

**TRAUMA WRITING TASKS: AN EXAMINATION OF THE PROCESS OF
CHANGE INDICATED BY COGNITIVE-BEHAVIOURAL MODELS OF
TRAUMA**

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Abstract

Past research indicates a causal relationship between emotional writing and health benefits (Smyth, 1998). At present, little is known about the mechanisms underlying change or if the emotional writing paradigm may be applied to a clinical setting. This present study reviewed current models of trauma and hypothesised three mechanisms of change leading to future health benefits: exposure, devaluation, and benefit-finding. Instructions for the standard writing paradigm were manipulated to isolate and increase engagement with each of these processes. It was hypothesised that if any one of these processes were to underlie health benefits, participants assigned to that condition would obtain more benefit than standard writing participants. Individual differences were also hypothesised to interact with each process to amplify or detract from their influence in leading to future benefit.

A total of 201 university students were recruited from Griffith University. Participants were assigned to one of five writing conditions: Control, Standard, Exposure, Devaluation, and Benefit-Finding. Sessions were conducted once a week for three weeks. Physiological and self-report measures were taken before, during and after writing sessions. Follow-up assessments of psychological and physical health were taken at 2 and 6-months post-writing.

Essay content analysis suggested that participants wrote in the instructed manner. Participants assigned to each of the groups experienced expected amounts of distress and affect changes. Overall, results failed to replicate the beneficial health effects for the standard emotional writing paradigm. There were no significant physical or psychological benefits for the standard trauma-writing participants in comparison to control. However, a trend in the appropriate direction was noted for illness visits at 6-months. Furthermore, in support of Greenberg and Stone's (1992)

findings, standard writing participants who disclosed more severe and personal experiences evidenced significant illness visit reductions in comparison to control.

Comparisons between standard and experimental trauma writing groups failed to support hypotheses that any one mechanism was responsible for physical health benefits. Examination of psychological self-report measures indicated exposure participants experienced the greatest reduction on the Impact of Events Scale at two months. However, these participants experienced greater reduction of positive affect and growth for the experience. They also became more anxious, depressed, and stressed at six-months follow-up. Process variables were examined within the exposure condition to explain these findings. Habituation was found to be strongly associated with the alternate outcomes. Individual differences, including alexithymia, absorption, and negative affect, were also related to outcome. Benefit-finding participants experienced the greatest increase on a measure of post-traumatic growth at two-months and positive affect for the experience, but the finding was significant only in comparison to exposure and devaluation groups.

The results of this study failed to identify the process of change, but suggest specific areas for future research. The findings demonstrate the importance of comprehensive health research to avoid blanket statements that suggest a paradigm either does or does not lead to health benefits. The results also support the manipulation of the writing paradigm to examine the role of emotion processing in trauma and health research.

Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Signed _____

Date _____

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Recent estimates suggest almost everyone experiences traumatic events throughout their lives (Norris, 1992; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). These events can have a deleterious effect on physical, psychological, and social well-being and cause significant economic cost to the individual and society (Amaya-Jackson et al., 1999; Jorgensen, Frankowski, & Carey, 1999; Kohn et al., 2001; Norlander, Dahlin, & Archer, 2000; van der Kolk, McFarlane, & Weisaeth, 1996). In the long term, it is estimated 15-30% of those exposed to traumatic events develop clinical symptoms of Post-Traumatic Stress Disorder (PTSD; Green, 1994). For those who do not develop PTSD, negative effects may persist years later (Wortman & Silver, 1989). It is clear that strategies designed to neutralize the impact of negative life events and traumatic stressors could have significant benefits for health in the community.

1.1. Emotional Expression, Writing, and Health

The psychological literature indicates that individuals are able to alter their coping approaches in order to reduce the negative effects of traumatic stress and major life events (Lazarus, 1999). Central to dominant approaches has been the notion that individuals need to confront, habituate, express, accommodate, or assimilate the subjective emotional experience associated with traumatic events (Foa & Kozak, 1986; Davey, 1997; Horowitz, 1976; Pennebaker & Susman, 1988). Regardless of therapeutic orientation, it is the facilitation of 'emotion processing' that has been suggested to be beneficial for physical and psychological health (Breuer & Freud, 1960; Brewin, Dalgleish, & Joseph, 1996; Foa & Jaycox, 1999; Harber & Pennebaker, 1992; Rachman, 2001). In contrast, research has provided strong evidence that suppression, repression, or denial of emotion processing generally has a negative effect on physical and psychological health (Wegner & Pennebaker, 1993).

Over the last two decades it has emerged that encouraging individuals in non-clinical samples to write their thoughts, feelings, and perceptions of past traumatic stressors produces physical and psychological health benefits. In a review of the majority of these articles, Smyth (1998) reported a total of 13 studies have used a controlled writing paradigm to examine the associated benefits. This meta-analysis indicated an effect size ($d = 0.46$, $r = .23$) significant at the $p < .001$ level for the trauma disclosure group over the control group in long-term health gains. Smyth suggested this effect size indicated an overall 23% improvement in long-term health, demonstrated for participants asked to write about traumatic experiences over the control groups. This effect is similar to that reported by studies examining the effects of other psychological, behavioural, or educational treatments (Smyth, 1998) and complements other research suggesting that writing about traumatic stressors may produce similar outcomes as psychotherapy (Murray, Lamnin, & Carver, 1989). In this meta-analysis, the number of studies required demonstrating a null hypothesis for the observed effect size to be diminished, the fail-safe N, was 199 studies. The results of this review were interpreted to indicate a causal relationship between written emotional expression of past trauma and positive long-term health outcomes (Smyth, 1998).

The implication of this research is that the writing intervention may provide a simple, cost-effective intervention to assist in buffering the deleterious effects of negative life events in the general population. At best, this simple and cost-effective intervention could be used in clinical populations by itself, or as an adjunct to therapy, for the treatment of trauma and other emotional conditions (L'Abate, 1991; Pennebaker & Sussman, 1989). Apart from clinical factors, researchers have suggested the paradigm could be theoretically important to provide a method of

assessing the role of emotion processing relatively free from therapist variables (Esterling, L'Abate, Murray, & Pennebaker, 1999; Murray & Segal, 1994).

1.2. The Paradigm: Procedure and Participants

Past research has employed a brief and simple writing paradigm that was originally published by Pennebaker and Beal (1986). The following is a general explanation of the standard writing paradigm. First-year college students are required to sit in a booth alone and write continuously for a period of fifteen to thirty minutes (Smyth, 1998). The number of writing sessions for each individual has included one to five sessions and has been spaced on a daily or weekly basis. The participants have been randomly assigned to each of at least two writing conditions, a control and a trauma disclosure condition. Participants in the control condition are generally asked to write about a non-emotional topic, such as their plans for the day. Participants in the standard trauma disclosure condition have been asked to write about the most personal and upsetting experience of their lives in an emotional and thoughtful manner. Some studies have required individuals to write about the same trauma event each day, while others have suggested participants are able to write about different trauma topics on separate days if they wish. Some studies have also asked participants to specifically write about traumas that have not been disclosed before. An example of the instructions are provided below:

‘During each of the four writing days, I want you to write about the most traumatic and upsetting experiences of your life. You can write on different topics each day or on the same topic for all four days. The important thing is that you write about your deepest thoughts and feelings. Ideally, whatever you write about should deal with an event or experience that you have not talked with others about in detail’ (Pennebaker, Kiecolt-Glaser, & Glaser, 1988, p. 240).

Studies have generally employed both psychological and physical measures of health to assess for outcome. Both have been considered important for comprehensive health research. Physical measures of health, for instance, have been suggested to provide more objective data for health research (Watson & Pennebaker, 1989). Alternatively, psychological measures provide easily attainable and condition specific data (Watson & Pennebaker, 1989). Past research also supports the notion that interventions may differentially effect psychological and physical systems (Keller, Schleifer, Bartlett, Shiflett, & Rameshwar, 2000). For instance, Smyth's meta-analysis indicated that two factors were associated with improved physical and psychological health: the increased use of male participation, and longer spacing between writing sessions. However, multiple factors positively influenced the effect size for psychological benefits only and included: the use of student participation, instructions to write about current traumas (as opposed to past traumas) and whether the study reviewed was published or not. Greater psychological benefits were found in studies that had not been published. In contrast, physical improvements were significantly influenced only by the discussion of past and current trauma, as opposed to past trauma only.

1.3. Outcomes: Short and Long-Term

In the short-term, disclosing past traumatic experiences can have a taxing effect on participants. For example, research by Pennebaker, Hughes, and O'Heeron (1987) required participants to talk alone into a tape recorder for six minutes while measures of both cardiovascular and electrodermal activity were taken. When individuals were required to disclose trauma experiences, as opposed to a non-emotional topic, they experienced elevations of cardiovascular activity (i.e., heart rate,

systolic and diastolic blood pressure) and negative mood (i.e., crying, self-reports of anger, sadness).

In this study, an interesting dissociation occurred for individuals identified as 'high-disclosers'. High-disclosers provided a trauma narrative that was extremely personal, emotional, and distressful, as determined by self-reports and independent judge ratings. During the disclosure, high-disclosers experienced significantly lower skin conductance levels than low disclosers. In comparison to self-report measures, the mean skin conductance measure was a better predictor of the degree of disclosure than were independent judge ratings of the tape-recorded disclosure. To make sense of this, Pennebaker et al. (1987) incorporated Gray's (1975) model of behavioural inhibition to suggest high-disclosers 'let go' or dis-inhibited their trauma. In contrast, low-disclosers held back and inhibited the emotional disclosure of their past trauma experiences. Pennebaker et al. hypothesized that this dis-inhibition would be associated with longer-term health benefits.

Follow-up intervals have generally been conducted between one and six months after the writing intervention. Outcome measures have indicated improvement for participants in the trauma disclosure condition, particularly on measures of physical health. At follow-up, first-year college students assigned to the trauma disclosure condition have reported significantly improved mood (Paez, Valesco, & Gonzalez, 1999) and decreases in intrusive thinking (Klein & Boals, 2001). Physically, participants demonstrate fewer-illness visits to the doctor, time off due to sick days (Pennebaker & Beall, 1986; Pennebaker, Colder, & Sharp, 1990), and self-report fewer somatic complaints (Greenberg, Wortman, & Stone, 1996).

Self-reports and visits to the doctor provide an indirect measure of physical health that may be subjected to multiple demand characteristics, such as personality

style (Watson & Pennebaker, 1989). The strongest evidence linking physical health improvements comes from four separate studies demonstrating immunological improvements. Reported immunological benefits include enhancement of selected T-helper cell activity (Pennebaker, et al., 1988), response to latent Epstein-Barr virus reactivation (Esterling, Antoni, Fletcher, Margulies, & Schneiderman, 1994), and response to hepatitis-B vaccination (Petrie, Booth, Pennebaker, Davison, & Thomas, 1995). Overall, all of these observed health benefits have been found to be significant when social support has been statistically controlled and also unrelated to changes in health behaviours (Stone, Smyth, Kaell, & Hurewitz, 2000). In summary, these data provide evidence for the long-term beneficial effects of trauma disclosure. However, for the paradigm to be clinically useful and flexible, these effects need to be demonstrated on multiple populations for various topics.

1.4. Other Populations and Topics

Generally, university participants have been studied and asked to disclose a trauma topic of their choice. Studies that have employed other instructions indicate participants may write about a specific stressor topic and still obtain benefit. Three studies assigned first-year college participants to write about their thoughts and emotions associated with adjusting to college (Cameron & Nicholls, 1998; Pennebaker et al., 1990; Pennebaker & Francis, 1996). Long-term health data in these studies indicated improvement. Emotional disclosure participants made fewer visits to the health centre, attained a better GPA in comparison to control participants, and adjusted better to college as indicated by the College Adjustment Test (Pennebaker et al., 1990).

One study (Spera, Buhrfeind, & Pennebaker, 1994) recruited layed-off professionals to write about their job loss. They found that participants in the trauma

disclosure condition were re-employed quicker and experienced less absenteeism days from work. Richards, Beal, Seagal, and Pennebaker (2000) recruited 98 prisoners, (47% = sex offenders, 53% = non-sex offenders) who had all received at least one DSM-IV diagnosis. In this sample, only trauma writing participants classified as sex offenders obtained health effects, as measured by fewer infirmary visits. Unlike past studies, this measure was not specific to illness visits and may have been confounded as a measure of physical health by the inclusion of visits that were for injuries and miscellaneous other reasons. Psychological measures of health did not obtain significance in any condition. The authors were unable to explain why the psychological benefits were not obtained or why the general population of inmates did not obtain benefit. However, Richards et al. did suggest that individuals who suffered socially stigmatised traumas may be more likely to 'hold back' their experiences and obtain the greater benefit from the paradigm than other inmates.

Most studies to be reviewed in the following sections were completed after the Smyth (1998) review. Thus, their results were not included in the meta-analysis. The findings over the past five years have been far more inconsistent. Four studies have examined the effect of the Pennebaker writing intervention for participants suffering grief and loss (Kovac & Range, 2002; Range, Kovac, & Marion, 2000; Stroebe, Stroebe, Schut, Zech, & Van den Bout, 2002). None of these studies were able to replicate significant health improvements for the emotional writing task. Kovac and Range (2000) suggested the writing paradigm was beneficial for students who had a family member suicide in the past two years. However, their results were based on two lesser known and poorly validated self-report grief questionnaires. There were no effects demonstrated on general measures such as the Impact of Events Scale or illness visits. Stroebe et al. recruited 119 bereaved partners to write about their

upsetting experience and assigned them to one of three conditions, control, standard writing, and a problem-solving condition. This study revealed no effects of writing on IES scores, general health (GHQ), or physician visits (Stroebe et al., 2002). Stroebe et al. concluded that based on these results, the writing paradigm was not useful for this population. They suggested that this may be a population specific problem, with poor responses found with many standard psychological interventions for this population.

Effect on Trauma Symptoms

A number of studies have specifically examined the effect of trauma disclosure on trauma symptoms in non-clinical populations. Two of these studies (Klein & Boals, 2001; Schoutrop, Lange, Hanewald, Davidovich, Salomon, 2002) have produced effects. The latter compared with a wait-list control, which confounds results. For instance, measures such as the IES have been found to be susceptible to time effects for control groups who have been required to participate in a non-emotional writing task (Lepore, 1997; Smyth et al., 2002). In contrast, eight studies have failed to demonstrate a reduction in trauma symptoms, as measured by the Impact of Events Scale (Brown & Heinberg, 2001; Gidron, Peri, Connolly, & Shalev, 1996; Greenberg et al., 1996; Kovac & Range, 2002; Lepore, 1997; Paez et al., 1999; Smyth et al., 2002; Stroebe et al., 2002). In fact, three studies (Greenberg et al., 1996; Smyth, True, & Souto, 2001) found a negative effect on the avoidance sub-scale of the Impact of Event Scale. Two of these studies (Greenberg et al., 1996; Smyth et al., 2002) used one writing session and suggested that the single writing session may have exposed individuals to the trauma without providing a follow-up opportunity for them to habituate to the memory. Thus, the writing session may have re-traumatised them.

Three of these studies that failed to reveal effects employed individuals with significant PTSD symptoms (Brown & Heinberg, 2001; Gidron et al., 1996; Smyth et

al., 2002). Of these studies, Gidron et al. (1996) were the only researchers to employ participants with a PTSD diagnosis. They found ratings of avoidance symptoms and health care utilization at 5-week follow-up increased for the trauma writing group. Furthermore, emotional disclosure was positively related to health care visits. The authors suggested that the three 20 minute writing sessions may not have provided enough time for habituation in a PTSD population, or provided an opportunity to develop adequate coping responses in addition to the self-exposure. Overall, the overwhelming majority of these studies suggest that the writing paradigm may be insufficient in its current form to treat traumatised populations, although larger studies are required.

