild & Pavio, 2003), or no significant relationship between growth and distress (e.g. Cordova et al., 2001; Powell et al., 2003; Salsman et al., 2009; Widows et al., 2005). More recently, it has been acknowledged that the relationship between growth and distress is most likely to be curvilinear, where the highest rate of growth is reported by those with intermediate levels of symptomatology, while low levels of distress are insufficient for stimulating growth and high levels of distress overwhelm coping abilities and impede growth (Butler et al., 2005; Kleim & Ehlers, 2009; Lechner et al., 2006). As such, posttraumatic distress is understood as the engine that fuels growth, whereby a degree of posttraumatic stress is necessary for subsequent growth (Joseph, 2012). It has also been suggested that posttraumatic growth begins to diminish at approximately the point where posttraumatic stress becomes so overwhelming that a diagnosis of Posttraumatic Stress Disorder (PTSD) would be made (Joseph, 2012).

Beyond posttraumatic distress, posttraumatic growth has also evidenced varied relationships with other indices of adjustment. Thus, while some cross-sectional studies have shown that posttraumatic growth is positively associated with positive affect (Tomich & Helgeson, 2002), quality of life (Davis et al., 1998), better coping (Thompson, 1985), less suicidality (Kessler et al., 2006), fewer mental health problems (Feigelman, Jordan & Gorman, 2009), and fewer physical symptoms (van Oyen Witvliet et al., 2010), other studies have found growth to be associated with greater depression (Pollard & Kennedy, 2007), anxiety (Best et al., 2001), avoidance and intrusion symptoms (Cadell et al., 2003), and negative changes in outlook (Fromm et al., 1996; Weiss, 2002). These mixed findings concerning the relationship between growth and numerous adjustment outcomes reveal a rather inconclusive picture in terms of the adaptive significance of posttraumatic growth.

In many ways, whether one considers posttraumatic growth to be adaptive largely depends on how positive adjustment is conceptualised. While some would maintain that psychological adjustment is the absence of psychological distress and negative symptoms (e.g. PTSD symptoms, depression), positive psychologists have emphasised that there is more to psychological well-being than an absence of distress, whereby adjustment also constitutes the presence of positive outcomes. From the latter perspective, optimal psychological functioning extends beyond a more superficial conceptualisation of adjustment as less distress to include powerful experiential changes and existential fulfilment, meaning and wisdom. When defined in this way, one would expect posttraumatic growth to be positively associated with these aspects of adjustment. In support of this perspective, Peterson, Park, Pole, D'Andrea and Selgiman (2008) recently demonstrated that posttraumatic growth was associated with numerous positive character strengths including humour, kindness, love, honesty, perseverance, appreciation of beauty, creativity, curiosity, gratitude, hope, zest for

life, and forgiveness, amongst others. Nevertheless, the occurrence of these positive psychological processes alongside posttraumatic growth does not necessarily mean a reduction in distress.

It is also important to acknowledge the paradoxical nature of posttraumatic growth, where devastating losses produce valuable gains; realising one's vulnerabilities leads one to feel stronger; seeing life at its worst allows one to treasure life at its best, and coming close to death causes one to live life to the fullest. Part of the accommodation process involves adjusting one's worldviews to accept that in reality, life can be arbitrary and random, that one is weak and vulnerable, and that the world may be meaningless and malevolent, but that *despite* that knowledge, one becomes more able to recognise and appreciate the value of their life; that they are strong in many ways; that people can be good and loving; and that life must be lived to the full. As such, it is clear that the experience of growth does not mean an immediate end to pain or emotional suffering, but the two can coexist.

8.6.4 Summary

At the beginning of this thesis, posttraumatic growth was defined as the profound positive psychological changes experienced following trauma that “propel the individual to a higher level of functioning than that which existed prior to the event,” (Linley & Joseph, 2004, p.11). In returning to the issue of what posttraumatic growth is, it becomes more and more apparent that clearly conceptualising and operationalising the construct is a minefield. Posttraumatic growth is a concept that is hard to pin down scientifically and there is still much work to be done in terms of refining the construct and its measurement. The difficulties in clearly defining the processes associated with the subjective feeling of growth following trauma raise doubts concerning the real or illusory nature of this phenomenon and its’

adaptive value, as well as making operationalisation and assessment difficult. Yet the issues of operational definition and validity are extremely important if the growth literature is to progress. It is only by tackling these cutting edge issues and finding sophisticated solutions to the challenge of measuring growth that we will become better able to understand the nature, complexity and extent of positive changes experienced following trauma and adversity.

8.7 Strengths and Limitations of the Thesis

Overall, the studies included in this thesis have made an important contribution to the posttraumatic growth literature by paying much needed attention to the conceptualisation, assessment and function of cognitive processing following traumatic life events. As such, it responds to the call for further research into the topic of cognitive processing (Calhoun & Tedeschi, 2006) by exploring in depth the issue of how cognitive processing contributes to posttraumatic growth, using a range of participants and methods. As a result, this thesis offers a new, wider conceptualisation of cognitive processing that recognises that rumination might also represent a way of processing past traumas.

Specific strengths of this thesis include the comprehensive review of the posttraumatic cognitive processing literature, the identification and testing of a much needed measure of trauma-specific cognitive processing, and the use of cross-sectional, longitudinal and experimental methods to systematically examine the gaps identified in this literature using a range of traumatised populations. The literature review provided a thorough and methodical assessment of the various conceptualisations of cognitive processing that exist and their associations with growth following trauma. Given that no prior review existed and the literature was advancing rapidly, with 12 of the 29 studies being conducted in the

previous 12 months, this was a timely and relevant review that provided a firm foundation to this thesis, as well as having the potential to benefit subsequent research in this area.

This thesis has also advanced the literature by demonstrating the efficacy of the modified Rumination Inventory, combined with the ruminative processing subscale items, for comprehensively capturing posttraumatic cognitive processing. Prior studies have used diverse, and often unsuitable, measures of cognitive processing that fail to capture the essential qualities of posttraumatic thinking, but the work of this thesis has shown that the intrusive, deliberate and ruminative processing subscales provide a systematic way of capturing several aspects of cognitive processing simultaneously. It has also been shown to have good reliability, is relatively easy to administer, and, at only 30 items, is not particularly burdensome for participants to complete, which is a particular advantage when studying traumatised populations.

Since completing the studies in this thesis, the modified version of the Rumination Inventory, which comprised the intrusive and deliberate processing subscales used in studies 2, 3 and 4, has been published as the Event-Related Rumination Inventory (ERRI; Cann, Calhoun, Tedeschi, Triplett, Vishnevsky & Lindstrom, 2011). The ERRI has been shown to possess good psychometric properties, with exploratory and confirmatory factor analyses supporting the two-factor structure, consistently high internal consistency reliabilities and good construct validity (Cann et al., 2011). These findings further support the conclusions of this thesis regarding the separation of intrusive and deliberate processing subtypes. However, in line with the expansion of cognitive processing to include the ruminative subtype, the ERRI fails to tap into this third dimension of processing. Thus, for future studies of cognitive

processing to be comprehensive, they would benefit from the use of both the ERRI and the ruminative processing items presented in this thesis.