On the basis of current evidence it appears that the writing paradigm does not reduce trauma symptoms and could potentially produce negative effects. However, there is some support for the notion that multiple writing sessions may provide an opportunity for individuals to cope with, or habituate to, the distressing images of the traumatic event in non-clinical populations (Lepore, 1997). For example, Lepore used a student population to assess whether there were any benefits on IES scores in relation to an impending students exam. While the study found no impact of writing on IES scores, they did report a reduction in depression symptoms for the trauma writing condition. Further, the intrusion sub-scale score was found to predict depressive symptoms only in the control condition. That is, there was no relationship between intrusion scores and depression for trauma-writing participants, but there was for control. Lepore argued that, based on these results, the writing paradigm may improve trauma coping in student populations by reducing the effect of trauma symptoms on depression. In a subsequent study, Smyth et al. (2002) replicated these findings for individuals who had experienced a natural disaster. While Lepore's

conclusions are not unfounded, associative findings do not provide strong evidence for improved coping for trauma writing participants and further research on the relationship between emotional writing, depression, and trauma symptoms is required.

A third study by Paez et al. (1999) produced alternate support for the conclusion that trauma writing assists the individual to cope with trauma symptoms. They found that trauma-writing participants self-reported a decrease on how arousing it was to remember the event and decreased their negative appraisal ratings about the event at follow-up. While providing the strongest evidence for improvements, these findings should be accepted cautiously. Measures demonstrating effects in this study have not been validated in clinical research. Overall, it may be concluded that some tentative evidence suggests trauma writing may assist individuals to cope with trauma symptoms.

Health Conditions

A population that has generated significant research interest has been individuals with health conditions. Two studies have recruited individuals with Rheumatoid Arthritis (RA: Kelley, Lumley, & Leisen, 1997; Smyth, Stone, Hurewitz, & Kaell, 1999). Kelley et al. (1997) assigned RA patients to either a trauma talking condition or a control talking condition. The trauma disclosure participants experienced a significant reduction in physical dysfunction and less affective dysfunction in comparison to controls. There were no differences in self-reports of pain, nor was there any differences in physical changes in the individual joint condition. The second study (Smyth et al., 1999) recruited two groups of participants, RA patients and Asthma patients. Each group was split into control and trauma writing for three consecutive writing days. Results indicated that at 2 and 4-month follow-up, the Asthmatic trauma writing participants decreased on a disease rating for

one outcome measure (forced expiratory volume) but not others (forced vital capacity, quality of life), in comparison to control. For RA patients, there were no health effects at 2-month follow-up. At 4-month follow-up, trauma disclosure participants decreased on overall disease activity, but not joint pain, joint swelling, or PA symptoms. The results of this study should be viewed as tentative. Not all objective health measures showed effects, psychological measures of health were not presented and effects were found at certain follow-up but not others. Finally, the authors conducted a final analysis by splitting the experimental condition into two groups, responders and non-responders. They found that half of the trauma-writing participants did not respond to treatment on measures that produced effects. Therefore, at best it may be concluded that on selected health outcome measures, some RA patients obtained health benefits.

Two studies recruited patients with different types of cancer (Rosenberg et al., 2002; Stanton et al., 2002). Stanton et al. used stage one and two breast cancer patients. Participants were assigned to control, standard trauma, and a benefit-finding writing conditions. Trauma writing condition participants visited the doctor less than control. No measure of psychological distress attained significance overall. However, results indicated that those high in cancer-related avoidance suffered more in the standard trauma writing condition, while those low in cancer-related avoidance reported some benefit, in comparison to the two other conditions. This study provided tentative support for alternate outcomes according to individual differences and also suggested that a sub-group may suffer from an emotional expression task.

Rosenberg et al. (2002) employed 58 men with prostate cancer and assigned them to a trauma writing condition or a control. The study provided tentative support of physical health benefits for trauma writing participants, as indicated by a self-report measure of physical symptoms and found a trend in the predicted direction for

physician visits. However, the study indicated there were no effects on a pain measure, four other psychological measures, and no immune system benefits (PSA values, peripheral blood T-cell proliferation, and serum cytokine levels of TNF alpha). Overall, it may be concluded that some cancer patients may receive physical health benefits, but some will not. Further, there is unlikely to be psychological benefits, with some even suffering from the paradigm.

Finally, one study recruited somatizing participants (Schilte et al., 2001) and assigned them to trauma disclosure or control (no intervention). The former were required to disclose their trauma to a visiting doctor on two occasions and write about the trauma in between visits. This study failed to produce physical (physician visits) benefits, health behaviour improvements, or psychological benefits (Symptom checklist 90) at 6-month, one-year and two year follow-ups. However, it should be noted that research has previously indicated confession-based paradigms are less likely to reveal health benefits (Pennebaker et al., 1987).

Overall, studies using clinical health populations published at the time of this writing provide, at best, inconsistent evidence that writing improves health for patients in a variety of populations. It appears that researchers are unable to predict which measures will demonstrate the health effect and at what follow-up interval. In light of numerous non-significant effects and design difficulties (using talking instead of writing), more studies are required to demonstrate effectiveness for the writing intervention in health populations. On the basis of current results, it would seem that the writing paradigm is limited in its capacity to improve health in a clinically significant manner for many individuals who complete the paradigm.

1.5. Contradictory Findings

Smyth (1998) suggested in his review that the evidence indicated a causal link between emotional writing and health benefits. While these conclusions were not unfounded at the time, the conclusion appears more complex given current inconsistencies. There are multiple replications of the Pennebaker paradigm that have failed to produce any health benefits in both university (Greenberg & Stone, 1992; Honos-Webb, Harrick, Stiles, & Park, 2000; Kloss & Lisman, 2002) and other populations (Stroebe et al., 2002). There have even been findings from studies to indicate that the writing intervention may have had a negative effect on individuals for both psychological parameters (Greenberg & Stone, 1992; Greenberg et al., 1996; Smyth et al., 2001; Stanton et al., 2002) and physical parameters (Honos-Webb et al., 2000). For instance, Greenberg et al. (1996) found that university trauma-writing participants actually increased the reporting of avoidant trauma symptoms and fatigued mood.

When making conclusions about the paradigms effectiveness, there is also general tendency to place greater focus on measures that produce significant effects. For instance, studies that report the writing intervention was beneficial have often failed to replicate health benefits on other measures, such as self-report measures of health (Paez et al., 1999; Richards et al., 2000), illness visits to the doctor (Kelley et al., 1997; Kovac & Range, 2000), psychological measures of health (Greenberg et al., 1996; Rosenberg et al., 2002; Stanton et al., 2002), or immune system measures (Rosenberg et al., 2002). Some studies report significant effects on physical health-measures, such as physician visits or immunological data, but do not report the effect on other standard self-report measures of psychological distress or physical symptoms (Esterling et al., 1994; King, 2001; Pennebaker et al., 1988; Pennebaker et al., 1990;

Spera et al., 1994) and vice versa (Smyth et al., 2002). Some studies have stated that benefits exist, when the control group was a wait list control (Schoutrop et al., 2002), even though time effects have been demonstrated on active control groups. A final consideration has been a tendency for some researchers to conclude that the writing paradigm was effective based on measures that are not widely known or have not demonstrated validity (Kovac & Range, 2000; Paez et al., 1999).

Based on the review conducted thus far, it would seem health benefits attained from completing the writing paradigm are not clearly understood and are produced inconsistently across sites and populations. Effects on psychological measures are particularly inconsistent and the outcome measures employed vary significantly. This means the nature of the benefits appears to change from study to study, despite few differences with the paradigm being employed. On the basis of such inconsistent research, it makes it difficult to explain how, why, or when the intervention is effective and recommend it as a practical tool for clinicians.

However, there are interesting associations between trauma disclosure and health that require further research. For instance, research seems to indicate that those who appear to become highly emotionally engaged within disclosure may benefit more in comparison to those who seem unable to emotionally engage (Pennebaker et al., 1987). Alternatively, writing may not decrease trauma symptoms, but it may assist coping with trauma symptoms (Lepore, 1997). These associations, and others to be discussed, have led to a growing focus on identifying the process of change in the writing paradigm.

1.6. Past Research on the Process of Change

'Knowing that it works is not enough. A technique or an instrument may work well and even be used for great social benefit, but while its inner mechanisms remain a mystery, it begs for scrutiny' (Millon, Davis, Millon, Escovar, & Meagher, 2000, p. 91).

Research over the last decade has increasingly focused on identifying process of change variables. These can have important implications. Firstly, the identification may lead to modifications of the paradigm to ensure maximal benefit for users. Secondly, individuals who are less likely to benefit from the paradigm may be excluded or offered alternatives to its use. Finally, at the time of this writing, the paradigm had not been applied successfully in a clinical setting to treat psychological disorders. Without an understanding of the mechanisms of change, it is difficult to assess whether the paradigm may be clinically useful and what circumstances it should be used.

Researchers have identified the mechanisms of change through 1) correlation analysis of predictor variables thought to mediate health benefits, and 2) the manipulation and modification of the trauma disclosure condition in an attempt to isolate processes thought to mediate health benefits. These will now be reviewed.

Correlation Analysis of Predictor Variables

Studies that have attempted to correlate specific process variables in the prediction of health benefits have isolated cognitive-linguistic and trauma disclosure factors. Researchers have used a Linguistic Inquiry Word Count Program (LIWC; Pennebaker, Francis, & Booth, 2001) to analyse the written text and revealed a relationship between increased use of cognitive change words over writing sessions (increases in insight, self-referent and causality word usage) and future health benefits

(Pennebaker, 1993; Pennebaker & Francis, 1996; Pennebaker, Mayne, & Francis, 1997).

A study by Suedfeld and Pennebaker (1997) provided evidence to suggest other important cognitive change processes. They re-analysed the data from Pennebaker et al. (1988) and found health benefits were linked to increases in cognitive complexity of the narrative. Cognitive complexity was defined on a seven-point scale from (1) differentiation without integration, to (7) high levels of integration involving super-ordinate or over-arching concepts. Higher levels of complexity required participants to invest more time and effort into thinking through the facets and implications of a problem and possible solutions. It was revealed that moderate complexity was associated with increased health benefits, particularly for those narratives that increased in complexity over time. Individuals who began with a highly complex narrative were less likely to obtain benefits, as were individuals who maintained a low-level integrated narrative. It was suggested that these individuals may engage in counter-productive, ruminative, and static thinking processes.

Honos-Webb et al. (2000) contradicted these seemingly consistent findings linking cognitive changes to improved health. They rated essays according to an assimilation model they developed and found that university students who had the greatest cognitive change, according to the assimilation model, visited the health centre more. However, this study should be taken with caution as they combined both injury and illness visits and reported that the health visit measure was heavily influenced by outliers in the trauma writing sample. Overall, it would seem that associatively identified change processes include the development of insight, ideas of causation, link of self within the narrative, and the development of a cohesive and detailed narrative.

Studies suggest the expression of emotion may be critical to health benefits (Pennebaker & Beal, 1986; Pennebaker et al., 1987). However, in contrast to the relatively consistent findings associated with cognitive change variables, analysis of emotional valence has been equivocal. Pennebaker (1993) found the increased expression of negative emotions to be linked to health benefits, while the increased expression of positive emotion was linked to subjects who did not obtain any benefits. In contrast, Francis and Pennebaker (1992) found the use of positive emotion words, not negative emotion words, was associated with health benefits. The third study by Pennebaker et al. (1997) suggested subjects who increased their use of positive emotion words and expressed fewer negative emotion words obtained the greater health benefit. In light of these findings, it remains unclear whether the expression of positive or negative emotion or changes over time in emotional valence is related to health benefits.

Finally, research has attempted to relate the type of disclosure with health benefits. Analysis has found the disclosure of highly stressful and personal experiences (Pennebaker, 1993) and the greater severity of the trauma disclosed (Greenberg & Stone, 1992), the more likely the health benefits. As reported, Smyth's (1998) meta-analysis indicated that individuals obtain greater benefits if they disclose current trauma as opposed to past trauma. Two studies (Pennebaker et al., 1988; Paez et al., 1999) found that those who have inhibited or not disclosed their trauma previously obtain the greatest health benefits, while another failed to support this relationship (Greenberg et al., 1996). In summary, it is currently unclear whether undisclosed traumas or the disclosure of current traumas amplify health effects. It would seem that in general, there is some support for the notion that the processing of traumas that may be more difficult to confront may result in greater long-term benefit.

Manipulation of Writing Condition

Studies reviewed implicate multiple mechanisms involved in obtaining future health benefits. However, correlations are difficult to interpret, particularly when inconsistent findings exist. A second method to identify processes of change has been to manipulate the trauma condition to isolate processes hypothesized to mediate change. Seven identified published studies have experimentally manipulated the trauma disclosure condition in an attempt to identify the important aspects of trauma disclosure.

Pennebaker and Beal (1986) assigned participants to three trauma-writing conditions where they were asked to write about either their 1) emotion only, 2) facts only, and 3) a combination of emotions and facts about the trauma over four days for 15 minutes per session. They suggested these conditions tested a discharge cathartic model (Nichols, 1974), purely cognitive model (Meichenbaum, 1977) and a cognitive-emotion cathartic model (Breuer & Freud, 1960), respectively. Results indicated the trauma combination and emotion only groups experienced similar short-term effects. In contrast, control and fact trauma writing groups scored similarly on short-term measures. For long-term health, it was the trauma combination group that evidenced improvement on measured physician visits and the greatest improvement on physical and psychological self-report health measures. The only other group to experience long-term health benefits was the trauma emotion group with self-reports indicating a decrease in psychological complaints. However, no physical improvements were reported for this group. This study was suggested to support the integration of cognition and emotion as mediating future long-term health benefits. In contrast to a venting-hypothesis, it was found that both emotion and combination

groups self-reported thinking more about the trauma over the four months that followed writing than other groups.

Smyth et al. (2001) examined how important it was to develop a narrative of the event. They asked individuals to write about their traumatic experience in a fragmented format or to construct a narrative. They found that individuals obtained health benefits as measured by self-reports of physical symptoms and activity restriction only in the narrative disclosure condition. Thus, it was concluded that developing a narrative was particularly important for long-term health benefits. It should be noted this study did not use physician visits as an outcome measure.

A third study by Paez et al. (1999) examined whether individuals needed to emotionally engage in the trauma memory for a long period of time. Subjects were assigned to write about their traumatic experience over a 20-minute period for three days, or over a three-minute period for one day. Those who wrote about traumas for three minutes experienced a similar distress level of initial distress as those who wrote for twenty minutes. However, the three-minute writing group suffered an increase in their negative appraisals associated with the trauma. In contrast, those who wrote about their traumas for twenty minutes experienced significant decreases in appraisals and habituated, according to a self-report Impact of Remembering Scale. This scale was not validated in trauma populations. In the long-term, it was only the 20-minute writing group that achieved health benefits. Paez et al. (1999) suggested that both habituation and re-appraisal processes may underlie improvements.

These studies provide strong evidence that individuals need to emotionally process the trauma narrative over a period of time. That is, there is evidence from these studies that it is not sufficient just to recall information in an unstructured, factual manner or over a short interval, to achieve benefits. Overall, these findings

have also been interpreted to best support a habituation and re-appraisal model as mediating health benefits. However, studies have not tested this hypothesis directly and comprehensive assessment is required.

The four studies reviewed so far have examined the importance of engaging with the trauma memory. Three of the four studies conclude that it is important to engage in the memory by describing in narrative form one's deepest thoughts and emotions over an extended period of time. Three studies have altered the type of writing about the traumatic experience. These studies do not imply that engaging with the memory is not important, but suggest that focusing on what is distressing may not be important.

King and Miner (2000) tested the assumption made by recent trauma models (Affleck & Tennen, 1996) that perceiving positive benefits in trauma experiences leads to future resilience. They assigned participants to control, standard trauma, perceived benefits only condition and a combination of trauma writing and perceiving benefits condition. Results indicated that, in the short term, participants did not report increases of negative affect immediately after disclosure. In the long-term, writing about the trauma only and benefits only was associated with long-term benefits, as measured by physician visits, while writing about both trauma and benefits was associated with weaker health improvements. To examine the processes responsible for the health benefits, a Pearson's correlation indicated that different predictors mediated health benefits for the two groups. An association was found between insight and health benefits for the positive benefits only group, but not for the trauma group. The authors concluded that different mechanisms were responsible for health benefits in the two trauma groups. This left the results of this study inconclusive in regards to mechanisms of change for the standard writing paradigm. King and Miner

(2000) and King (2002) suggested that writing about positive benefits could improve health benefits through the construction of a resilient possible self that may assist in future emotion regulation and coping with future life difficulty. However, there was no outcome data to demonstrate such changes.

Stanton et al. (2002) partially replicated these effects with women who had breast cancer. They found that the standard disclosure condition was marginally more effective than the positive benefit-finding condition and the positive benefit-finding condition was more effective than the control in reducing physician visits. Similarly, King (2001) conducted a second study to examine the benefits of writing about all of the best possible outcomes for an individual's life goals. Structured in a similar format to the previous study, they found that participants assigned to both the trauma writing and the life goals writing condition obtain health benefits as measured by physician visits. Once again the combination group did not obtain benefits.

Finally, Greenberg et al. (1996) tested the assumption that enhanced self-efficacy and coping skills in dealing with negative emotion may mediate future health benefits. They assigned participants to a standard trauma writing group and a second imaginary trauma group that was required to write hypothetically about a trauma as if it were real, based on a description of a trauma given to them. Participants assigned to the imaginary group were suggested to use their imagination, media-based experiences, and vicarious influences to construct the hypothetical narrative. In contrast to the real-trauma writing group, the imaginary trauma participants did not experience significant increases in negative affect. Long-term health measures indicated a reduction for both the real-trauma and imagery-trauma groups in health centre visits, as compared with control participants. Once again, examination of processes responsible for the health benefits indicated different predictor variables

mediated health benefits for the two groups, leaving the results of this study inconclusive in regards to mechanisms of change for the standard writing paradigm. For the trauma condition, hypothesized mechanisms included increased emotion regulation skills, engagement/habituation with the trauma memory, and memory reconstruction processes. For the imaginary trauma group, possible processes hypothesized included emotion regulation and construction of a resilient possible self.

In review of the studies, it would appear that a number of different hypothesis exist as to mechanisms associated with future health benefits. These include exposure, habituation, cognitive change mechanisms such as re-appraisal processes and the development meaningful insight in relation to the experience, and the construction of a resilient possible self. Unfortunately, these studies have been unable to isolate processes of change at this stage. One of the reasons for that is the lack of comprehensive evaluation of the mechanisms of change. One study by Kloss and Lisman (2002) illustrates the lack of comprehensive evaluation in the writing literature.

Kloss and Lisman (2002) claimed to assess the habituation hypothesis as a mechanism of change in the writing paradigm. They measured negative affect on the PANAS immediately after writing over three writing days. They predicted the trauma-writing participants would gradually decrease their ratings of negative affect following writing over each of the three sessions. In contrast to their prediction, they found that participants in the trauma-writing group did not decrease in their negative affect ratings. The authors then concluded that habituation was unlikely to be a mechanism of change.

This study contained numerous confounds, making conclusions erroneous. Firstly, participants were free to write about a different topic each writing session.

Secondly, there was no assessment to determine if participants who had increased engagement with the trauma memory obtained increased benefit, as would be indicated by exposure based trauma models (Foa & Kozak, 1986). Thirdly, all measures of distress examined how they felt immediately following writing, as opposed to whilst they wrote. Major exposure based trauma models (Foa & Kozak, 1986) suggest habituation is related to the decreased level of distress between sessions and within session. Both of these measures require an assessment of distress whilst writing, rather than post-writing. Therefore, conclusions from this study can only be considered, at best, tentative.

Alternatively, King and Miner (2000) suggested that benefit-finding and constructing a resilient self is likely to be a mechanism leading to future health benefits. This was based on their study that had found writing about positive benefits gained from a trauma leads to health-benefits. However, the authors did not measure the concept of benefit-finding or operationalise 'constructing a resilient possible self' either in the writing script or as an outcome measure. Thus, it is unclear whether these type of changes actually occurred and could account for health benefits.

As yet, there has been no comprehensive evaluation of the mechanisms highlighted by trauma models in predicting health benefits. As noted by reviews of this literature (Bootzin, 1997; Littrell, 1998; Smyth, 1998), multiple continuous measures are required to assess trauma recovery processes in an attempt to provide some conclusion as for need to, or benefits associated with, disclosing traumatic experiences through writing. Mechanisms identified and evaluated must be theoretically consistent with current research and the relevant trauma models will now be reviewed.

1.7. The Psycho-Somatic Theory of Inhibition

Pennebaker and Susman (1988) originally presented a Psychosomatic Theory of Inhibition to explain the observed beneficial effects of disclosing traumatic experiences through writing. Central to this theory was the assumption that thoughts, feelings, and behaviour were active processes that require physiological work (Pennebaker & Susman, 1988). Inhibition of these thoughts, feelings, and behaviour was proposed to increase short-term physiological arousal. Over time, this short term increased arousal was suggested to serve as a cumulative stressor, increasing vulnerability to disease and decreasing long-term health. Consequently, the theorists hypothesized that if the event was confronted and disclosed, the individual could reduce the work of inhibition and lower the stress placed on his or her body in the long-term.

Evidence to support the Psychosomatic Theory of Inhibition remains equivocal. A number of questionnaire based studies support the notion that the experience of past trauma leads to future negative health effects, particularly for traumas experienced in early childhood which remain undisclosed (Pennebaker, 1997). Further, indirect findings suggest that individuals with a propensity to repress or conceal (i.e., shyness) report more health problems than individuals who are characterized as less inhibited (Pennebaker, 1993, 1997).

However, research has been inconsistent in demonstrating that it is more beneficial to disclose a previously inhibited trauma as opposed to a disclosed trauma (Smyth, 1998). It has also been unclear whether the disclosure of past traumas may be more beneficial than the disclosure of recent or current trauma (Greenberg & Stone, 1992; Smyth, 1998). Finally, research has been unable to directly assess the accumulation of stress on the body in the long-term by a trauma experience (Littrell,

1998) and the evidence to demonstrate that disclosure reduces inhibition and thereby reduces health has not developed (Pennebaker, 1997).

In contrast to the theory, evidence indicates that emotional disclosure of trauma can result in an increase in thinking and pre-occupation with the experience, rather than an alleviation or 'letting-go' of the experience (Mendolia & Kleck, 1993; Pennebaker & Beall, 1986). Finally, the theory is unable to predict or cannot explain why particular variables, such a cognitive change variables, may be important for disinhibition to occur. Recent findings have led to modifications of the theory to accommodate evidence that cognitive and social factors may be important. However, with researchers unable to directly assess the Psychosomatic Theory of Inhibition or use it to identify important predictor variables in the processes of change, recent authors (Littrell, 1998; Smyth, 1998) have focused more on widely used models of traumatic stress to account for current findings.

While the underlying mechanism has been a point of contention, it has long been considered beneficial for clients to emotionally process past trauma (Brown, 1921; McDougall, 1921; Myers, 1921). Current dominant models of trauma highlight a variety of factors that are believed to be important for treatment (Ehlers & Clark, 2000) and three main factors highlighted in both the writing literature and the trauma literature will now be reviewed. These include exposure to the feared memory, re-appraisal of the threatening stimulus, and benefit-finding.

1.8. Exposure and Habituation to the Trauma Memory

There is general agreement across models that exposure to the trauma memory is important for recovery (Ehlers & Clark, 2000). Once again, operating mechanisms of exposure in the treatment of PTSD have been a point of contention. For instance, hydraulic models suggest that exposure allows the individual to release pent up

energy (Nicholls, 1974). Conditioning models (Mowrer, 1960) have argued that fear responses to trauma cues operate as conditioned responses. These theories suggest that exposure provides a corrective experience to extinguish the association between the trauma cues and the conditioned response (fear). More recently, cognitive-behavioural models of trauma have focused on the differences between trauma memories and other everyday types of memories. These theorists, for instance, highlight the lack of structure, increased intrusiveness, context specificity, and lack of explicit elaboration within trauma memories (Alvarez-Conrad, Zoellner, & Foa, 2001; Ehlers & Clark, 2000; Gray & Lombardo, 2001; Porter & Birt, 2001). These findings have led to theories that suggest imaginal exposure provides an opportunity to elaborate and modify on implicit fears structures so that the memory may be incorporated and assimilated into more normal, everyday memory structures (Ehlers & Clark, 2000; Foa & Kozak, 1986).

Foa and Kozak's (1986) Emotional Processing Theory (EPT) has been dominant in explaining the importance of imaginal exposure in the treatment of trauma. Foa and Kozak reported that individuals who suffer PTSD symptoms experienced heightened arousal when exposed to cues associated with the trauma event. Basing much of their theory on Lang's (1979, 1980) Bio-Informational Emotional Imagery Model, they suggested this heightened arousal was due to primitive fear structures developed within the trauma memory. Foa and Kozak (1986) suggested these fear structures could be accessed and modified by various trauma cues, including imaginal exposure.

The theorists suggested imaginal exposure was particularly effective in accessing fear structures if individuals could provide a detailed verbal description of the set of events at the time of the experience. EPT suggested activation of the fear

structure would be enhanced if the description elaborated on the sensory aspects of the memory, as well as the various personal physical, emotional, behavioural, and cognitive reactions experienced at the time. These important factors have also been elaborated in further models. For instance, Brewin et al., (1996) define situationally accessible memory processes (SAMS) to describe memory for traumatic experiences which is more perceptual, implicit, and automatic. They also argued that these memory structures needed to be accessed and modified during imaginal exposure.

EPT focused on physiological and emotional measures as markers for engagement with the fear structure. That is, elevations on physiological measures (i.e., cardiovascular activity, electrodermal activity) and self-report distress levels (SUDS). Recovery processes were hypothesised to occur during the activation of the fear structure. EPT argued that during exposure, the individual would incorporate new information inconsistent with the original fear structure. This could be both a conscious and unconscious process. However, they argued habituation provided evidence for the modification of the fear structure. That is, a gradual decrease in affective arousal and physiological arousal (i.e., heart rate, SCL, SUDS) during imaginal exposure to trauma cues. It was hypothesised the decrease in arousal could occur within session, the difference between the highest level of arousal during the imaginal exposure session and the level of arousal at the end of the session. Alternatively, it could be evidenced as between session habituation, the difference between the average levels of arousal during each subsequent exposure session.

In summary, EPT suggests that exposure is beneficial for individuals who are able to initially engage with the trauma memory, and incorporate new, corrective, information necessary to change the fear structures, as indicated by within and between session habituation (Jaycox & Foa, 1999). Overall, there is strong evidence

to support the effectiveness of exposure based treatment methods in decreasing arousal and treating PTSD (Foa & Meadows, 1997; Tarrrier, Sommerfield, Pilgrim, & Humphreys, 1999). In support of EPT, moderate to high levels of initial emotional engagement within the trauma memory, as indicated by physiological arousal (i.e., heart beat and SCL) and self-reports (level of distress), have been associated with improved recovery (Jaycox, Foa, & Morral, 1998; Foa, Riggs, Massie, & Yarczower, 1995). Decreased engagement, as indicated by low physiological responses, dissociation, emotional numbing, and avoidance of the trauma memory, has been associated with increased poorer health outcomes (Marmar, Weiss, Metzler, & Ronfeldt, 1996; Wegner & Lane, 1995). Further, the importance of engagement and habituation during imaginal exposure has been indicated by recent research linking different response patterns to exposure with outcome (Jaycox et al., 1998; Van Minnen & Hangenaars, 2002). These process studies seems to highlight the specific importance of between session habituation in predicting trauma symptom outcome. For example, Jaycox et al. found PTSD patients who experienced moderate levels of initial engagement and subsequent between session habituation, as indicated by self-report distress levels, obtained the greatest benefit from exposure sessions in comparison to other groups with differing response patterns.

Exposure and subsequent habituation to the trauma memory has been suggested as a possible mechanism leading to future health benefits within the writing paradigm (Greenberg et al. 1996; Paez et al. 1999). No studies have conclusively examined this process within the paradigm. One study revealed that subjects in the trauma disclosure condition self-reported fewer emotional and physiological arousal responses to the trauma memory in comparison to control (Paez et al., 1999). However, these measures were not well validated. In a second study, Mendolia and

Kleck (1993) required participants to watch a disturbing video and then disclose either emotionally or factually about the trauma over a one-minute talking session. This study found that only emotional disclosure participants habituated to the trauma when the video was presented 48 hours later. Unfortunately, this varies significantly from the writing paradigm and can only provide tentative evidence for exposure in writing paradigms. Finally, as stated previously, Kloss and Lisman (2002) claimed that exposure was unlikely to underlie the writing paradigm based on the finding that participants did not decrease their rating of negative affect after writing. However, this study failed to assess any measure of arousal whilst writing, making it unclear whether participants experienced either within session or between session habituation. From the current review, it is clear that exposure and habituation requires further evaluation as a mechanism of change in the writing paradigm.

1.9. Re-Appraisal of Threatening Stimuli

Cognitive models assert that attention to threatening stimuli, implicit and explicit memory retrieval biases to threatening information, and negative appraisals, are important to the aetiology and treatment of emotional disorders (Beck & Emery, 1985; Bower, 1981; Williams, Watts, McLeod, & Matthews, 1997). Cognitive-Behavioural and Social-Cognitive models have received much research and theoretical attention in the trauma literature. However, different models highlight differing critical cognitive factors that are related to trauma pathology (Chemtob, Roitblat, Hamada, Carlson, & Twentyman, 1988; Creamer, 1995; Davey, 1992, 1997; Ehlers & Clark, 2000; Foa, Sketee, & Rothbaum, 1989; Janoff-Bulman, 1989).

More behaviourally focused models of trauma (Davey, 1997; Davey & Dixon, 1996; Foa, Sketee, & Rothbaum, 1989) tend to highlight appraisals of the stressor itself. For example, Foa et al. (1989) highlight appraisals of the event as highly

threatening, uncontrollable, and unpredictable in moderating trauma symptoms. Similarly, Davey's (1993; 1997) Evaluative Condition Model explores the role of these event appraisals in mediating stimulus-response contingencies. Other models focus more on social-cognitive factors (Ehlers & Clark, 2000; Janoff-Bulman, 1992; Horowitz, 1976). These models place emphasis on the impact of the trauma in shattering fundamental beliefs/ schema's that include 'the world is safe' and 'the self is trustworthy' (Ehlers & Clark, 2000). For example, Janoff-Bulman's (1989) model suggests that PTSD sufferers become engaged in a repetitive search for meaning to reconstruct shattered beliefs of self, world, and other.

It has also been hypothesised that some appraisals inflame negative symptoms through the development of attribution biases and dysfunctional cognitions (Dunmore, Clark, & Ehlers, 1999). Many cognitive models suggest that attribution biases lead to dysfunctional coping responses and emotional conditions. For example, the Revised Learned Helplessness Model (Abramson, Seligman, & Teasdale, 1978) suggests that individuals who make internal, stable, and global attributions to negative situations are more likely to experience depression. A dysfunctional cognition (I am a failure) may result from a trauma and lead to unhelpful attribution biases for the individual's general life (i.e., tendency to blame the self for future problems).

Research in this area is in its infancy and methods to examine changes in cognitive processes vary widely, from basic self-report measures to implicit memory tests. For those that have relied on self-report measures, there are none that have been suggested to provide reliable assessments of appraisal processes. This may be partly due to the differences in definition of a re-appraisal. Further, researchers have argued that appraisals may not necessarily be conscious, deliberate and accessible for retrospective assessments by self-report inventories (McNally, 2001).