As such, adoption of this combined measurement tool would provide the much needed consistency in the assessment of cognitive processing that has so far prevented unification of the processing and growth literature. Similarly, expressive writing studies, which have to date lacked a way of directly assessing the cognitive activity that is presumed to occur, would benefit from the inclusion of this measurement tool rather than relying solely on the assessment of word use patterns. Finally, this measure could prove valuable for therapeutic work, where it can be employed in the clinical context to provide an indication of where an individual is in the process of adjustment with respect to the nature and content of their trauma-related thoughts.

Despite these strengths, the limitations of this thesis must also be acknowledged. The first limitation is the reliance on exclusively quantitative research techniques to examine the phenomenon of posttraumatic growth and its antecedents. As such, this thesis can be seen as taking a *nomothetic* approach in that it has investigated large groups of people in an attempt to identify general principles or laws to explain human behaviour. This nomothetic approach emphasises the similarities between individuals, as well as considering general differences between groups rather than individual idiosyncrasies. Whilst this approach has the strength of generalisability and can make inferences about causation, it provides only a superficial understanding of any one person and as such, those generalisations may not apply to the individual. In contrast, *idiographic* research is concerned with exploring uniqueness and what makes a person distinctly individual. Idiographic approaches therefore tend to focus on the

detailed study of an individual or small group of individuals using in depth interviews or case studies to understand the complexity of a particular person or experience.

Adopting an idiographic approach to this research topic would have allowed more detailed consideration of individual variations in posttraumatic cognitive processing and growth, including their interactions and trajectory over time. It would have also enabled participants to reveal the subtleties and complexities of their own experience of posttraumatic growth, which is fundamentally a unique and personal phenomenon. This approach would also be more useful in terms of clinical implications, where the focus on the individual, rather than people in general, is prioritised. Further research into the topic of posttraumatic cognitive processing would therefore benefit from adopting qualitative methods. This issue is explored further in the Future Directions for Research section (section 8.9).

The second main limitation of this thesis relates to inconsistencies in the measurement of posttraumatic growth. Across the four studies, posttraumatic growth was assessed using three different versions of the Posttraumatic Growth Inventory: Study 1 used the full 21-item PTGI (Tedeschi & Calhoun, 1996), Studies 2 and 4 used the 10-item PTGI Short Form (PTGI-SF; Cann et al., 2010), and Study 3 used the 13-item Clinician Version of the PTGI (PTGI-CV; Calhoun & Tedeschi, 1999). It is regrettable that the same version of the PTGI was not used across all four studies, particularly since it precludes direct comparison of the levels of growth reported across the studies.

The reason for this was because at the outset of the current research program, the Short Form of the PTGI had not yet been developed. Therefore, there was a growing need for a more concise version, particularly with respect to the studies of this thesis where numerous

measures were being administered and participant burden was a concern. This concern was exacerbated by the Internet-based design of the studies, where bored or fatigued respondents could very easily exit the study with the click of a mouse to close the browser. As such, an initial aim of the research was to explore options for reducing the number of items in the PTGI, specifically by examining the reliability and factor structure of the less well known 13-item Clinician Version of the PTGI presented by Calhoun and Tedeschi (1999) in their book *'Facilitating Posttraumatic Growth: A Clinician's Guide.'* In the interim, the PTGI-Short Form was published and precluded the need for further investigation down this line of inquiry. The subsequent studies of this thesis therefore adopted the well validated and psychometrically sound 10-item PTGI-SF.

8.8 Internet-Based Research

According to recent estimates, the number of internet users reached 1.96 billion in June 2010, with approximately 51 million of those in the UK alone (Internet World Stats, 2010). This exceptional growth in the use of the internet over the last decade has alerted psychologists to the potential of this medium for supporting and enhancing research endeavours, with some arguing that the internet has the potential to revolutionise the practice of psychology (Reips, 2002). As such, the internet is becoming a key research medium and this is reflected in the growing number of internet research projects being published in peer-reviewed journals (e.g. Michalak & Szabo, 1998). As Birnbaum (2001) reports, "the number of Web studies listed by the American Psychological Society (APS) doubled from 1998 to 1999," (p.10), a rate of growth that is expected to burgeon as the explosion of interest in this medium spreads. Ó Dochartaigh (2002) even argues that social scientists "cannot consider ignoring the Internet as a research resource," (p.7), and predicts that the internet will be

responsible for a “fundamental transformation in the way academic research is carried out,” (p.13).

Advocates of internet-based research point to the unique potential of the medium for accessing large, diverse samples relatively rapidly and conveniently, making this approach cheaper and more efficient than traditional research practices. Access to such large numbers of potential participants means that samples recruited online tend to be more varied in terms of age, sex, language, culture and socio-economic status than those recruited using traditional methods, providing greater sample representativeness and therefore generalisability (Buchanan & Smith, 1999; Krantz, Ballard & Scher, 1997). This diversity also increases the likelihood that a range of perspectives, experiences and opinions will be represented, potentially generating new insights that traditional methods may not uncover. The sheer number of people online means that specialised or rare populations may be easier to locate and contact than using traditional methods (Reips, 2002), and it allows people who previously would be unable to participate in psychological research due to practical limitations such as geographical location have a voice (Buchanan, 2002). In terms of financial issues, conducting research online reduces the costs of laboratory space, equipment, personnel hours and other research expenses, and avoids scheduling issues since multiple subjects may participate simultaneously (Reips, 2000).

There are also advantages for the participants of internet-mediated research. The ease of participation that comes from not having to leave ones’ desk allows individuals to take part in the comfort of their own home at a time and pace that is most convenient for them. This may have the added advantage of increasing retention over the course of the study (Sheese et al., 2004). Similarly, it has been argued that the anonymity of the internet might facilitate

more honesty and openness than traditional data collection methods, which can reduce self-presentational concerns and socially desirable responding (Joinson, 1999; Richman et al., 1999).

In light of these advantages, all four studies of this thesis were conducted via the internet, particularly because of the acknowledged difficulties of recruiting large samples of trauma survivors using traditional methods. As such, the current studies provide further evidence to support the use of the internet as a valid platform for conducting questionnaire-based research, as well as demonstrating the potential of this method for the administration of an expressive writing intervention. Many participants in the writing study also reported in the feedback sections that the anonymity of the internet had made the detailed disclosure of personal traumas easier, reiterating the potential value of internet-mediated expressive writing. The findings of this thesis also highlight that future research seeking to study individuals that have been exposed to specific experiences (e.g. sexual assault survivors, individuals that have been bereaved by suicide, survivors of motor vehicle accidents, trauma exposed emergency personnel) could benefit from using the internet to canvass and recruit research participants.

However, the Internet is not a cure-all solution to longstanding methodological issues and generates its own limitations regarding the quality of data and the generalisability of online samples (Kraut, et al., 2004). A key disadvantage of conducting research online is that it is impossible to standardise the environment in which the study is administered (Michalak & Szabo, 1998). This lack of control over testing conditions means that researchers have less understanding of any possible extraneous (e.g. distraction) or temporary (e.g. fatigue, intoxication, distress) factors that may be affecting participants' responses (Buchanan, 2002).