In the context of these limitations, research studies demonstrate the importance of cognitive factors in both leading to the development of, and treatment for, trauma reactions (Bryant & Harvey, 1997; Bryant, Moulds & Guthrie, 2001; Bryant, Moulds, Gurthrie, Dang, & Nixon, 2003; Davey, 1992, 1993, 1997; Davey & Dixon, 1996; Dunmore et al., 1999; Foa et al., 1989). For instance, Davey (1992, 1997) illustrates examples of blocking, sensory pre-conditioning, higher-order conditioning, latent inhibition, and incubation to demonstrate the importance of cognitive re-evaluation processes in conditioning paradigms. While difficult to assess, research has also generally supported conclusions that individuals who develop more negative views of the self, world and others, develop greater trauma symptoms (Foa & Zoellner, 1998; Wenninger & Ehlers, 1998). Finally, research supports the role of attribution biases in maintaining PTSD symptoms, leading to dysfunctional coping strategies, and the development of co-morbid emotional difficulties (Ehlers & Clark, 2000; Dunmore et al., 1999; Joseph, Brewin, Yule, & Williams, 1993; Wenninger & Ehlers, 1998).

This body of research provides a rationale for Cognitive Therapy in the treatment of PTSD symptoms. A number of differing cognitive therapies exist (Resick & Schnicke, 1992; Tarrier, Pilgrim, et al., 1999), but the core focus is the same (Foa, 2000). In general, cognitive therapy aims to alter certain dysfunctional thinking patterns that are hypothesised to produce pathological symptoms. To do this, cognitive therapists teach patients to identify dysfunctional cognitions, challenge dysfunctional cognitions, and replace the dysfunctional cognition with a functional and realistic belief. There is some disagreement as to how much deliberate and conscious efforts to change thoughts are able to change symptoms in isolation, particularly from theorists who regard cognitive processes as more automatic and

implicit than conscious and deliberate (Littrell, 1998; McNally, 2001). For instance, Brewin et al. (1996) argue that traumatic memories consist of dual memory processes. The first, situationally accessible knowledge (SAMs), consists of more automatic, unconscious and contextually specific information. The second, verbally accessible material (VAMs), refers to more consciously retrievable, deliberate, and controlled information. Both may be the focus of treatment. Alternatively, Littrell (1998) suggested there were two channels that may operate to produce a re-appraisal in the writing paradigm. The first was related to developing a new automatic response when confronted with painful material. The second was related to making conscious attempts to develop new cognitive responses in the absence of exposure to painful stimulus. While the debates surrounding the importance of explicitly based and implicitly based processes in trauma, research does seem to indicate the overall efficacy of cognitive therapy in treating individuals with PTSD alone or in combination with exposure therapy (Bryant et al., 2003; Foa, 2000).

Davey (1997) has recently provided a specific model to assess cognitive processes in trauma paradigms. Basing much of his research on the coping literature, Davey and colleagues identified various 'cognitive neutralising strategies' that were hypothesised to devalue the threatening nature of stimulus and weakened the UCS-CS contingency. Seven separate cognitive neutralising strategies employed included 'Downward Comparisons', 'Positive Reappraisals', 'Cognitive Disengagement', Optimism 'Faith In Social Support', 'Life Perspective' and 'Denial' (Davey et al., 1999). Previous published studies (Davey, 1993; Davey, Burgess, & Rashes, 1995) have indicated the utility of some of these cognitive neutralising strategies, or 'threat devaluation strategies' as they were previously known, in coping with stress and decreasing trauma reactions. However, his most recent unpublished paper presents the

most exhaustive examination of these processes, over the course of six studies (Davey et al., 1999). The recently developed Cognitive Neutralising Strategies Questionnaire (CNS) was found to provide a reliable assessment of each of these strategies. All strategies were correlated with measures of positive health, except denial. All except denial, were found to be associated with problem-focused coping. These strategies predicted future psychological health when dealing with significant stress, above other measures of psychopathology and coping. Of upmost importance and relevance for this study, all except denial, were associated with improved future health in a student population.

Re-appraisal processes have been suggested as a possible mechanism that underlies the writing paradigm by multiple authors (Paez et al., 1999; Littrell, 1998; Smyth, 1998). At the time of this writing, there had been virtually no evaluation of the process. Some studies had found that trauma-writing individuals had decreased their self-report rating of how stressful, traumatic, uncontrollable and unpredictable the experience was (Paez et al., 1999). However, these studies have been unable to link the post-hoc ratings to health benefits or text within the essay. General text analysis has only focused on general cognitive words, such as how many insight and causation related words people used. While these studies indicate that people who increased the use of insight and causation related words obtain better health (Pennebaker, et al., 1997), they only provide tentative evidence that appraisal may mediate health changes. Therefore, from this review it seems that further assessment of changes in appraisals processes as a mediating mechanism in the writing paradigm is required.

1.10. Positive-Growth from Traumatic Experiences

As stated previously, social-cognitive models emphasise the impact that traumatic experiences have on an individual's fundamental beliefs about the self, world, and others (Janoff-Bulman, 1992). Research has focused on the negative changes in fundamental beliefs and how these negative changes are related to trauma symptoms. This research field uses such terms as reconstruction, assimilation, and accommodation to describe the process of trauma recovery. Davis, Nolen-Hoeksema, and Larson (1998) labelled these types of explanations 'sense-making' processes. Along with other authors (Tedeschi, Park, & Calhoun, 1998, Carver, 1998; Taylor, 1983; Park, 1998), they have suggested a second independent process, 'benefit-finding'. Benefit-finding from loss or trauma was described as a means of assigning positive value or significance for the event in one's own life. These authors suggest that finding benefit preserves the notion that one's life has purpose, value, and worth and may lead to improved functioning over what existed previous to the trauma.

In this new area of research, benefit-finding has been referred to as 'post-traumatic growth' and 'thriving'. From herein, the term benefit-finding will be used. Tedeschi and Calhoun (1996) have classified three types of positive changes that may occur for an individual as a result of a negative experience: positive changes in the perception of self (i.e., I am a stronger person); perceived changes in interpersonal relationships (i.e., development of closer family relationships); and a changed philosophy of life (i.e., became more spiritual or religious). Evidence of benefit-finding has been highlighted throughout the trauma literature, even for extremely negative experience such as rape or sexual abuse (Abbey & Halman, 1995; Affleck, Tennen, Rowe, & Higgins, 1990; Burt & Katz, 1987; Taylor, Lichtman, & Wood, 1984). While the evidence is inconsistent and based on correlations (Calhoun &

Tedeschi, 1998), benefit-finding processes have been implicated in leading to health benefits and improved coping (Stein, Folkman, Trabasso, & Richards, 1997; Taylor & Armor, 1996). Studies have found benefit-finding to be associated with less negative affect and better adjustment for patients with cancer (Taylor et al., 1984; Revenson, Wollman & Felton, 1983), better adjustment for men with HIV (Taylor et al., 1992), and less distress in infertile women (Abbey & Halman, 1995). For example, Affleck, Tennen, and Rowe (1991) found women who were unable to identify any positive benefits immediately after a difficult child-birth experienced more distress six and eighteen months later. Affleck, Tennen, Croog, and Levine (1987) found that men who were unable to identify positive changes had poorer cardiac health and were more likely to suffer a heart attack than those who could eight years later. Finally, while benefit-finding has been linked to health benefits, no correlations have been found with detrimental health effects (O'Leary, Alday, & Ickovics, 1998). This finding has been interpreted to indicate that benefit finding is a relatively safe process that is unrelated to denial strategies (Calhoun & Tedeschi, 1998).

Research on this topic is in its infancy and theoretical models that suggest the importance of benefit-finding have not been evaluated with experimental rigour (O'Leary et al., 1998). It is unclear whether benefit-finding represents an adaptive and stable personality characteristic, is simply a type of coping style, is determined largely by situational variables or social support, or whether it simply represents a real and permanent transformational growth in how people view themselves, the world, and others. If the process of benefit-finding does represent a transformational shift that could be targeted in therapies, there is little understanding of whether these changes need to occur spontaneously, need to occur at a particular coping phase, or can be induced in a deliberate and controlled manner (Calhoun & Tedeschi, 1998).

One writing study aimed to facilitate the development of benefit-finding through a benefit-finding writing task. As stated previously, King and Miner (2000) required individuals to write about the positive things gained from their upsetting experience. They found long-term health benefits from completing this task. However, a continuous measure of benefit-finding was not employed. This made it difficult to know if participants actually experienced changes in benefit-finding processes and whether change was related to health improvements. Another important reason to support the inclusion of a benefit-finding task is the decreased distress and greater satisfaction that participants report after completing the task, in comparison to other trauma focused tasks (King & Miner, 2000). Thus, if the health benefits are similar in a task such as this one, there would seem little sense in recommending the standard trauma writing task.

On the basis of the models reviewed, three separate processes are suggested to underlie the treatment of trauma. These include the engagement and habituation to the feared memory, re-appraisal of the feared stimulus, and benefit-finding. These separate processes have been hypothesized to underlie benefits in the writing task.

1.11. Individual Differences

While assessing process variables it is also important to consider multiple traits or characteristics that may both restrict or enhance the individual's ability to engage in the hypothesized processes. Two writing studies demonstrate the importance of identifying individual difference variables.

Paez et al. (1999) found that individuals who had difficulty describing feelings, a sub-scale of the alexithymia construct, were not able to obtain benefit from the standard disclosure condition, despite the condition overall indicating health improvements for participants. They suggested individuals rating high on the sub-

scale were contra-indicated for the writing paradigm. Cameron and Nicholls (1998) found that individuals classified as pessimists did not benefit from writing about adjusting to college. When the instructions were modified to suggest they were to develop coping plans to deal with the problems and challenges they faced, pessimists also obtained long-term health benefits.

The above examples suggest a number of reasons to identify individual differences. Firstly, individuals who do not benefit provide theoretical clues as to what process may be important in the writing paradigm. The above studies, for instance, indicate that the ability to re-frame things in a positive manner and describe thoughts and feelings could mediate health benefits. Secondly, the effect of individual differences within each experimental condition could confound findings by weakening effects. Thirdly, the examination of individual difference variables may identify clinical populations suitable or unsuitable for this paradigm (Pennebaker, 1997). Finally, the paradigm may be altered to suit the needs of the individual difference identified. Individual differences examined in this study will now be reviewed.

Behavioural models argue that emotional engagement through imagery is important for recovery. Important individual differences in imagery generation capacity have been suggested to mediate an individual's ability to engage and habituate to the feared memory through imaginal exposure (Dadds, Bovbjerg, Redd, & Cutmore, 1997; Foa & Kozak, 1986). A brief review of literature also appears to support the notion that imaginal exposure works particularly well with individuals defined as 'good imagers', and poorly with individuals defined as 'poor imagers' (Miller et al., 1987). For example, Miller et al. (1987) found that poor imagers responded less, physiologically, to response-oriented emotion scripts than 'good

imagers'. If the mechanisms of change responsible are associated with the emotional engagement of the mental image it would be expected good imagers would experience significant health benefits, while poor imagers may not.

A separate construct associated with imagery ability is that of absorption. Absorption has been referred to as a personality construct of one's capacity for attentional and imaginal involvement in tasks (Tellegen & Atkinson, 1974). Absorption, like imagery generation ability, has been predictive of performance in imaginal tasks (Roche & McConkey, 1990). For example, Kwekkeboom, Huseby-Moore, and Ward (1998) recently reported that it was absorption, rather than imagery generation, that predicted an individual's ability to become engaged in a guided imagery task. However, controversy surrounds its relationship with imagery ability or various forms of imagery (Qualls & Sheehan, 1981; Roche & McConkey, 1990). While some imply absorption is highly related to imagery ability (Qualls & Sheehan, 1981), others suggest the two are very separate constructs (Kwekkeboom et al., 1998). For instance, Kwekkeboom et al. argue that low correlations between absorption and imagery generation questionnaires, such as the Bett's QMI, indicate the questionnaires measure separate constructs. Thus, it would seem that assessment of both imagery generation and absorption constructs would provide a comprehensive assessment of the ability of the individual to engage in imaginal tasks.

Evidence has also accumulated to indicate that enduring individual differences may effect how people perceive and react to life stressors. The optimistic personality coping style has been associated with a tendency to hold positive expectations about the future, while the pessimistic personality style has been associated with a tendency to perceive negative expectations for the future (Scheier, Carver, & Bridges, 1994). Examination of the literature reveals multiple studies that report optimistic individuals

are more likely to attain perceived growth or benefit-finding from trauma (Affleck et al., 1991; Curbow, Somerfield, Baker, Winegard, & Legro, 1993; Fontaine, Manstead, & Wagner, 1993). If the ability to perceive positive benefits, or positively re-appraise trauma, is a mediator for health benefits, one would expect that optimists would be more likely to obtain health benefits as opposed to pessimists. Indeed, accumulating evidence suggests that dispositional optimism is beneficial for physical and psychological well being when coping with stress (Litt, Tennen, Affleck, & Klock, 1992; Scheier & Carver, 1992).

Trauma disclosure studies have reported individuals who are unable to deeply disclose (referred to as 'low disclosers') experience fewer health benefits and may be associated with increased health problems (Pennebaker et al., 1987; Pennebaker, Barger, & Tiebout, 1989). One personality coping style that has been suggested to impact on whether individuals are able to disclose high levels of emotion is the repressor personality. Repressors have been characterized by high defensiveness and a need for social approval (Weinberger, Schwartz, & Davidson, 1979). This coping style has been associated with the inhibition of negative emotional sensations, thoughts and feelings on self-report measures and emotion memory tasks (Harrigan, Harrigan, Sale, & Rosenthal, 1996; Newton & Contrada, 1992). For example, Myers, Brewin, and Power (1998) reported that repressors tended to deny or inhibit past negative emotional experiences or material.

Evidence suggests that repressors may not obtain similar health benefits from the writing paradigm as other individuals. Suedfeld and Pennebaker (1997) specifically found that repressors were less emotionally engaged in trauma writing paradigm. Further, Esterling et al. (1990, 1994) found that repressors suffered poorer immune functioning, as indicated by EBV antibody titer measures, and achieved

fewer health benefits from the writing paradigm, in comparison to participants classified as sensitizers. The inclusion of repressors in any condition could effect the outcome of experimental manipulation and confound findings and, therefore, the effect of repressors requires assessment.

A second construct that may be linked to inability to highly engage in emotional disclosure is that of alexithymia. The term alexithymia (Bagby, Taylor, & Parker, 1994) refers to a group of symptoms, often referred to as a personality type, that is associated with difficulty identifying and describing emotions, difficulty in using mental images and a cognitive style dominated by operational thinking. This personality style is at variance with the requirements of the study to engage in the trauma memory with deep and emotional verbal descriptions. In contrast to repression, Bagby et al. (1994) argue that alexithymia is essentially associated with a lack of affectual awareness, as opposed to attempts to suppress emotional material. A recent study by Paez et al. (1999) indicated that individuals classified as alexithymic did not obtain benefits from the writing paradigm and were unable to engage in high levels of emotional disclosure. Like repressors, it would also seem that the effect of alexithymia would need to be assessed within the writing paradigm.

In contrast to repression and alexithymia, an opposite effect has been suggested for participants who score highly on negative affect (NA). Generally, these individuals report greater negative moods, physical symptoms, and general dissatisfaction (Watson & Pennebaker, 1989). These individuals are characterized by high levels of introspection and a dwelling on failures and are reported to deeply disclose personal experiences in the writing paradigm (Pennebaker et al., 1990). With high reports of physical ailments and high levels of disclosure, it has been suggested

these individuals have the most to gain from the paradigm (Watson & Pennebaker, 1989). However, this hypothesis is yet to be supported.