Furthermore, unlike the laboratory, the experimenter is unable to obtain or verify participants' identities, age or gender. Similarly, the anonymity of the Internet enables individuals to assume pseudo-identities and potentially mislead researchers about their demographic characteristics or whether they have experienced the phenomenon under investigation. As such, the studies included in this thesis were unable to verify whether the participants had personally experienced the traumatic events they were claiming to have, although traditional data collection methods are presumably just as susceptible to this sort of dishonest responding. Adopting pseudo-identities may also allow the same individual to provide multiple submissions, which reduces the quality of the data and thus the validity of the research. Nevertheless, both Gosling et al. (2004) and Reips (2002) report that the rate of multiple submissions is below 3% in most studies and therefore does not represent a major threat to online research.

Conducting research via the internet also generates several unique ethical concerns, particularly relating to privacy, confidentiality and informed consent (Michalak & Szabo, 1998). The lack of physical proximity between researcher and participants makes it difficult for researchers to ensure that experimental instructions are understood, informed consent is obtained, and any necessary questions or clarifications can be asked. This physical presence is also useful for monitoring whether respondents are engaged in the task and participating seriously, and is particularly important in research where the impact of participation must be assessed to ascertain whether the task has had any undesirable effects and thus whether the researcher needs to intervene (Kraut et al., 2004). This was of particular importance in the studies of this thesis, since emotional distress has been cited as a potential risk to trauma survivors participating in trauma-focused research (Draucker, 1999; DuMont & Stermac, 1996), although evidence also indicates that research participation does not overwhelm or re-

traumatise individuals (Griffin, Resick, Waldrop & Mechanic, 2003). Nevertheless, specific steps were taken to ensure that risk of distress to participants was minimised, including warning participants about the potential for emotional distress and providing materials that could help participants to access support services if necessary. In addition, the relative ease of terminating online participation (basically clicking a button to close the browser) suggests that those not wanting to continue because of concerns about distress have an arguably easier means of withdrawing than participants being tested in the laboratory.

In light of the preceding discussion, it appears that the use of the internet to conduct the research presented in this thesis can be considered a legitimate and credible approach that offers much in the way of targeted participant recruitment and intervention delivery. It afforded numerous advantages over more traditional methods, particularly with respect to issues of confidentiality and anonymity, efficiency and ease for both researcher and participant, and access to large samples of traumatised individuals. However, it must be acknowledged that recruiting participants from trauma related websites and support forums may have resulted in samples that differ in important ways from trauma survivors as a whole, yet the differences between users and non-users have not yet been established. This issue will be further discussed in the following section.

8.8.1 How do Trauma Website Users Differ from Non-Users?

Three of the four studies presented in this thesis used trauma related websites, support forums and message boards to recruit participants. While this recruitment strategy generated sufficiently large samples, there is the possibility that those samples may have been biased in certain ways. Firstly, it might be inferred that individuals accessing trauma websites are more computer literate, better educated and from the higher end of the socio-economic scale than

traumatised individuals that do not access internet support. This is supported by evidence that individuals who seek health-related information online are a) younger; b) more educated; c) have higher incomes; and d) spend more time online, than individuals who seek health-related information offline (Cotton & Gupta, 2004).

Secondly, it makes sense to presume that people who use trauma based websites and online communities are seeking some form of help, information or support concerning their traumatic experience. Their use of these websites indicates that they may be seeking to reduce their distress, process their experience or make sense of their response. The implication of this is that the participants studied in this thesis may have been engaged in a higher degree of processing than that which may be found in studies of participants that do not use online trauma support resources. Similarly, their willingness to take part in the research suggests they may be more motivated to find ways of reducing their distress and making sense of their experience. As such, the findings of this thesis would not apply to all trauma survivors, especially those who are not actively seeking information or support regarding their traumatic experience.

In light of these concerns about potential differences in both demographic characteristics and processing activity between trauma website users and non-users, a number of subsequent analyses were conducted using the data from studies 2 and 3 of this thesis. The study 2 sample consisted of participants recruited from trauma websites while the study 3 sample consisted of participants recruited from the University of Nottingham Intranet Portal and therefore represents a non-user comparison sample.¹⁹ The analyses compared the two

¹⁹ Although Study 3 participants were still recruited online, the website they were recruited from was not trauma related: it was the 'announcements' section of the University student portal where messages concerning various aspects of student life could be posted (e.g. Library opening hours, university news items, information about

samples to examine whether any significant differences existed between them with respect to demographic characteristics and levels of cognitive processing activity or posttraumatic growth. The results showed that trauma website users were significantly older, had experienced their traumatic event less recently, were more likely to be married, and were less educated than non-users.²⁰ However, no significant differences were observed for sex, ethnicity, trauma type or ratings of event stressfulness. Furthermore, no significant differences were detected in levels of intrusive, deliberate or ruminative processing across the two samples. Similarly, the extent of posttraumatic growth did not differ between trauma website users and non-users.

Taken together these findings suggest that while people recruited from trauma websites differ from people recruited from non-trauma websites on specific demographic characteristics, their levels of cognitive processing and posttraumatic growth are largely comparable. This finding is encouraging and suggests that individuals that seek trauma-related information or support online are not necessarily more likely to be engaged in cognitive processing activity than those that do not use the internet in this way. As such, the use of online communities for participant recruitment in the studies of this thesis does not appear to have resulted in samples that were biased with respect to cognitive processing. Nevertheless, it is still possible that using internet support sites might be a manifestation of deliberate processing that is not captured by the measures of processing used in this thesis. It is also important to note that these analyses were post hoc and based only on the variables available. As such, there may be other important differences that were not captured in the

social activities, opportunities available to students etc.). Thus, participants were not visiting this site to obtain information or support concerning a prior traumatic experience.

²⁰ These demographic differences are somewhat expected, since student samples in general are more likely to comprise younger, single, better educated individuals than non-student samples.

current analyses which require further empirical scrutiny such as trauma-related distress, coping styles, avoidance and social support. The findings of this thesis should therefore be interpreted with this caveat in mind.

Further research is clearly needed to systematically compare samples of trauma survivors recruited from online and offline sources in order to understand more about the demographic profiles and psychological functioning of trauma exposed individuals that vary in their use of internet support. Such research would allow us to make inferences about the generalisability of the findings of this thesis as well as the wider literature, since researchers are increasingly turning to internet communities to recruit participants from hard-to-reach populations. Within such studies it would also be advantageous to take into account the website users' patterns of activity (e.g. number of sessions, average session length, number of threads started, number of replies received, number of messages sent), since activity amongst forum users can vary greatly and an absence of postings or participation in discussions does not necessarily mean absence from the site (Radin, 2006).²¹

8.9 Future Directions for Research

8.9.1 Qualitative Research

This research has generated numerous avenues for further inquiry. One of the most obvious directions in which to proceed with future research, as highlighted in some of the preceding sections, is to begin to look at the issue of posttraumatic cognitive processing and growth from a qualitative stance. Specifically, in-depth interviews with trauma survivors would allow for comprehensive exploration of the nature of trauma-related cognitive activity.

²¹ Mendelson (2007) has highlighted that the visible users in online communities – those who post messages or replies – are only the tip of the iceberg, with 'lurkers' (members who read messages but never post) representing a considerably larger portion of users.

Listening to participants' experiences about the type and content of thoughts they have in the aftermath of trauma could broaden the current perspective. As such, there is considerable scope to refine the conceptualisation of cognitive processing presented in this thesis.

Semi-structured interviews and detailed case studies would enable a degree of validation as to whether the types of intrusive, deliberate and ruminative processing identified and assessed in this thesis adequately capture the types and quality of trauma-focused thoughts experienced by survivors. Particular attention to the valence, duration, vividness, content, voluntariness and distress associated with the occurrence of trauma-related thoughts would be advantageous, as well as questions concerning their potential triggers or antecedents. Diary studies could also prove useful as a method of assessing the sequence of processing over time and the interaction between processing subtypes. Similar qualitative work has already been conducted by Speckens et al. (2007) and Evans et al. (2007), although both studies focused only on the nature of, and distinction between, intrusive memories and ruminations and did not incorporate deliberate forms of event-related thinking. Both studies were also conducted within the context of posttraumatic stress disorder and the role of these cognitions in influencing symptom severity, rather than considering their potentially adaptive function in contributing to posttraumatic growth. As such, further exploration of posttraumatic cognitive processing using qualitative methodologies would provide a valuable extension to the current work.

8.9.2 Facilitating Deliberate Processing

One of the main findings from this thesis was that deliberate processing appears to be a critical precursor to the development of posttraumatic growth. This was particularly evident in the expressive writing study, where increased deliberate cognitive processing over the

course of the writing intervention was positively associated with increases in posttraumatic growth from baseline to 8 week follow-up. Given these positive findings concerning the importance of deliberate processing, a natural progression would be to examine whether the facilitation of deliberate processing contributes to improved posttraumatic growth. To test this hypothesis, future research could modify the writing instructions to facilitate deliberate processing and examine the effect on posttraumatic growth relative to standard expressive writing instructions. Specifically, participants could be instructed to write about whether they have learned anything from the experience, how the event has changed their beliefs about the world, what the experience might mean for their future, and how they can find meaning in what they have been through.

Numerous prior studies have manipulated the writing instructions to test hypotheses about mechanisms of effect (e.g. Batten et al., 2002; Gidron et al., 2002; King & Miner, 2000; Smyth et al., 2001; van Middendorp et al., 2007), although the effect of these modifications have been mixed. Similarly, writing instructions specifically designed to facilitate narrative formation (e.g. focusing on meaning-making or reinterpretation of the traumatic event) have not resulted in physical or psychological health improvements compared to controls (e.g. Batten et al., 2002; Broderick, Stone, Smyth & Kaell, 2004; Danoff-Burg et al., 2010; Kovac & Range, 2002). Only two studies to date have tested whether modifying the writing instructions influences posttraumatic growth. First, Ullrich & Lutgendorf (2002) instructed disclosure participants to focus on either the emotional aspects of their experience or the emotional and cognitive aspects of their experience (e.g. how they have tried to make sense of the experience). Results demonstrated that participants in the cognitions and emotions group reported increased growth over time, while participants in the emotions only and control groups showed no change in growth. Second, Guastella and Dadds

(2008) tested the effects of exposure, devaluation, benefit-finding, unstructured or control writing tasks on various markers of psychological health and reported that participants instructed to write about the benefits they had gained from their experience reported significantly greater posttraumatic growth than all other writing groups.

However, no study to date has tested whether instructing participants to write in a manner that involves deliberately contemplating the experience and its meaning influences growth. A key area for future empirical attention would therefore be to examine whether incorporating aspects of deliberate processing into the writing instructions enhances the psychological health benefits experienced, particularly with respect to posttraumatic growth. As well as being conceptually and theoretically useful in clarifying the mechanisms through which expressive writing exerts its effect, this line of inquiry would also have important implications for therapeutic work with trauma survivors. It is, of course, important to bear in mind the possibility that imposing structure on disclosure writing might interfere with the individual's own cognitive processing activity in a way that disrupts the development of posttraumatic growth. Nevertheless, findings from Ullrich and Lutgendorf (2002) and Guastella and Dadds (2008) point to the potential positive effects of such modifications.

8.9.3 Factors Influencing Processing Subtypes

In order to gain a more comprehensive understanding of the role of cognitive processing following traumatic events, it is important to consider the social and interpersonal processes that have an important bearing on the type of cognitive processing adopted. As has previously been discussed in section 8.5, empirical attention to the ways in which social and cultural factors influence cognitive processing is an important line of further inquiry.

Tedeschi and Calhoun's (2004a) model of posttraumatic growth also highlights that certain

personality characteristics and ways of managing distress can influence the way people cognitively process trauma-related information. As such, further research would benefit from exploring various personality characteristics and dispositional coping styles that might predispose individuals to engage in more or less constructive varieties of cognitive processing. One factor examined in Chapter 6 of this thesis was dispositional ruminative style and results demonstrated that individuals with a stable tendency to reflect on past experiences were more likely to engage in deliberate processing while individuals with a stable tendency to ruminate were more likely to engage in ruminative processing. Further variables worthy of consideration in future research include the numerous positive personality characteristics such as self-esteem, optimism (Scheier & Carver, 1985), openness to experience and extraversion (Costa & McCrae, 1992), sense of coherence (Antonovsky, 1993) and hardiness (Waysman et al., 2001).

A related line of inquiry would be to examine emotional intelligence as a potential determinant of cognitive processing activity. Emotional intelligence has been defined as “the ability to perceive emotion, integrate emotion to facilitate thought, understand emotions, and to regulate emotions to promote personal growth,” (Salovey, Mayer, Caruso & Lopes, 2003, p. 251). People with high levels of emotional intelligence proactively use emotional distress to facilitate problem solving and obtain a deeper understanding of their thoughts and feelings. Broadly speaking, emotional intelligence can therefore be understood as a trait related to the processing of emotional information and as such may influence the cognitive processing of traumatic material. Despite the obvious connection between emotional intelligence and posttraumatic growth, I am aware of no research that directly examines the link between emotional intelligence and posttraumatic growth. This would be an important line of further inquiry and would improve our understanding of the dispositional factors that influence

trauma-specific processing. Given the assumption that individual differences in emotional processing relate to individual differences in processing styles and abilities (Salovey & Mayer, 1990), it is likely that emotional intelligence will be positively associated with growth via its' role in influencing deliberate cognitive processing.

8.9.4 LIWC Analysis of Trauma Message Boards

One limitation of recruiting expressive writing study participants from trauma-related websites and message boards is that the impact of the writing intervention may be influenced by the extent to which participants are already engaging in disclosure online. This limitation was highlighted in Chapter 7, but points to a valuable direction for further research inquiry that involves analysing the content of trauma support forums using the LIWC text analysis program in order to compare patterns of word use with those found in disclosure writing essays. Similar research has been conducted in relation to breast cancer support forums (Alpers et al., 2005) and prostate cancer forums (Owen et al., 2004), but no studies exist that have examined the patterns of word use on trauma-related forums and as such this would be a worthwhile endeavour.