In summary, hypothesised individual differences that may increase the positive health effects of the writing intervention include imagery skills, absorption, optimism, and negative affect. Dimensions hypothesised, or demonstrated, to decrease the effect of the writing intervention include alexithymia and repression.

1.12. Aims, Predictions, and Hypothesis

The aim of the study reported here is to provide an examination of current trauma models in predicting processes of change and subsequent health outcomes for the trauma writing disclosure paradigm (See Figure 1.1). The review conducted has indicated that three main processes can be identified within the trauma literature which may mediate health benefits. These processes can best be summarised as exposure and habituation (Foa & Kozak, 1986), cognitive devaluation of trauma stimuli (Davey, 1997), and benefit-finding (Davis et al., 1998). The review has also revealed certain individual differences that may effect hypothesised recovery processes and mediate future health outcomes. These individual differences include imagery and absorption, optimism, repression, alexithymia, and negative affect.

In support of previous studies, it is predicted that the standard writing paradigm will lead to significant physical and psychological health improvements for individuals asked to express traumatic experiences in comparison to a control group. In accordance with Greenberg and Stone's (1992) findings, it also hypothesized that the physical benefits will be greatest for those individuals who disclose severely stressful upsetting experiences

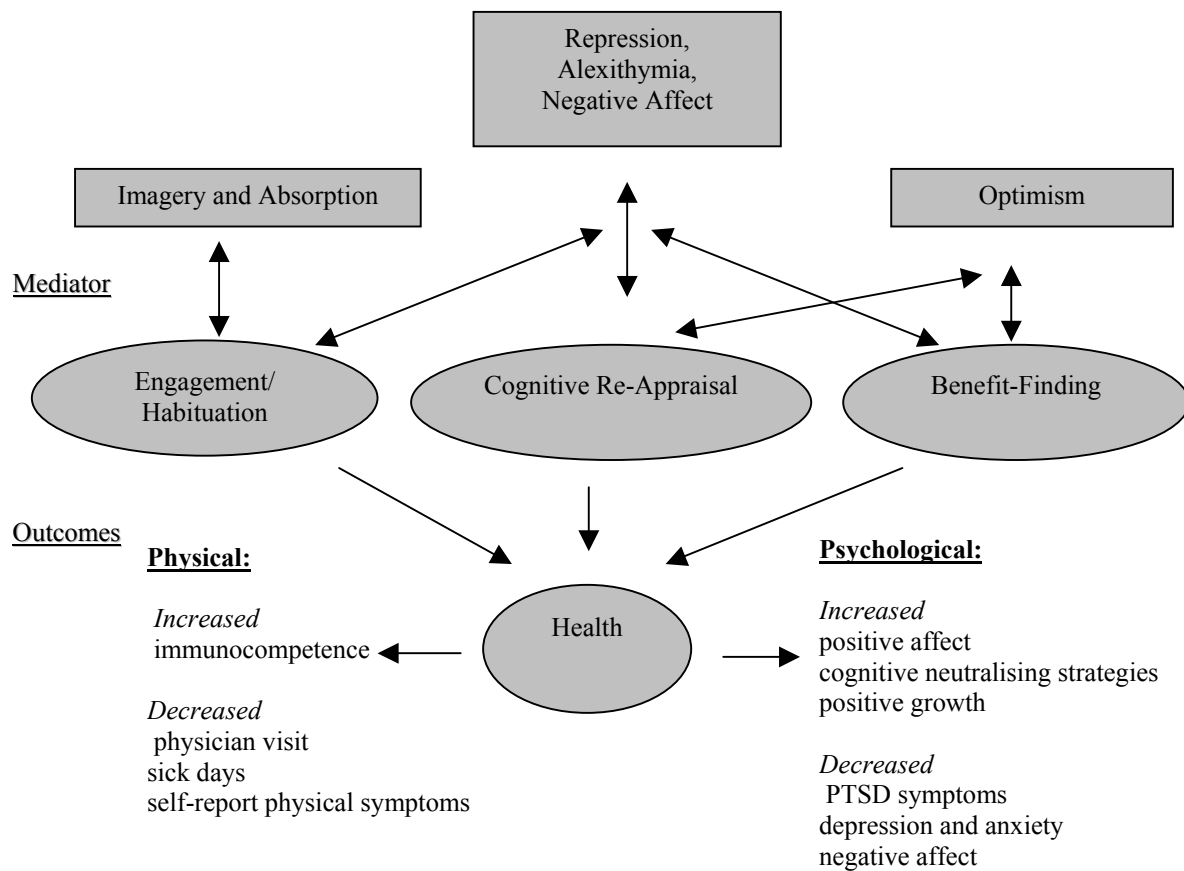


Figure 1.1. Hypothesized model of change in the trauma-writing paradigm.

Process of Change

In relation to the process of change, it is predicted that revised versions of the writing paradigm, where hypothesised mechanisms of change will be amplified, will result in increased physical and psychological health benefits in comparison to the standard trauma writing condition. Theories supporting each hypothesised process are not mutually exclusive. However, referenced authors are associated with each process due to the support their models provide. For example, it would not be suggested that Foa and Kozak (1986) do not support mechanisms like devaluation, or Davey's (1997) ECM does not provide support for the utility of exposure in recovery from trauma.

In accordance with the emotional engagement and habituation hypothesis (Foa & Kozak, 1986), it is predicted that individuals assigned to engage with the trauma memory through a description of the sequence of events and personal responses will obtain greater health benefits than participants assigned to the standard trauma condition. In accordance with the cognitive re-appraisal and devaluation hypothesis (Davey, 1997), it is predicted that individuals assigned to cognitively re-appraise the threatening nature of the trauma stimulus will obtain greater health benefits than participants assigned to the standard trauma condition. In accordance with the benefit-finding hypothesis (Davis et al., 1998), it is predicted that individuals assigned to identify the positive effects of their experience on themselves, their relationships with others, and their world view, will obtain greater health benefits than participants assigned to the standard trauma condition.

Individual Differences

Participants were measured on imagery ability, absorption, optimism, alexithymia, negative affect, social desirability and anxiety. These measures were to test for the possible influences of these variables on the relationship between hypothesised processes of change and health benefits. It is predicted that an individual's score on individual difference measures will significantly effect the degree of long-term health benefit attained from the writing paradigm. These individual differences are predicted to interact with hypothesized mechanisms of change. In accordance with the emotional engagement and habituation hypothesis (Foa & Kozak, 1986), it is predicted that individuals who score low on imagery and absorption scales will obtain less benefits than those who score high on these questionnaires. In accordance with the cognitive re-appraisal hypothesis (Davey, 1997) and a benefit-finding hypothesis (Davis et al., 1998), individuals who score low

on optimism will achieve fewer benefits than those who score highly. It is predicted that individuals identified as repressors and alexithymics are unlikely to engage in high levels of emotional disclosure (Esterling et al., 1994; Paez, et al., 1999) and will not obtain significant benefit from the writing paradigm. Finally, it is predicted individuals who score high on negative affect may be more likely to achieve self-reported health benefits (Pennebaker et al., 1990), and will obtain significantly more benefit than other individuals.

Method

2.1 Participant Demographics and Design

Participants ($N = 213$) were recruited from Griffith University, Brisbane, Australia, from a wide variety of school disciplines. The majority of participants were psychology first-year students who received course credit for their participation. Non-first year psychology students were reimbursed \$75 for their time. Of the 213 participants, 12 failed to complete all of the writing sessions or did not complete the first follow-up questionnaire. Two more participants were removed from analysis after they became extremely distressed between writing sessions and required referrals for counselling from the experimenter. Both of these participants had been assigned to the exposure writing condition. A total of 199 participants completed the 2-month follow-up and were included in the analysis. Of the 199 participants, 137 participants (68.8%) were female and 62 (31.2%) were male. Participants were aged between 16 and 56, with an average age of 24 years and 1 month. At six-month follow-up, 5 participants within this population could not be contacted and were unable to be included in the 6-month follow-up analysis ($N=194$).

The design was a 5 (control, standard trauma, exposure trauma, devaluation trauma, benefit-finding trauma writing instruction) x 3 (pre-intervention, and post 2 and post 6-month follow-up) mixed repeated measures MANOVA.

2.2 Materials

The following types of materials were employed: (a) measures of pre-existing trait factors (see Appendix A) b) manipulation checks (see Appendix B) c) experiment instructions and d) outcome assessments of physical and psychological health (see Appendix C).

Pre-Existing Trait Measures.

The Tellegen Absorption Scale (Tellegen & Atkinson, 1974) is a 34-item questionnaire assessing the ability of the individual to become absorbed in imagery and fantasy. Participants respond on a true/false format to statements that do or do not describe themselves. Items include such questions as ‘Sometimes I can change noise into music by the way I listen to it’ and ‘I often have physical memories: for example, after I’ve been swimming I may still feel as if I’m in the water’. Tellegen (1982) reported good internal reliability of 0.88 and test re-test reliability of 0.91 in the original study. Numerous evaluations since have further confirmed the unidimensionality of the scale (Wild, Kuiken, & Schopflocher, 1995).

The Bett’s Questionnaire on Mental Imagery (Bett’s QMI; Sheehan , 1967) is a 35 item questionnaire that measures general ability to form vivid imagery across seven sensory modalities: visual, auditory, olfactory, organic, kinaesthetic, cutaneous. Each sensory modality is assessed according to 5 item sub-scales. Vividness is rated on a 7-point scale from 1 ‘Perfectly clear and as vivid as the actual experience’ to 7 ‘No image present at all, you only “know” that you are thinking of the object’. Good internal reliability (0.92; Wild et al., 1998), and test-retest reliabilities has been demonstrated for this measure over periods of six weeks and 12 months (Richardson, 1994).

The Toronto Alexithymia Scale (TAS-20; Bagby, Taylor, & Parker, 1994) is a 20-item questionnaire that measures alexithymia, a trait construct associated with deficits in emotional awareness, understanding, and expression. The scale has three dimensions: difficulty identifying feelings, difficulty in describing feelings, and externally-oriented thinking. Items include ‘I have feelings that I can’t quite identify’ and ‘It is difficult for me to reveal my innermost feelings, even to close friends’.

Participants rate how much they agree with each statement on a 5-point likert scale. The TAS-20 total score demonstrates good internal consistency (0.81) and test re-test reliability over three weeks to six-months (0.77- 0.95; Bagby et al., 1994).

The Life Orientation Test, Revised (LOT-R; Scheier, Carver, & Bridges, 1994) is a ten item measure, with six scored items and four filler items, which aims to assess dispositional optimism. Controversy surrounds the factors structure of the LOT-R. Some researchers suggest the LOT-R measures a single bipolar dimension of Optimism-Pessimism (Scheier et al., 1994). Others have suggested the LOT-R measures two independent factors relating to optimism and pessimism (Marshall et al., 1992). Research supporting this second hypothesis has found scores on the pessimism dimension (3 negatively worded items) may be correlated with other personality factors (Marshall et al., 1992), while scores on the optimism dimension (3 positively worded items) are unrelated. In response to this issue, Scheier et al. (1994) have suggested that both a one factor and two-factor analysis could be conducted in different populations to assess the effect of dispositional optimism and pessimism.

Respondents are asked to indicate their agreement with each of the items on a 5-point likert scale ranging from 0 (strongly disagree) to 4 (strongly agree), with 2 representing a neutral response. Item are weighted equally and scores are summed to give a total score that can range from 0 to 24 on the full scale. Norms for the one factor solution have been provided, indicating means and standard deviation for a student population ($M = 14.33$, $SD = 4.28$). The full scale demonstrates acceptable internal reliability of 0.78 to and test-retest reliabilities ranging between 0.56 and 0.79 (Scheier et al., 1994). Modest correlations, 0.36 to 0.54, were also indicated between the sub-scales and other conceptually related questionnaires, such as the Self-

Mastery Scale (Pearlin & Schooler, 1978) and the State-Trait Anxiety Scale (STAI: Spielberger et al., 1983), demonstrating validity for the scale.

The Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988) measures the tendency to display adaptive or aversive mood states according to two independent dimensions, Positive Affect (PA) and Negative Affect (NA; Watson et al., 1988). PA affect reflects the extent to which people feel enthusiastic, active or alert. High scores of PA are characterized by concentration, eagerness, and pleasurable engagement. Low scores of PA are characterized by sadness and lethargy. Alternatively, NA was described as a general dimension of subjective distress. High scores of NA are associated with unpleasurable mood states such as anger, contempt, and fear. Low scores of NA are associated with calmness and serenity.

Participants respond to twenty items, ten relating to PA (i.e., excited, interested) and ten relating to NA (i.e., angry, distressed). Responses are scored on a five-point scale ranging from 1 ('very slightly/ not at all') to 5 ('extremely'), according to the degree they experience each emotion. The trait scale refers to the degree participants feel these emotions in general, while other versions employed refer to the 'past month' or 'right now'. Possible scores on each of the two scales range from 10 to 50. Reports (Watson et al., 1988) indicate the PANAS has good internal reliability (PA = 0.86 to 0.90; NA = 0.84 to 0.87) and test re-test reliability (PA = 0.68, NA = 0.71). The independence of these two constructs has been demonstrated with poor correlations between the two measures ($r = -0.12$ to -0.23 , Watson et al., 1988). Further, NA correlates highly with other self-report anxiety measures, while PA is unrelated (Watson & Clark, 1984).

The following two individual difference measures reviewed are combined to assess repression. Firstly, the Marlowe-Crowne Social Desirability Scale (Crowne &

Marlowe, 1960; Crown & Marlowe, 1964) was originally developed to measure individual differences in social-desirability response biases. That is, some participants respond to statements about themselves on the basis of what they consider to be the socially desirable answer rather than on actual perceptions. The scale has 33-items and respondents answer on a true/false format. Scores may range from 0 to 33, with those who score above the 75th percentile suggested by Weinberger et al. (1979) to be classified as high in defensiveness or social desirability. Items included in the questionnaire include 'I have never been irked when people expressed ideas very different from my own' and 'Before voting, I thoroughly investigate the qualifications of all the candidates.' The Marlowe-Crowne Social Desirability Scale has an internal consistency of 0.89 and test-retest reliability of 0.88 (Crowne & Marlowe, 1964).

The short form of the T-MAS (Bendig, 1956) was designed to measure trait anxiety levels and consists of 20 items such as 'I am a high-strung person' and 'I have periods of such great restlessness that I cannot sit long in a chair.' Respondents answer in a true/false format and scores may range from 0 to 20. The scale has an internal reliability of 0.76 (Bendig, 1956) and correlates highly ($r = 0.81$) with the trait scale of the State-Trait Anxiety Inventory (Spielberger et al., 1983). Individuals who score below the median of the tested population on the short form of the T-MAS are classified as low in anxiety while those who score above are classified as high in anxiety. The combination of the Marlowe-Crowne Social Desirability Scale and the T-MAS has been used to identify repressors (Fuller & Conner, 1990; Weinberger et al., 1979). According to Weinberger et al. (1979), participants that score high in defensiveness on the Marlowe-Crowne Social Desirability Scale and low in anxiety on the short form of the T-MAS are classified as repressors.

The Social Support Questionnaire included three sub-scale items extracted from the Assessment of Past Disclosure Questionnaire (Greenberg et al., 1996). The items provided a basic assessment of how much the participant felt socially supported and free to express their feelings with others. Items included ‘I have had people to talk about my worries concerning the experience’, ‘I have felt free to express all of my feelings about the experience to others close to me’, and ‘There are people I can count on whenever I have wanted to talk about my experience’. Participants rate how much they agree with each statement in relation to their upsetting experience on a 5-point likert scale ranging from 1 ‘not at all’ to 5 ‘extremely’. In this study, the questionnaire evidenced good internal consistency of 0.83.

Manipulation Checks

A variety of manipulations checks were employed to assess the degree participants followed instructions. Some of these measures differentiated between control and emotional writing, while others were more specific to each of the trauma writing conditions.