8.10 Clinical Implications

The present results have potentially important implications for clinical work with trauma survivors. Primarily, they have contributed to the growing literature testifying to the potential for positive psychological change following the experience of a major trauma or life crisis and highlight that clinicians should be aware of this potential for growth in their traumatised clients. Failure to recognise the possibility of posttraumatic growth by focusing on psychological damage and impairment may serve to stifle the possibility of growth for clients (Calhoun & Tedeschi, 1999; Joseph & Linley, 2006). Leading on from this, the

findings support the position that the facilitation of posttraumatic growth should be considered a “legitimate therapeutic aim” (Linley & Joseph, 2002, p. 12). Thus, tying in with the wider positive psychology literature, therapeutic work with trauma survivors should not focus exclusively on the alleviation of distress, but should be equally focused on the facilitation of posttraumatic growth (Joseph, 2004).

However, while there is a vast literature on clinical approaches to dealing with trauma and PTSD, the literature on the facilitation of growth following adversity is only just beginning to develop, such that it might be too early to propose specific therapeutic directions. Nevertheless, many have advocated the person-centred perspective as a useful way of working with clients that have experienced trauma and are struggling to find meaning in their lives (Joseph, 2003, 2004, 2005; Williams & Joseph, 1999). Client-centred therapy aims to support the client in seeking or creating their own new meaning, with the ultimate goal of supporting the individual as they move toward becoming a fully-functioning person where self and experience are integrated. Using the terminology of this thesis, becoming fully functioning for traumatised individuals can also be described as posttraumatic growth (Joseph, 2004; Linley & Joseph, 2004) and as such, the person-centred approach represents a therapeutic approach that can support the client in moving beyond their previous levels of psychological functioning (Joseph & Linley, 2006). Part of this process might involve helping the individual to remember and revisit the traumatic experience in the safety of the therapeutic relationship, which from the person-centred approach is characterised by the core conditions of congruence, empathy, and unconditional positive regard (Rogers, 1957).

Leading on from section 8.9.2, the facilitation of deliberate processing can also be considered an important clinical implication of the work of this thesis. The findings indicate

that cognitive confrontation with a prior traumatic experience might only be beneficial to growth if such confrontation is deliberate, under conscious control, and focused on the meaning of the event for ones' life and future. As such, therapeutic work could involve encouraging clients to shift their cognitive activity toward more deliberate contemplation of the meaning and significance of the event. Such an approach is similar in many ways to existing evidence-based treatments for PTSD that aim to shift client's thoughts toward more productive, trauma-focused processing (e.g. Cognitive Behaviour Therapy). However, in line with the preceding discussion concerning the value of adopting the person-centred approach, therapists working from this perspective must be mindful to work at the client's pace and not 'push' a particular agenda or force the client to move in particular directions (Meichenbaum, 1994). Instead, they should allow the client to lead the process and trust the client's intrinsic motivation toward growth and self-actualisation (Rogers, 1957).

It is also important to highlight that the facilitation of posttraumatic growth need not be restricted to the therapeutic context, but that supportive interactions with members of the trauma survivors' social network can also encourage the passage to growth through the facilitation of cognitive processing. As discussed in section 8.5, positive social support networks can foster the consolidation and integration of traumatic memories, provide alternative interpretations, and encourage the exploration of new meanings in the wake of trauma, thus supporting the cognitive processing necessary for growth. This may be achieved by encouraging the survivor to verbalise their feelings and concerns, listening actively without judgement or ill-timed interjections, avoiding clichés or placations, and offering practical support where appropriate (Wortman, 2004). More fundamentally, social support systems that meet the individuals' needs for autonomy, competence and relatedness are most likely to facilitate growth (Scrignaro, Barni & Magrin, 2010).

In circumstances where a social support network is absent or inadequate, trauma survivors may benefit from participation in support groups (Lepore & Helgeson, 1999). The supportive group atmosphere may influence posttraumatic growth in several ways, including facilitating emotional expression, normalising the post-event experience, and providing positive role models of growth. Furthermore, with a growing number of people turning to the internet for health-related information and support, online support groups for trauma survivors may also represent an important resource for the facilitation of posttraumatic growth. Indeed, a study by Lieberman and Goldstein (2005) showed that new members of a breast cancer bulletin board evidenced statistically significant improvements in posttraumatic growth 6 months after first joining the group. Such findings are particularly encouraging because they emphasise the potential of online support groups in helping people to find meaning after trauma, especially given that they are free, widely accessible, and rely on the input of peers rather than specially trained professionals. In addition, receiving support online may serve as a platform that can facilitate ‘graduation’ to more tangible social support seeking.

8.11 Summary and Conclusions

Cognitive processing has long been regarded as a prominent underlying mechanism of positive transformation following trauma and adversity (Ho, Chu & Yui, 2008), yet elaboration of its nature or precision concerning its impact on subsequent growth has been under explored. The major contribution of this thesis has therefore been the theoretical and empirical scrutiny paid to posttraumatic cognitive processing. Specifically, this work has confirmed the theorised distinction between intrusive and deliberate processing, whilst also extending the conceptualisation of cognitive processing to include a third subtype of processing, ruminative processing, with preliminary evidence suggesting it may play a role in

stimulating the deliberate processing that is a fundamental precursor to posttraumatic growth. The findings of this thesis have also raised important questions about the conceptualisation of intrusion and its role in post-trauma adjustment, particularly with respect to the possibility that intrusive thoughts constitute a precursor to cognitive processing rather than processing itself. The implications of this thesis for both theory and clinical applications are far reaching and suggest that supporting individuals to deliberately contemplate the meaning and significance of traumatic experiences can serve to facilitate improved psychological well-being after trauma and adversity.

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APPENDICES

Appendix A:

Email to website moderators requesting permission to advertise study

Dear (moderator's details),

I am a PhD student at the University of Nottingham and I am currently working on a research project concerning stressful or traumatic life experiences and their impact on individuals' psychological health and well-being. I am looking at potential factors that may both impede and facilitate recovery from such experiences, with a long term view to helping us understand how best to work with people who have experienced traumatic life events.

I am currently looking for people who would be willing to participate in the first phase of the research project by completing an online questionnaire, which asks about the impact of a distressing or traumatic experience on the way people feel about themselves, their life and how their life may have changed following this event. The study is completely anonymous, strictly confidential, and participants have the option to exit the study at any time. It has had full ethical approval from my Institute's ethics committee.

I am aware of the need to be sensitive when approaching individuals via forums regarding research participation. However, I was wondering whether it would be possible for me to post some information about the study and a link to the online questionnaire on your forum, either by doing so myself, or by getting one of the administrators to do it on my behalf. I would very much appreciate it if this was possible and I am happy to liaise with you concerning the specific content of the post. If you need any further information please do not hesitate to contact me and I will be happy to help.

I look forward to hearing from you,

Hannah Stockton

Appendix B:

Information for participants

Thank you for your interest in this study. Please read the following information carefully then click on the 'continue' button at the bottom of the page to continue with the survey.

The following survey is part of a PhD research project conducted by Hannah Stockton, under the supervision of Dr Nigel Hunt and Professor Stephen Joseph. The research team is based within the Institute of Work, Health and Organisations, which is a postgraduate institute of applied psychology at the University of Nottingham. The study examines the impact of distressing or traumatic experiences on the way people feel about themselves, their life and how their life may have changed following these events. You will be asked a number of questions, and it should take approximately 20-30 minutes to complete.

In order to participate, you must be at least 18 years old.

Completion of this survey is entirely voluntary, and you can withdraw your participation from this survey at any time. You also do not have to answer any questions that you do not want to. If you start the survey but do not wish to continue, just click the "Exit this survey" link at the top right of the page and you will be exited from the study.