Measures differentiating between control and emotional writing were the same as those used by Pennebaker et al. (1988) and Greenberg et al. (1996). The first of those was the Essay Evaluation Questionnaire (Pennebaker et al., 1988). There are multiple variations of this questionnaire throughout past writing studies. This study employed a 7-item scale to assess the way that participants self-report writing their essay. Items included to what degree the essay was traumatic, was personal, how much they revealed emotions, how much they revealed thoughts, and how much they wanted to talk about what they had written about. Two extra items were added to the scale, the degree that people were able to ‘make sense’ and ‘obtain meaning’ from the

essay. Respondents answered each of the items on a 7-point likert scale ranging from 'not at all' to 'a great deal' immediately following the writing session.

The PANAS- Immediate Version (Watson et al., 1988) has also been employed by past writing studies to assess the degree that participants feel positive and negative affect immediately following the writing session. The scale was the same as the trait measure, but required participants to rate how they feel 'right now'.

Manipulation checks employed to specifically assess the degree participants engaged in the hypothesised mechanism of changes included self-reports, independent judge analysis, linguistic analysis, and physiological data. The first set of manipulation checks assessed essay content. The Self-Report Process Identification Questionnaire (PIQ) was a 6-item self-report questionnaire given to participants immediately after writing to determine the degree that each of the participants engaged in the hypothesised mechanism of change. The 6-item scale has 3 independent sub-scales: exposure, devaluation, and benefit-finding, with 2 items representing each construct. Respondent were asked to rate the degree essay content was described by each of the items. Ratings were made on a 7-point scale from 'not at all' to 'a great deal.' Items representing exposure included 'I wrote a detailed and elaborate description of the event and the surroundings at the time of the experience from beginning to end.' and 'I wrote an in-depth description of my reactions at the time of the experience from beginning to end'. Items representing devaluation included 'I identified and explored my current thoughts on why I am upset now,' and 'I wrote about what specifically upset me and how I could think differently about the specific things I identified'. Items representing benefit-finding included 'I identified the positive things I have gained from my experience for my life in general' and 'I wrote about how the experience positively effected a life philosophy surrounding

myself, the world, and other people.’ Items were selected on the basis of extensive pilot-testing which indicated the use of each item in differentiating between the different emotion processes.

Independent judges, clinical psychology students, were also required to fill in questionnaires to provide an independent assessment of essay content. Independent judges filled out the Judge version of the Essay Evaluation Questionnaire (JEEQ) and Judge version of the Process Identification Questionnaire (JPIQ). The JEEQ contained 4 items mimicking the items in the self-report EEQ, such as how personal, traumatic, thoughtful and emotional the essay was. An additional item of essay coherency was added. The JPIQ consisted of 12 items that differentiated between the three experimental writing groups, 4 items representing exposure (i.e., a detailed description of the most upsetting aspect of the experience as it happened), devaluation (i.e., identified core beliefs associated with why they are upset now), and benefit-finding (identified positive changes to one’s belief about themselves as a result of the experience). More items were included in the JPIQ than the PIQ to provide greater specificity to the process of change. For example, judges not only rated how much individuals developed ways to re-evaluate what upsets them, but also assessed clinically how much they believe the re-evaluation was plausible given the concern. Ratings on both scales were made on a 7-point likert scale from ‘not at all’ to ‘a great deal’.

The Linguistic Inquiry Word Count 2001 (LIWC; Pennebaker, Francis, & Booth, 2001) provided computer analysis of the written essays. The LIWC program is composed of 2,290 words and word stems. The program evaluates written text on a word by word basis and calculates percentage words in the text that match each of up to 82 language dimensions. Of these categories, 8 were considered to provide a

manipulation check to experimental conditions. These included positive emotion words (i.e., happy, pretty), negative emotion words (i.e., hate, nervous), insight words (i.e., think, know consider), causal related words (i.e., because, effect, hence), sensory words (i.e., see, touch, listen), motion words (i.e., walk, move, go), and different time indicators of past tense, present tense, and future tense.

The next group of manipulation checks employed assessed the degree individuals became aroused during the essay writing and habituated to the stimulus. These process measures were particularly important for the exposure condition. Three measures were employed. The first was a Subjective Units of Distress Self-Report Indicator (SUDS). The SUDS scale was a rating of how distressed the participant felt, from 0 (not at all) to 100 (most ever felt) completed immediately after writing. Participants responded to three items, 'the average level of distress experienced during their writing session', 'the maximum level of distress experienced whilst writing', and 'the level of distress experienced in the final minute of writing'. Consistent with Jaycox et al. (1998), the average level of distress was used to provide a measure of habituation between sessions, with the third session average subtracted from the first. Subtracting the last minute level of distress from the highest level of distress and averaging these amounts over the three sessions calculated within-session habituation. These assessments were different from past studies as they were reliant on retrospective assessment of SUDS after writing.

Participants completed the Body Sensations Questionnaire (Chambless, Caputo, Bright, & Gallagher, 1984) to determine the amount of anxiety-related body sensations whilst writing. Respondents were required to report on 5-point likert scale (1 = not at all to 5 = a great deal) to 17 items that assessed the experience of physical sensations consistent with anxiety (i.e., sweaty hands, increased heart). The scale has

a minimum score of 17 and a maximum score of 85. It demonstrates good internal reliability of 0.87, moderate test-re-test reliability over one month of 0.67, and is correlated moderately with trait measures of anxiety (Chambless et al., 1984). The scale was originally developed to assess an individual's fear of these sensations for a panic disorder population. The questionnaire had been slightly modified for this study to measure the extent to which individuals experienced these sensations while writing, as opposed to fearing these sensations.

Finally, continuous measures of heart-rate whilst writing were taken on a BIOPAC MP100 system, using Acqknowledge as the operating system to record the data. Pulse Plethysmograph Transducers were used to collect the heart beat signal at a rate of 200 beats per second. Transducers were attached to the non-writing hand, third finger. A computer programmer designed a heart-beat analysis program in MATT Lab that detected peaks per second and averaged the number of peaks for each 60-second interval.

Experimental Instructions

Five types of writing instructions were developed over the year preceding the experiment. Instructions were based on theoretical and clinical treatment methods which aim to instruct individuals in the different emotion processing methods. For instance, exposure writing instructions were partially based on the exposure technique based on Foa and Rothbaum (1998), devaluation procedures were based on methods regularly used in cognitive re-structuring, and benefit-finding instructions were based partially on the previous methods of King and Miner (2000). Extensive pilot-testing was conducted until instructions were clear and reliable in producing expected behavioural differences between groups. Instructions required participants to engage in one of five tasks. These included a control topic (see Appendix D), the standard

Pennebaker writing condition (see Appendix E), an exposure writing condition (see Appendix F), a devaluation writing condition (see Appendix G), and a benefit-finding writing condition (see Appendix H). Each instruction was pilot-tested over many months until it was clear to the lay student and reliably produced the desired response. The instructions were repetitive to try to ensure seemingly complex tasks, such as devaluation of a threatening stimulus, were understood as a matter of simple steps.

All instructions, except the standard writing instruction, were the same length, number of pages, and of similar format. The first page of all instructions was an overview of the experiment. The first page stated that this study focused on ‘how different people remember past events and how these different types of memories can affect us’. They were all told that research indicated that writing in the manner that they were to be instructed was found to be useful. Instructions contained such statements so participants would persist with unpleasant tasks, such as exposure. On the second page they were given instructions on how to write, along with an example of a person who wrote in this format. On the third page, a brief summary of the instructions was provided to reinforce the main points. On the fourth page, a steps card was provided with four dot-point steps to complete the writing task. The steps-card was kept in front of the individual for the duration of the writing session. All instructions requested participants continue writing for the entire session, even if they had to repeat what they had previously written. They were told not to worry about sentence structure.

Control instructions were developed to match the difficulty levels and complexity of tasks experienced in other trauma writing tasks. Thus, the control topic mimicked the essence of an exposure task, without the emotional content. Instructions stated that research suggested it was beneficial to test and improve imagery skills by

completing the following task. They were requested to 'visualise' and write in as much perceptual complexity as possible the things they could see, hear, smell, and taste, for one of three environments 1) the university campus, 2) the home they lived in, 3) and a place they go to on weekends. They were instructed not to interpret, place opinions or place feelings on any description, but to write objectively to attain a clear image.

The standard writing instruction was kept similar to that of Pennebaker et al. (1988). As with all other instructions, the overview page simply stated that research found it was beneficial to their write deepest thoughts and feelings about past upsetting experiences. On the second page, participants were simply instructed to write their very deepest thoughts and feelings and to really get into it. There were no examples or steps card provided to keep instructions similar to past writing studies.

The exposure instructions stated on the overview page that it was beneficial to mentally re-live the memories of our most upsetting experiences so that the anxiety or fear that we feel when remembering these events can wear off. The instructions on the following pages instructed participants to describe in great detail from beginning to end the sequence of events at the time. They were told to describe in great detail the things they saw, heard, felt, smelt, and tasted so they could experience it all again. They were also told to describe their reactions, including their thoughts, feelings, bodily sensations, and actions at the time. A critical component of these instructions was to focus on the most distressing aspect of the experience as it happened.

The devaluation instructions stated on the overview page that it was 'beneficial for individuals to identify their fears and develop different ways of viewing these fears so that they could feel less scared or distressed.' The instructions on the following pages specifically stated that they were to explore what upsets them

now about the event and search for what it really meant to them personally. Once they were able to identify reasons as to why they were upset now, they were then instructed to explore fresh ways to alter their thinking in relation to that matter. They were told to persist and explore as many different perspectives as possible. At the end of the instructions they were given a variety of questions on the steps card to prompt the development of fresh perspectives (i.e., ‘Am I blaming myself too much?’).

The benefit-finding instructions stated that ‘past research suggested it was beneficial for individuals to identify and describe positive benefits that they gained from past upsetting experiences.’ The instructions on the following pages instructed participants to identify as many benefits as possible in relation to themselves, their relationships with others, and their world-view. Individuals were instructed to only focus on identifying positive gains from the experience and to elaborate on these gains in as much detail as possible. They were also told to state clearly how their life had changed practically or could change in the future as a result of these gains.

Outcome Assessments of Psychological Health

The Depression, Anxiety Stress Scale – Revised (DAS-R; Lovibond & Lovibond, 1995) is based on the tri-partiate model of depression and anxiety (Clark & Watson, 1991). The model suggests that there are unique features associated with anxiety (physical hyper-arousal) and depression (low positive affect) and also common features shared by the two. Based on this model, Lovibond and Lovibond (1995) developed the DAS, a 42-item scale. It was recently revised to a 21-item scale (Antony et al., 1998) to make it faster to complete and increase its internal consistency. The scale contains three sub-scales, depression (i.e., ‘I sometimes feel I am pretty worthless’), anxiety (‘There are times when I feel close to panic’), and stress (I would describe myself as ‘nervy’ or ‘jumpy’). Participants respond on a 4-

point likert scale assessing how much they agree with each statement ranging, from 1 (does not apply to me at all) to 4 (applies to me very much, or most of the time). One study (Antony, et al., 1998) indicated excellent internal consistency for the three subscales of depression of 0.94, anxiety of 0.87, and stress of 0.91. Low correlations between depression and anxiety scales ($r = 0.28$) indicated that the scale provided adequate separation of anxiety and depressive symptoms. Moderate correlations between the stress and the depression and anxiety scales ($r = 0.48$) provided further support for utility of a common factors dimension for anxiety and depression. Concurrent validity was also demonstrated within this study with high correlations reported between the depression sub-scale and the Beck Depression Inventory ($r = 0.77$) and between the anxiety sub-scale, the Beck Anxiety Inventory ($r = 0.85$), and the Trait scale of the State-Trait Anxiety Inventory ($r = 0.55$).

The Impact of Events Scale (IES; Horowitz, Wilner, & Alvarez, 1979) was originally developed to provide an assessment of two domains of Post-Traumatic Stress Disorder, intrusions and avoidance. The intrusion sub-scale measures symptoms comprising of nightmares and intrusive thoughts, images or feelings. The scale includes items such as ‘I thought about it when I didn’t mean to’ and ‘Pictures about it popped into my mind’. The avoidance sub-scale generally measures attempts to dampen or avoid experiences, thoughts, and feelings associated with the traumatic events. Items on this scale include ‘I was aware that I still had a lot of feelings about it, but I didn’t deal with them’ and ‘I stayed away from reminders about it’.

The original study by Horowitz et al. (1979) reported that the IES had a split-half reliability of 0.86 for the total score. Internal consistency for each sub-scale was also reported to be high for intrusions at 0.78, and for the avoidance sub-scale at 0.82. A recent meta-analytic review of 23 past studies that had examined the psychometric

properties further confirmed the internal reliability of the scales (Sudan & Horowitz, 2002). Of the 12 studies reviewed, 10 reported a two factor-structure representing intrusions and avoidance with significant correlations between the two of 0.63. However, two studies reported a single factor structure. The authors concluded that over periods of time since the traumatic event both sub-scales may converge to form one measure of stress response. The review also concluded the IES demonstrated construct validity, with decreases on the IES as individuals recover from their traumatic experience (Sudan & Horowitz, 2002). Finally, convergent validity has been demonstrated with high correlation with the IES scales and other measures such as the PTSD symptoms scale and the Structured Clinical Interview for the DSM-III (Sudan & Horowitz, 2002).

The Cognitive Neutralizing Strategies Questionnaire (CNS; Davey et al., 1999) was used to assess participants perceived use of devaluation strategies before and after the writing procedure. The 31-item questionnaire measures seven factors associated with threat devaluation. All sub-scales demonstrate acceptable to excellent internal reliability and include: downward comparison (0.83, 'Other people are worse off than me'), positive reappraisal (0.81, 'This will make me a stronger person'), cognitive disengagement (0.77, 'This situation isn't worth getting upset about'), optimistic approach (0.71, 'Everything will work itself out in the end'), denial (0.78, 'I refuse to believe this is happening'), life perspective (0.58, 'I can put up with these problems as long as everything else in my life is okay'), and faith in social support (0.84, 'I can find comfort and help in my friends'). Respondents rate on a 4-point likert scale the amount they use each statement when coping with a traumatic event, from 0 ('Almost Never') to 4 ('Almost Always'). To assess validity, the questionnaire was compared to two standard coping measures, the Modified Health

and Daily Living Form (Moos, Cronkite, Billings, & Finney, 1986) and the Coping Inventory for Stressful Situations (CISS; Endler & Perker, 1990). Results were in the expected direction with all scales, apart from denial, correlating positively and contributing independently with problem-focused coping. The denial sub-scale correlated significantly with measures of avoidant and emotion-focused coping. Finally, faith in social support was also correlated with avoidant coping, with the author's suggesting that faith in social support may also serve as a distracter from the trauma. For this study, all scales were totalled (27-items), except for denial, to produce a CNS Total Score out of 108. Internal reliability for this total score has not been provided.

The Post-Traumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) is a 21-item, positively worded questionnaire that assesses post-traumatic growth as a result of a significant negative life event. The questionnaire consists of five positive growth dimensions: Relating to others ('A sense of closeness with others'); new possibilities ('I developed new interests'); personal strength ('A feeling of self-reliance'); spiritual change ('I have a stronger religious faith'); and appreciation of life ('My priorities about what is important in life'). Participants respond on a 6-item likert scale from 0 ('I did not experience change as a result of my crisis'), to 5 ('I experienced this change to a very great degree as a result of my crisis'). The separate sub-scales demonstrate adequate internal reliability in student samples (0.67-0.85; Tedeschi & Calhoun, 1996). The test-retest reliability of the full scale has been demonstrated to be adequate at 0.71. However, this study also indicated stability for two of the PTGI subscales, personal strength and appreciation of life, was low at 0.37 and 0.47 respectively (Cohen, Hettler, & Pane, 1998). One study (Tedeschi & Calhoun, 1996) has examined the validity of the PTGI. Low but significant

correlations ($r = 0.14 - 0.29$) were indicated with measures of optimism (LOT), religious participation extraversion, openness to experience, agreeableness, and conscientiousness (Neo Personality Inventory; Tedeschi & Calhoun, 1996). No correlation was found with a measure of social desirability.

As with some previous writing studies (Greenberg et al., 1996), a measure of both positive and negative emotion for the traumatic experience was employed. To maintain consistency in this study, the Positive and Negative Affect Scale- E was modified to assess positive affect (EPA) and negative affect (ENA) for the upsetting experience. Instructions stated respondents were to rate how much they felt each emotion in relation to the experience now. The psychometric properties of this scale have been discussed previously, although this modification had not been reported.

Outcome Assessments of Physical Health

The Self-Report Physical Symptoms Scale (PSS; Greenberg et al., 1996) separates common physical complaints into three domains: upper respiratory symptoms, musculoskeletal symptoms, and miscellaneous symptoms. The upper respiratory symptom scale contains 9 items (e.g. sore throat, dry cough) and the musculoskeletal symptom scale contains three items (muscle aches, aching joints, and muscle pain). The miscellaneous symptom scale contains 12 of 13 items (e.g. diarrhoea, headache) from the southern Methodist University Health Questionnaire Symptom Scale (Watson & Pennebaker, 1989). The questionnaire was adapted from a weekly report to a monthly report. On the advise of Greenberg (personal communication, December, 2000), responses were adapted from a yes/no criterion to a 5 point likert scale (1- 'never experienced this symptom in the past month' to 5- 'experienced this symptom all of the time in the past month'). Past writing studies had employed similar physical symptoms questionnaires. These include the PILL

(Pennebaker, 1982) and another modified physical symptoms scale (Paez et al., 1999). The validity of this measure has been demonstrated with low significant correlations between symptom reporting and illness visits (Pennebaker, 1982). However, the measure may also be affected by individual differences such as negative affect and gender (Pennebaker, 1982).

A second measure of physical health employed by most writing studies has been the number of illness visits to the doctor. Students were required to nominate any health centre or general practitioner they had visited during the past 6-months and any they are likely to visit in the following 6-months. At the end of the experiment, participants once again nominated any health centre they may have visited over the past year. Consent to access to health centre records was obtained in a manner consistent with the National Health and Medical Research Council Guidelines (see www.privacy.gov.au).

Instructions similar to that of Pennebaker (personal communication, May, 2000) were given to each health centre (see Appendix I). Medical practitioners were asked to fill in a simple sheet requesting what months the participants had visited the surgery over the year interval, and whether those visits were for an illness, injury or some other reason. Visits were broken into three categories: illness, injury, and other miscellaneous reasons. An illness visit was defined as a visit based on the presenting symptom that may involve the immune system, such as a sore throat. Even if the physician was unable to identify the specific reason for the presenting symptom, it would be counted as an illness visit if it could have involved the immune system. Visits for the same problem needed to be separate by 8 days to count as separate.

2.3 Procedure

Recruitment and testing period

Testing was conducted over six-months, in five separate phases. The first phase began in April 2002 and ended in October 2002, while the last phase began in July 2002 and ended in January 2003. Participants were recruited through sign-on notices placed on university notice boards and lecture announcements in psychology, education, drama, and criminology. Participants were then contacted by telephone and provided a brief summary of the time required and the information we wished to obtain in the study (see Appendix J). Participants were told the experiment was examining how different individuals write about a variety of topics and how ways of writing according to these individual differences is linked to general functioning. Individuals were told they could be given one of many different types of writing tasks, and some of these tasks could involve writing about a personal and upsetting experience. They were assured of confidentiality and that all information would be held anonymously. Participants were informed that if they had any difficulties during the study, they were free to withdraw at any time. All participants were briefly screened for the presence current significant intrusive symptoms in relation to any upsetting experiences. Any participants disclosing high levels of current intrusive and avoidant symptoms to the experimenter were removed from the study. Once in agreement, a time was set to meet for the first session.

Session 1: Questionnaires.

The first session involved filling out the pre-assessment questionnaire booklet. Most completed this booklet within an hour. Participants filled out the consent form and the medical access consent. They then filled out all individual difference measures and health measures. Finally, participants were asked to complete trauma

related questionnaires in relation to one upsetting experience. All participants were encouraged to choose an experience that they believed was the most upsetting of their life, one that they had not disclosed to others, and/ or one that they felt they hadn't really understood. Once questionnaires had been completed, participants set a time with the experimenter for the first writing session.

Session 2-4: The writing sessions.

All participants wrote once a week for three weeks. Each of the writing sessions was scheduled for the same time every week. However, many participants changed their times from week to week due to other commitments. On the first day, the lead experimenter greeted participants and re-iterated the importance of the study. The experimenter also stated that it was important not to discuss with other people involved in the study what they were being asked to do. Participants were tested in pairs, however, each was seated at their own isolated booth.

Once seated, the experimenter attached the pulse-plethysmograph to the third finger, along with skin conductance transducers on the index and middle finger (due to the instability of the skin conductance transducers, skin conductance measures were never analysed). A 7-minute orientation phase was also used to calibrate equipment. After completion, participants were then asked to copy two emotionally neutral pages from the APA Manual (2001) for 10 minutes. While participants completed this phase, the lead experimenter recorded heart rate signals to obtain a 10-minute baseline. After the 10-minute copy phase, participants were given the PANAS-I to complete to obtain pre-affect ratings. Participants were then assigned randomly to an experimental condition.

The same experimental condition was given to each pair of individuals. When instructions had been read to participants, the lead experimenter asked each

participant to summarize the instructions. When it was clear the participants understood the instructions, they were left on their own to write for 30 minutes and recording began. The steps card was placed in front of all participants, except for those assigned to the standard writing condition, in case they wanted to refer back to the instructions for any reason.

After the 30-minute session was complete, participants handed their writings to the experimenter, who coded them immediately and placed them in a coded folder. All participants believed that someone would read their anonymous writings. Participants were asked to fill out the post-writing measures, including the EEQ, PANAS-I, BSQ, and the SUDS indicator. Only the emotional writing groups completed the PIQ. The process was repeated each week for three weeks. The only differences between session one and the following two sessions was that there was no orientation phase at the beginning of the session.

If participants reported high levels of distress at the end of each writing session they were initially calmed through normalizing the writing experience and placing them in a quiet environment to relax. They were told it was normal to have recurring thoughts about the writing experience throughout the coming weeks. They were told if they had any significant difficulties they could contact the lead experimenter at any time.

Session 5 and 6: The follow-up questionnaires.

Two months later participants were contacted and given the follow-up psychological and physical health outcome questionnaires. At six months, participants were contacted again and given the same questionnaires. For the final follow-up, many participants had begun their holiday vacation and had to be contacted via mail. Unfortunately, 5 participants could not be contacted or did not return their

questionnaire. Once all data had been collected, participants were debriefed about the nature of the study and had any questions answered.

Further data preparation.

Once all individuals were tested and data had been collected, all 600 essays were typed to prepare them for the LIWC analysis and the independent judge analysis. Of the 600 essays, 7 participant hand-writings were illegible, thus 21 were excluded from analysis. Over 300 health centres were contacted and after many months of collecting this data, we were able to obtain 91% of participant illness visit data.

RESULTS

3.1 Overview

Measures were employed to serve as trait measures, integrity checks for experimental conditions, or outcome measures assigned to assess physical and psychological health. Each was examined in a progressive manner over six phases. First, descriptive statistics, reliabilities, and sample characteristics were provided for all pre-measures. Second, effectiveness of randomisation to experimental groups for the demographic, individual difference, trauma event, and outcome measures was assessed. Third, integrity checks were examined to ensure adherence to experimental instructions. Fourth, main predictions assessing the impact of emotional writing on health were examined. This was done by initially determining whether the results replicated past studies by producing expected differences between the control and the standard trauma writing condition. Following this, comparisons between the newly developed experimental conditions and the standard writing condition were conducted to determine whether the structured instructions led to increased benefits above and beyond that of the standard unstructured writing condition. For the fifth phase, each of the individual differences were examined to determine their impact on health. The identified individual difference predictors were examined for their impact on the dependent variables in conjunction with experimental groups.

There were multiple analyses in this study. This can inflate the risk of a type 1 error. To correct for this possibility, many statisticians would suggest a bonferroni procedure where the $p < .05$ criterion is divided by the number of tests conducted. This would create a scenario where the cut-off for significance throughout analyses was decreased to a level well below $p < .01$ for this study, contrary to the sample size that was selected to detect moderate effect sizes at power = 0.8 and $p = 0.05$.

A criterion of $p < .05$ was thus maintained for all planned analyses. The justifications were multiple. Firstly, effects in past studies are typically of medium size and have been demonstrated using a $p < .05$ criterion. A more stringent criterion would have resulted in multiple type II errors for these studies. For power to reveal effects at a lower criterion, many more participants would have been required for each condition. This is outside the resources of most researchers, and even more so in a study that involved five separate writing conditions. Most importantly, the defining feature of this study is that it was hypothesis driven, formulated from theory and on the effects demonstrated by past studies. Therefore, adherence to the stated hypothesis when conducting analysis reduces the risk of type 1 errors. Where an analysis may be considered post-hoc and more likely to result in ‘type 1 errors’, the results were both highlighted as post-hoc and cautioned. Finally, a level of statistical significance will be identified by criteria stated at $p < .01$ or $p < .001$ using alpha statistics.

3.2. Reliabilities, Descriptive Statistics and Sample Characteristics

Table 3.1, Table 3.2, and Table 3.3 present the means, standard deviations, and ranges for all individual difference trait variables, the newly developed Process Identification Questionnaire, and health outcome measures. All scales demonstrated moderate to strong internal reliability. To provide information about this sample in relation to previous studies, means were compared from previous research. This provides important information when placing this study in an international context, particularly if differences exist between studies. As may be noted there were no major differences between our gender distribution and other studies. The average age of participants in this study was slightly older ($M = 24.1$) than past studies that generally report an average age between 18-20 (Greenberg & Stone, 1992, Greenberg et al., 1996; King & Miner, 2000). This may be due to the fact that many of the current

Table 3.1.

Internal Reliability, Mean, Standard Deviation and Range for Individual Difference Pre-Measures

Variable	Study Entry				
	N	M	SD	R	Alpha
Tellegen Absorption Scale	199	20.77	5.80	2 – 33	0.81
Bett's Question. Mental Imagery	198	84.94	23.34	42-200	0.92
Toronto Alexithymia Scale	199	49.36	9.76	24 – 75	0.82
Social Desirability Scale	199	15.70	4.51	4 – 28	0.69
Taylor Manifest Anxiety Scale	199	8.47	4.72	0 – 20	0.84
Life Orientation Test - Revised	199	14.32	4.35	0 – 24	0.84
Positive Affect (PANAS- Trait)	199	32.47	7.22	12 – 49	0.90
Negative Affect (PANAS – Trait)	199	17.67	6.09	10 – 41	0.88

participants were not first- year psychology students. Scores on the PANAS did not appear to differ markedly from other studies (Greenberg & Stone, 1992). Scores on the IES were considerably higher than what would be expected (Paez et al., 1999). The scores fall in what would be considered borderline range for a clinical PTSD population. In fact, the means are comparable to that reported by Smyth et al., (2002) who used a group that had recently experienced a natural disaster. In terms of illness

Table 3.2

Internal Reliabilities, Mean, Standard Deviation, and Range for the Self-Report Process Identification Questionnaire

	Mean	St. Dev	Range	Alpha
SR Exposure	2.96	1.63	1 – 7	0.94
SR Devaluation	3.64	1.53	1 – 7	0.82
SR Benefit Finding	3.70	1.78	1 – 7	0.95

Table 3.3

Internal Reliability, Mean, Standard Deviation and Range for Health Outcome Pre-Measures

Study Entry					
Variable	N	M	SD	R	Alpha
Depression Anxiety Stress – Rev.	199	34.93	9.73	21 - 84	0.91
Physical Symptoms Questionnaire	199	37.49	8.59	24 – 82	0.80
Impact of Events Scale	198	26.97	17.64	0 – 70	0.91
Cognitive Neutralising Strategies	199	68.82	15.07	31-107	0.93
Post-Traumatic Growth Inventory	199	54.37	21.38	1 – 99	0.93
Positive Affect (Experience)	199	20.18	7.83	10 – 49	0.85
Negative Affect (Experience)	199	23.49	8.36	10 – 46	0.86

visits, scores were lower than what would be expected from past studies ($M = 0.13 - 0.18$; Greenberg & Stone, 1992; Pennebaker & Beal, 1986). Overall, differences in this sample on measures that had been previously reported included a slightly older group that reported more trauma symptoms and made fewer illness visits.

3.3 Randomization

It is critical for most research designs that participants are randomly assigned to conditions. It is expected that randomization will result in experimental groups exhibiting similarities across demographics and pre-measures. To check for this, one-way ANOVAs were conducted with experimental group as the independent variable and each of the demographic variables and individual difference variables as the dependent variables. The results are presented in Table 3.4, along with means and standard deviations within groups. ANOVAs indicated age was significantly different across groups. Participants in the benefit-finding condition were significantly older than participants in the control, exposure, and devaluation writing conditions. There were no other significant effects.

Table 3.4

Means, Standard Deviations, and Randomization Checks for Group by Demographic and Individual Differences

		Control	Standard	Exposure	Devalue	Benefit-Finding	F-Value	P
Gender	<i>M</i>	1.76	1.73	1.66	1.63	1.67	0.48	> .05
	<i>SD</i>	0.44	0.45	0.48	0.49	0.46		
Age	<i>M</i>	23.37 ^a	24.58	22.47	22.88 ^b	27.33 ^{ab}	2.58	< .05*
	<i>SD</i>	9.32	8.91	4.90	6.24	9.32		
Phase	<i>M</i>	2.20	2.30	2.35	2.50	2.36	0.86	> .05
	<i>SD</i>	0.98	1.09	1.03	1.20	0.87		
PA	<i>M</i>	31.27	33.50	33.16	31.49	33.03	0.81	> .05
	<i>SD</i>	7.56	6.49	7.67	6.42	7.98		
NA	<i>M</i>	16.88	16.93	18.13	18.32	18.15	0.55	> .05
	<i>SD</i>	5.63	5.55	6.79	7.12	5.29		
TAS-20	<i>M</i>	47.93	50.58	49.21	51.24	47.79	1.01	> .05
	<i>SD</i>	9.32	10.29	9.39	9.46	10.32		
LOT-R	<i>M</i>	13.88	15.18	14.47	13.83	14.26	0.63	> .05
	<i>SD</i>	3.91	4.55	4.06	4.57	4.70		
Bett's QMI	<i>M</i>	85.27	82.95	86.26	86.29	83.92	0.15	> .05
	<i>SD</i>	22.36	23.74	24.53	26.12	20.54		
Absorption	<i>M</i>	21.76	21.30	20.47	19.78	20.54	0.71	> .05
	<i>SD</i>	5.35	5.73	5.69	6.01	6.28		
Repressor	<i>M</i>	1.68	1.75	1.87	1.85	1.87	1.86	> .05
	<i>SD</i>	0.47	0.44	0.34	0.36	0.34		

Note. Means with the same superscript are different from each other at the $p < .05$ level.

A second group of one-way ANOVAs was conducted with experimental group as the independent variable and a number of trauma event characteristics as the dependent variable (see Table 3.5). One significant difference was revealed. Participants in the benefit-finding condition were significantly older at the time of their upsetting experience than control and devaluation writing participants. The difference was not significant between benefit-finding, exposure, or standard writing conditions. A third group of one-way ANOVAs was conducted with experimental

group as the independent variable and each of the dependent psychological and physical health pre-measures and as the dependent variable (see Table 3.6). Means and standard deviations within groups are presented later in Table 3.15 and Table 3.17. Table 3.6 presents the ANOVA results. There were no significant differences between groups, indicating adequate randomisation on these measures. In summary, the only significant difference between groups on all demographic and pre-measures was that individuals in the benefit-finding condition were slightly older at the time of testing and were older at the time of their upsetting experience.