The survey guarantees anonymity. Any personal comments from the submitted questionnaires that are used in project reports or academic papers will be quoted anonymously and anything that might identify you will be removed. However, you will be asked to provide a username at the start of the questionnaire – this is in order to identify your responses in case you wish to withdraw your data at a later time. If this is the case, simply email the researcher on lwxs2@nottingham.ac.uk, stating your username, and your responses will be destroyed.

This research has had ethical approval from the institute's Ethics Committee at the University of Nottingham, and the risks involved in participating in this study are judged to be minimal. Nevertheless, there is the possibility that some people may find some of the questions distressing, particularly since they ask you to think about the most distressing experience of your life. If you feel that you would be unable to manage this distress, it would be best to avoid participating. Similarly, if you begin the survey but become too distressed to continue, you have the right to terminate your participation. Should you experience distress following completion of this survey, you are advised to contact your General Practitioner or one of the organisations listed below for help and support.

If you have any questions with regard to the study, please email me (lwxs2@nottingham.ac.uk).

If you wish to keep a copy of this form for your records, you can do so now by selecting the File -> Print option from the pulldown menu on Internet Explorer, Mozilla or Netscape.

Appendix C:

Debriefing Pages

Study 1, 2 and 3 Debriefing

Thank you for completing this questionnaire. Your responses are very valuable to me. The purpose of this study is to examine the factors that might potentially play a role in recovery from traumatic life experiences. Previous research has suggested that the way people think about their experience with trauma can influence the way people adjust to that experience and contribute to psychological well-being. The aim of this study was therefore to examine some of the different ways of thinking about traumatic life events and explore how those thinking patterns can influence people's adjustment.

You can be confident that your responses will be kept confidential. If at a later date you wish for your data to be removed from this study, please email me on lwxs2@nottingham.ac.uk and state your username so that your responses can be identified and removed.

If you have been emotionally affected by completing this questionnaire and require support, you are advised to contact your GP or one of the organisations listed below:

For support or advice in the UK:

- British Association for Counselling and Psychotherapy (BACP): 0870 443 5252
- The Samaritans: 08457 90 90 90
- ASSIST (Assistance, Support and Self-Help in Surviving Trauma), 24 hour helpline: 01788 560 800
- Sudden Trauma Information Service and Helpline: 0845 367 0998 or website www.stish.org where you can find a gateway to PTSD information and support organisations

For support or advice in the USA:

- US American Trauma Society: 1-800-556-7890
- National Center for PTSD: 802-296-5132
- Rape, Abuse and Incest National Network (RAINN): 1-800-656-HOPE

If you are from another country and would like help to find contact details of support organisations or helplines in your country, please contact me on lwxs2@nottingham.ac.uk and I will do my best to assist you.

Study 4 Debriefing

The purpose of this study has been to examine which factors play a role in recovery from traumatic experiences. In particular, the research explores whether certain types of writing exercises can reduce distress and promote adjustment following traumatic events. Previous research has suggested that writing about a traumatic experience for as little as 15 minutes on three occasions can reduce people's PTSD symptoms and improve their psychological well-being. In this study, half of you were randomly assigned to write about your traumatic experience on three occasions, whilst the other half of you were randomly assigned to write about your daily routine and how you use your time. This was to allow me to see whether the people who wrote about a traumatic event experienced significantly more improvement than those who wrote about non-traumatic topics. If I am able to establish that three simple trauma-focused writing exercises can improve people's psychological well-being following traumatic events, then there are important implications for the treatment of traumatised individuals in the future. If you would like to know more about this study, please email me (lwxhs2@nottingham.ac.uk).

I would like to take this opportunity to express my gratitude for your contribution to my work. It has taken a great deal of commitment from you to complete all the required exercises and share your personal experiences with me, and for that I am truly grateful. As a small gesture of my appreciation I will be sending you a £5 Amazon.com voucher – you should receive this within 3 days of completing this final questionnaire.

You can be confident that your responses will be kept anonymous. If at a later date you wish for your data to be removed from the study, please email me on lwxhs2@nottingham.ac.uk and state your username so that your responses can be identified and removed.

If you have experienced any distress whilst completing this questionnaire or any of the writing exercises and require support, please contact either your GP or one of the organisations listed below.

For support or advice in the UK:

- British Association for Counselling and Psychotherapy (BACP): 0870 443 5252
- The Samaritans: 08457 90 90 90
- ASSIST (Assistance, Support and Self-Help in Surviving Trauma), 24 hour helpline: 01788 560 800

- Sudden Trauma Information Service and Helpline: 0845 367 0998 or website www.stish.org where you can find a gateway to PTSD information and support organisations

For support or advice in the USA:

- US American Trauma Society: 1-800-556-7890
- National Center for PTSD: 802-296-5132
- Rape, Abuse and Incest National Network (RAINN): 1-800-656-HOPE

If you are from another country and would like help to find contact details of support organisations or helplines in your country, please contact me on lwxs2@nottingham.ac.uk and I will do my best to assist you.

Appendix D:
Demographic Questions

1. How old are you? _____ years
2. What is your sex? Male/Female
3. Please state your ethnicity: _____
4. What is the highest level of education you have attained?
 - a) Secondary school
 - b) College
 - c) University
 - d) Postgraduate
 - e) Other (please specify) _____
5. What is your marital status? _____
6. This study concerns the impact of upsetting or distressing experiences. I would like you to think about events in your life that you have found particularly upsetting, traumatic or difficult to deal with, then select one event that you found the most upsetting and that you would be willing to share with me. Please provide a brief description of this event: _____

7. How long ago did this event occur? _____
8. How old were you at the time? _____
9. How distressing did you find this experience?
 - a) Not at all distressing
 - b) Moderately distressing
 - c) Distressing
 - d) Very distressing
 - e) Extremely distressing

Appendix E:

Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1999)

Consider the following statements in terms of how your struggle with the upsetting event you have described has initiated changes in you. Please rate each statement as follows:

0 = I did not experience this change as a result of my stressful event

1 = I experienced this change to a very small degree as a result of my stressful event

2 = I experienced this change to a small degree as a result of my stressful event

3 = I experienced this change to a moderate degree as a result of my stressful event

4 = I experienced this change to a large degree as a result of my stressful event

5 = I experienced this change to a very great degree as a result of my stressful event

1. I changed my priorities about what is important in life

0 1 2 3 4 5

2. I have a greater appreciation for the value of my own life

0 1 2 3 4 5

3. I developed new interests

0 1 2 3 4 5

4. I have a greater feeling of self-reliance

0 1 2 3 4 5

5. I have a better understanding of spiritual matters

0 1 2 3 4 5

6. I more clearly see that I can count on people in times of trouble

0 1 2 3 4 5

7. I established a new path for my life

0 1 2 3 4 5

8. I have a greater sense of closeness with others

0 1 2 3 4 5

9. I am more willing to express my emotions

0 1 2 3 4 5

10. I know better that I can handle difficulties

0 1 2 3 4 5

11. I am able to do better things with my life

0 1 2 3 4 5

12. I am better able to accept the way things work out

0 1 2 3 4 5

13. I can better appreciate each day	0	1	2	3	4	5
14. New opportunities are available which wouldn't have been otherwise	0	1	2	3	4	5
15. I have more compassion for others	0	1	2	3	4	5
16. I put more effort into my relationships	0	1	2	3	4	5
17. I am more likely to try to change things which need changing	0	1	2	3	4	5
18. I have a stronger religious faith	0	1	2	3	4	5
19. I discovered that I'm stronger than I thought I was	0	1	2	3	4	5
20. I learned a great deal about how wonderful people are	0	1	2	3	4	5
21. I better accept needing others	0	1	2	3	4	5

Appendix F:

The Rumination Interview (Michael et al., 2007)

The Rumination Interview is a structured interview of approximately 25 minutes' duration that asks a series of questions in a fixed order. Participants answer on given response scales.

1. Do you sometimes dwell on the assault and its consequences in your mind, going over and over things?

Answer: Yes/No

2. How much time do you spend dwelling on the assault?

Answer: Less than 1 hour per week/1 hour per week/Several hours per week/1 hour per day/Several hours per day

3. Does dwelling on the assault bring on unwanted recollections of parts of the assault that you would rather not think about? Or does it happen that dwelling brings these recollections to an end and occupies your mind with other thoughts?

Answers: Never/Rarely/Sometimes/Often/Always

4. Positive metacognitive assumptions.

Answers: Yes/No

Rumination is useful:

- in some respects
- to sort out things/put things in order in my mind
- to come to terms with the fact that I was assaulted
- to work out why it happened
- to prepare for future problems
- to work out how I could prevent something similar happening in the future
- to reassure myself that I did not do anything wrong
- to prepare me in case I encounter the assailant again
- to help me understand why I felt and behaved the way I did
- to help me remember/piece together what happened.

5. Negative metacognitive assumptions.

Answers: Yes/No

Rumination is unhelpful:

- in some respects
- it prevents me from getting on with my life
- it overwhelms me
- it takes too much time
- it makes me think I am a weak person
- it makes the event seem even worse.

6. Once you have started, how driven do you feel to continue dwelling on the assault and its consequences?

Answer: Not at all/A little/Moderately/Strongly/Very Strongly

7. ‘‘Why’’ and ‘‘what if’’ type questions.

Answers: Never/Rarely/Sometimes/Often/Always

- About why it happened to me
- What life would be like if the assault had not happened
- About what I would like to say or do to the assailant
- How unfair it is
- About what else might have happened
- About the long-term consequences of the assault.

Excluded prior to analysis:

How things would have been, if only I had done something differently

About other bad things that may happen in the future

8. Unproductive thoughts.

Answers: Never/Rarely/Sometimes/Often/Always

- I find it hard to put a stop to them
- My thoughts are racing
- The thoughts get more and more gloomy
- I seem to think in circles, coming back to the same things again and again
- The thoughts go the same way, repeat themselves
- I seem to drift from one topic to the next
- My thoughts are out of control
- I move from aspect of the assault and how things are now to another, without resolving any of them

- I know it makes me feel worse but I cannot stop myself from ruminating

9. Negative feelings during rumination.

Answer: Not at all/A little/Moderately/Strongly/Very strongly:

- Anxious
- Guilty
- Sad
- Numb
- Overwhelmed
- Ashamed
- Helpless

Excluded prior to analysis:

Angry

10. Negative feelings after rumination.

Answer: Not at all/A little/Moderately/Strongly/Very strongly:

- Exhausted
- Worried
- Sad
- Alienated
- Ashamed

Appendix G:

Posttraumatic Growth Inventory – Short Form (Cann et al., 2010)

Consider the following statements in terms of how your struggle with the upsetting event you have described has initiated changes in you. Please rate each statement as follows:

0 = I did not experience this change as a result of my stressful event

1 = I experienced this change to a very small degree as a result of my stressful event

2 = I experienced this change to a small degree as a result of my stressful event

3 = I experienced this change to a moderate degree as a result of my stressful event

4 = I experienced this change to a large degree as a result of my stressful event

5 = I experienced this change to a very great degree as a result of my stressful event

1. I changed my priorities about what is important in life	0	1	2	3	4	5
2. I have a greater appreciation for the value of my own life	0	1	2	3	4	5
3. I am able to do better things with my life	0	1	2	3	4	5
4. I have a better understanding of spiritual matters	0	1	2	3	4	5
5. I have a greater sense of closeness with others	0	1	2	3	4	5
6. I established a new path for my life	0	1	2	3	4	5
7. I know better that I can handle difficulties	0	1	2	3	4	5
8. I have a stronger religious faith	0	1	2	3	4	5
9. I discovered that I'm stronger than I thought I was	0	1	2	3	4	5
10. I learned a great deal about how wonderful people are	0	1	2	3	4	5

Appendix H:

Posttraumatic Growth Inventory – Clinician Version (Calhoun & Tedeschi, 1999)

Consider the following statements in terms of how your struggle with the upsetting event you have described has initiated changes in you. Please rate each statement as follows:

0 = *I did not experience this change as a result of my stressful event*

1 = *I experienced this change to a very small degree as a result of my stressful event*

2 = *I experienced this change to a small degree as a result of my stressful event*

3 = *I experienced this change to a moderate degree as a result of my stressful event*

4 = *I experienced this change to a large degree as a result of my stressful event*

5 = *I experienced this change to a very great degree as a result of my stressful event*

1. I changed my priorities about what is important in life

0 1 2 3 4 5

2. I have a stronger religious faith

0 1 2 3 4 5

3. I put more effort into my relationships

0 1 2 3 4 5

4. New opportunities are available that would not have been otherwise

0 1 2 3 4 5

5. I have more compassion for others

0 1 2 3 4 5

6. I am better able to accept the way things work out

0 1 2 3 4 5

7. I am more willing to express my emotions

0 1 2 3 4 5

8. I see more clearly that I can count on people in times of trouble

0 1 2 3 4 5

9. I have a better understanding of spiritual matters

0 1 2 3 4 5

10. I have a greater feeling of self-reliance

0 1 2 3 4 5

11. I am more likely to try to change the things that need changing

0 1 2 3 4 5

12. I developed new interests

0 1 2 3 4 5

13. I better accept needing others

0 1 2 3 4 5

Appendix I:

Email to Study 3a participants inviting them to participate in 6-month follow-up

Dear Sir/Madam,

I am a PhD student at the University of Nottingham and I am working on a project concerning stressful or traumatic life experiences and their impact on individuals' psychological health and well-being. I am writing to you because approximately 6 months ago you took part in a research study that I was conducting about stressful or traumatic life events. As part of this study you completed a short questionnaire and at the end of it you provided this email address and gave permission for me to contact you with details about further studies in this area. This is why I am emailing you now – I am currently running a follow-up study and contacting participants who completed the first questionnaire to ask them to consider taking part in the second stage of the research program.

This second stage will involve completing a second questionnaire just like the first one you completed 6 months ago. The questionnaire will ask you about the most distressing or upsetting experience of your life and how you feel your life may have changed following this event. It should take approximately 20 minutes to complete. The study is completely anonymous and strictly confidential. You have the option to exit the study throughout and once you have started you are not obliged to continue if you do not want to.

If you do decide to participate, you will need to enter a username at the start of the questionnaire. This is so that your responses can be matched up with the responses you provided last time. The username that you created last time you took part was: [insert username]. Please provide this username when prompted during the questionnaire.

If you would like to know more about the study, follow the link provided below and you will find further information and the questionnaire itself [insert link].

If you have any questions about this study, please do not hesitate to get in touch with me.

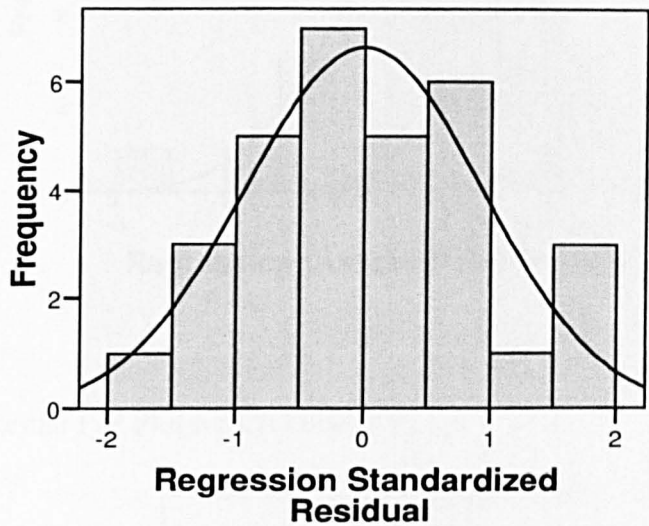
With many thanks and best wishes,

Hannah Stockton

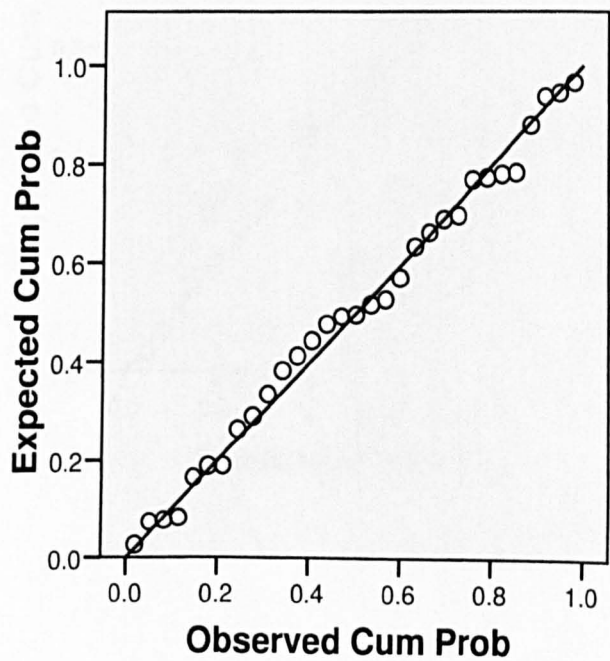
Appendix J:

Histograms and Normal Probability Plots for PTGI-CV and CiO Positive Heirarchical
Regression Models (Study 3b)

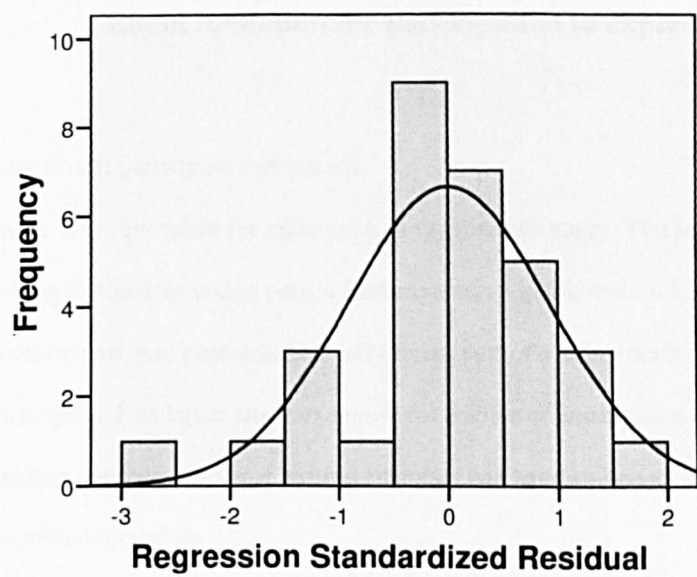
Histogram for PTGI-CV



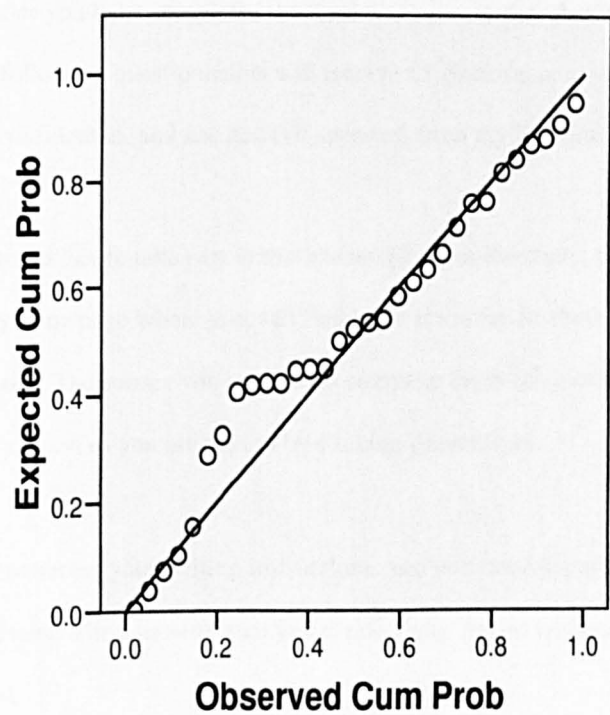
Normal P-P Plot for PTGI-CV



Histogram for CiO Positive



Normal P-P Plot for CiO Positive



Appendix K:

Email invitation for participation in expressive writing study (Study 4)

Dear [insert participant username],

Thank you very much for taking part in my research study. You indicated in your responses that you would be willing to consider taking part in further research in this area, which is why you have received this email. The questionnaire you completed actually forms part of a larger scale study for which you are also eligible to participate. This larger study examines the impact of writing on adjustment to traumatic experiences, exploring whether particular types of writing exercises can have an impact on symptoms of distress and recovery from emotional upheavals.

Participation in this phase of the study will involve completing a 15 minute writing exercise on 3 separate occasions, spaced 3 days apart, followed by a short online questionnaire to be completed two weeks and 8 weeks after you have completed the third writing exercise. Participants who complete all three writing sessions and the follow-up questionnaires will receive £5 Amazon.com vouchers. The study is completely anonymous, strictly confidential, and has had full approval from my institute's ethics committee.

If you would like to take part in this second phase of the study, click the following link, which will take you to the study homepage where you will find more information about this phase of the study and your writing instructions. The sooner you are able to complete the writing exercise the better, so please visit the study website as soon as you are able to by clicking [insert link].

In order to access your writing instructions, you will need to enter your username at the start of the questionnaire. The username that you created was: [insert username]. Please provide this username when prompted.

If you have any questions about this study, please do not hesitate to get in touch with me.

With many thanks and best wishes,

Hannah Stockton