Table 3.5

Randomization Checks for Group by Traumatic Event Characteristics

Trauma Event Characteristic		Control	Standard	Exposure	Devalue	Benefit-Finding	F-Value	Sig.
Type	M	20.32	24.33	24.00	18.73	23.13	0.25	> 0.05
	SD	28.93	27.39	31.04	28.30	29.12		
Onset Age	M	16.48 ^a	18.68	17.21	15.98 ^b	21.00 ^{ab}	3.08	< 0.05*
	SD	6.38	8.72	4.92	6.80	8.32		
Years Since	M	7.82	7.03	6.71	8.12	6.95	0.37	> 0.05
	SD	6.40	6.50	5.87	6.76	6.13		
Most Traum.	M	1.20	1.23	1.18	1.18	1.22	0.87	> 0.05
	SD	0.40	0.42	0.39	0.39	0.40		
Severity	M	8.37	7.88	8.08	8.39	8.44	1.06	> 0.05
	SD	1.26	1.62	1.68	1.41	1.37		
Disclose Before	M	1.38	1.48	1.44	1.54	1.38	1.01	> 0.05
	SD	0.49	0.51	0.50	0.51	0.49		
Social Support	M	9.37	9.53	9.95	8.59	10.41	1.70	> 0.05
	SD	3.34	3.46	3.30	2.95	3.13		

Note. Means with the same superscript are different from each other at the $p < .05$ level.

Table 3.6.

Randomization Checks for Group by Outcome Pre-Measures

Measure	F Value	Significance
Depression Anxiety Stress Scale -R	0.04	> 0.05
Impact of Events Scale	0.26	> 0.05
Cognitive Neutralising Strategies	1.15	> 0.05
Post-Traumatic Growth Inventory	1.07	> 0.05
Positive Affect (Experience)	1.43	> 0.05
Negative Affect (Experience)	1.04	> 0.05
Physical Symptoms Questionnaire	1.08	> 0.05
Pre 6-month Illness Visits	0.38	> 0.05

3.4 Integrity Checks

Critical to this study was the ability to demonstrate that participants in the experimental conditions followed instructions and engaged in the hypothesised mechanisms of change that were specific to their group. Two types of integrity checks were employed to test for this. The first assessed the content of the written essays. The second assessed participant arousal, and affect before, during, and after writing.

Essay content

The first category of manipulation checks involved an evaluation of what participants actually wrote. This included participant self-reports, independent judge ratings, and linguistic analysis using LIWC (2001).

Self-reports.

Initially, participants completed the EEQ developed by Pennebaker and Beal (1986). A one-way ANOVA was conducted to determine if there were significant differences between groups on each of the items. Means for each group on each item are presented in Table 3.7. Differences across writing conditions were revealed for

Table 3.7

EEQ Mean Scores and Standard Deviations According to Group Membership

EEQ		Control	Standard	Exposure	Devalue	Benefit-Finding	P
Personal	<i>M</i>	2.94 ^{abcd}	5.68 ^a	5.69 ^b	5.78 ^c	5.61 ^d	<.001
	<i>SD</i>	1.05	1.09	1.15	0.87	1.07	
Traumatic	<i>M</i>	1.11 ^{abcd}	3.63 ^{ae}	4.47 ^{begh}	3.50 ^{cgi}	2.45 ^{dfhi}	<.001
	<i>SD</i>	0.19	1.28	1.13	1.21	1.00	
Revealed emotions	<i>M</i>	1.80 ^{abcd}	5.18 ^a	5.39 ^b	5.20 ^c	5.00 ^d	<.001
	<i>SD</i>	0.77	1.02	0.81	0.77	1.23	
Revealed thoughts	<i>M</i>	3.57 ^{abcd}	5.68 ^a	5.69 ^b	5.58 ^c	5.73 ^d	<.001
	<i>SD</i>	1.44	0.88	0.84	0.69	1.06	
Wanted to talk	<i>M</i>	1.96 ^{abcd}	3.24 ^a	2.85 ^b	3.50 ^c	3.51 ^d	<.001
	<i>SD</i>	1.05	1.41	1.47	1.76	1.36	
Found meaning	<i>M</i>	1.94 ^{abc}	3.91 ^a	3.51 ^d	4.60 ^b	5.52 ^{cd}	<.001
	<i>SD</i>	0.98	1.13	1.14	1.01	1.25	
Made sense	<i>M</i>	2.02 ^{abcd}	3.43 ^{ae}	3.11 ^{bf}	4.33 ^{cef}	3.96 ^d	<.001
	<i>SD</i>	1.18	1.35	1.61	1.19	1.51	

Note. Means with the same superscript are different from each other at the $p < .05$ level.

how personal the essay was, $F(4, 189) = 55.69, p < .001$, how traumatic the essay was, $F(4, 189) = 61.84, p < .001$, how much emotion was revealed in the essay, $F(4, 189) = 106.67, p < .001$, how much thoughts were revealed in the essay, $F(4, 189) = 33.83, p < .001$, how much the essay assisted to make meaning, $F(4, 189) = 10.01, p < .001$, how much the essay helped make sense of their topic, $F(4, 189) = 17.01, p < .001$, and how much they wanted to talk about what they had written about, $F(4, 189) = 8.32, p < .001$.

These effects in the above analysis were in the expected direction. A Tukey HSD test at the $p < .05$ level indicated that, as expected, control participants wrote less personal, traumatic, emotional, and thoughtful essays than all other groups. They also wanted to talk less about what they had written about, found less meaning, and

made less sense of the topic they were writing about from their essays. Differences between trauma writing conditions were also revealed in expected directions. Exposure participants wrote more traumatic essays and wanted to talk less about what they had written about than all other groups. In contrast, benefit-finding participants found more meaning than exposure and standard writing conditions and wrote less traumatic essays than all other trauma-writing groups. Finally, the devaluation participants reported making more sense about their experience from their essay than exposure and standard writing conditions.

The second self-report questionnaire designed to assess essay content was the PIQ. It was more specific to the hypothesized processes of change, was only completed by trauma writing participants, and directly assessed compliance with experimental instruction. To initially assess whether the questionnaire differentiated on an individual level according to group assignment, discriminant analysis was conducted on the six self-report items. Analysis indicated a two-structure matrix after rotation accounting for 96.6% of the variance. The first structure included high positive correlations with the two exposure items, and high negative correlations with the two benefit-finding items. The second structure involved high correlations with the two devaluation items. These six items correctly classified participants to condition with 98.2% accuracy.

It appeared from this analysis that the PIQ adequately discriminated between individuals according to group assignment. However, analysis was required to determine whether group differences were in the expected direction. For this analysis, the two questions for each scale (i.e., exposure) were summed for each session. A 3 (writing condition) x 3 (Session Number) x 3 (PIQ scale) mixed subjects repeated ANOVA was conducted. Averaged means across conditions are presented in Table

3.8. Analysis on the exposure scale indicated a main effect for group, $F(3, 146) = 105.28, p < .001$. A Tukey HSD test indicated participants in the exposure condition rated higher on the exposure scale than all other groups. A main effect for session was also indicated, $F(2, 145) = 69.80, p < .001$, as was the interaction between writing condition and session, $F(6, 145) = 6.11, p < .001$. Overall, participants rated themselves less on the exposure scale from session 1 to session 3. However, participants in the exposure condition did not decrease and maintained similar ratings throughout the three sessions.

Analysis of the devaluation scale indicated an overall main effect for writing condition, $F(3, 145) = 71.58, p < .001$. A Tukey HSD indicated that the devaluation participants rated significantly higher on the scale than all other groups. There was no main effect of session on the devaluation scale but an interaction between session and writing condition was indicated, $F(6, 145) = 3.51, p < .01$. The effect appeared to be due to both the benefit-finding condition and exposure condition gradually decreasing their scores on the scale, while devaluation participants remained constant and the standard condition increased slightly over the three sessions.

Table 3.8.

Means and Standard Deviations of the Self-Reported Degree Trauma-Writing Groups Followed Experimental Instructions

		Standard	Exposure	Devaluation	Benefit-Finding
SR Exposure	<i>M</i>	3.59 ^{abc}	4.94 ^{ade}	1.80 ^{bd}	1.64 ^{ce}
	<i>SD</i>	1.26	0.88	0.82	0.68
SR Devaluation	<i>M</i>	4.06 ^{abc}	2.99 ^{ade}	5.30 ^{bd}	2.17 ^{cef}
	<i>SD</i>	1.12	1.04	0.83	0.92
SR Benefit-Finding	<i>M</i>	3.40 ^{ab}	1.79 ^{acd}	3.72 ^{ce}	5.71 ^{bde}
	<i>SD</i>	1.24	1.06	1.29	1.00

Note. Means with the same superscript are different from each other at the $p < .05$ level.

Analysis of the benefit-finding scale indicated an overall main effect for writing condition, $F(3, 145) = 69.32, p < .001$. A Tukey HSD indicated that benefit-finding participants rated significantly higher on the scale than all other groups. In comparison to all other groups, exposure participants engaged in the least benefit-finding. There was a main effect for session on the benefit-finding scale, $F(2, 145) = 6.60, p < .01$, as was the interaction between group and session, $F(6, 145) = 6.83, p < .01$. The standard writing condition increased reporting on the benefit-finding scale, the benefit-finding participants remained constant and the devaluation and exposure scale decreased their reporting on the scale over the three sessions. Overall, individual self-reports strongly indicated that participants followed instructions.

Independent judge ratings.

To ensure the self-report results were not due to a 'response bias' from simply reading the instructions, independent judges were employed to rate essays according to both the Pennebaker and Beal (1986) EEQ Questionnaire and the three mechanisms of change (JPIQ). To assess the control group, judges initially confirmed that control participants had written about the house they lived in, the university campus, and a place they like to go to on weekends by scanning each control essays. As expected, all control participants wrote about environmental topics. Analysis was then conducted on judge ratings of the EEQ. This analysis did not involve the control essays and is therefore slightly different to the previous self-report analysis. Comparisons between self-reports and independent judge rating were conducted on the four items that were identical. Correlations were low but significant for how personal ($r = 0.29, p < .01$), traumatic ($r = 0.57, p < .001$), emotional ($r = 0.29, p < .001$), and thoughtful ($r = 0.16, p < .05$) the essay was. It therefore appeared that self-report ratings were generally in poor agreement in independent judges.

One-way ANOVAs were conducted on the judge ratings of the essay assessment questionnaire to determine differences across condition. Means and standard deviations are presented in Table 3.9. Main effects for writing condition were revealed across groups for how personal, $F(3, 150) = 6.43, p < .001$, traumatic $F(3, 150) = 94.68, p < .001$, emotional, $F(3, 150) = 68.13, p < .001$, and thoughtful, $F(3, 150) = 5.45, p = .001$, the essay was. There was no difference between groups for how well structured and coherent the essay was, $F(3, 150) = 2.48, p > .05$.

Despite the low correlations observed between self-ratings and judge ratings on the four first items of the EEQ, effects were in the expected direction. A Tukey HSD test at the $p < .05$ level indicated that exposure participants wrote more traumatic essays and emotional essays than other groups. Their essays were more personal but less thoughtful than devaluation and benefit-finding participants. In contrast, benefit-finding participants wrote less traumatic and emotional essays in comparison to all other groups. Finally, devaluation participants wrote more thoughtful essays in comparison to standard writing and exposure writing conditions.

Table 3.9

Means and Standard Deviations of the Judge Rated EEQ for each Group

EEQ Judge		Standard	Exposure	Devalue	Benefit-Finding
Personal	<i>M</i>	5.69	5.98 ^{ab}	5.27 ^a	5.20 ^b
	<i>SD</i>	0.83	0.87	0.87	1.05
Traumatic	<i>M</i>	4.01 ^{ab}	5.18 ^{acd}	3.73 ^{ce}	1.47 ^{bde}
	<i>SD</i>	1.06	1.08	0.82	0.94
Revealed emotions	<i>M</i>	4.53 ^{ab}	5.52 ^{acd}	4.39 ^{ce}	2.73 ^{bde}
	<i>SD</i>	0.97	0.85	1.10	1.08
Revealed thoughts	<i>M</i>	4.86 ^{ab}	4.67 ^{cd}	5.38 ^{bc}	5.23 ^d
	<i>SD</i>	0.87	0.97	0.81	0.84
Coherent	<i>M</i>	5.53	6.05	5.67	5.80
	<i>SD</i>	1.05	0.92	0.86	0.94

Note: Means with the same superscript and different from each other at the $p < .005$

The second questionnaire completed was the JPIQ. This questionnaire was similar to the self-report version except that clinical judgment was required to address more specific criteria associated with the process of change. For example, judges rated each of the essays according to how much the person had identified a core belief or successfully re-evaluated what upset them. Therefore, there were four items for each of the processes as opposed to the self-report version which had two. One independent judge blind to condition assignment rated all essays. A second independent judge rated a further 90 essays for inter-rater reliability. Correlations between the two judges were modest to strong for exposure ($r = 0.91, p < .001$), devaluation ($r = 0.75, p < .001$) and benefit-finding ($r = 0.62, p < .001$). This would indicate there is reasonable inter-rater reliability across the scales. Correlations between the independent judge and self-ratings further support the concurrent validity of the scales. High correlations were observed between self-ratings and judge ratings for exposure ($r = 0.78, p < .001$), devaluation ($r = 0.71, p < .001$), and benefit-finding ($r = 0.69, p < .001$).

To initially assess whether the questionnaire differentiated on an individual level according to group assignment, discriminant analysis was conducted on the 12 judge rating items. Analysis indicated a two-structure matrix after rotation accounting for 100% of the variance. The first structure included high positive correlations with the four exposure items. The second structure included high positive correlations with the devaluation items and negative correlations with the benefit-finding items. These 12 items correctly classified participants to condition with 100% accuracy. This analysis confirms that the JPIQ adequately discriminated between individuals according to group assignment. Analysis was again conducted to determine whether group differences were in the expected direction. For this analysis, the four questions

for each scale (i.e., exposure) were summed for each session. A 3 (writing condition) x 3 (Session Number) x 3 (PIQ scale) mixed subjects repeated ANOVA was conducted.

Averaged means and standard deviations across conditions are presented in Table 3.10. Analysis on the exposure scale indicated a main effect for group, $F(3, 148) = 215.86, p < .001$. A Tukey HSD test indicated participants in the exposure condition rated higher on the exposure scale than all other groups. Further, standard writing participants rated more highly on the exposure criteria than did devaluation and benefit-finding participants. A main effect for session was also indicated, $F(1, 148) = 30.49, p < .001$, as was the interaction between writing condition and session, $F(3, 148) = 23.52, p < .001$. Overall, standard writing participants decreased the amount of exposure they engaged in, particularly from session 1 to session 2. Judges rated all other groups as remaining constant throughout the three sessions on the amount of exposure participants engaged in.

Table 3.10

Means and Standard Deviations of the Judge Rated PIQ For each Group

		Standard	Exposure	Devaluation	Benefit-Finding
SR Exposure	<i>M</i>	2.61 ^{abc}	5.26 ^{ade}	1.01 ^{ad}	1.01 ^{ae}
	<i>SD</i>	1.43	0.84	0.02	0.03
SR Devaluation	<i>M</i>	2.19 ^{abc}	1.21 ^{ad}	4.30 ^{bde}	1.16 ^{ce}
	<i>SD</i>	0.84	0.42	0.86	0.56
SR Benefit-Finding	<i>M</i>	1.21 ^a	1.01 ^b	1.25 ^c	4.45 ^{abc}
	<i>SD</i>	0.46	0.05	0.34	1.07

Note. Means with the same superscript are different from each other at the $p < .05$ level.

Analysis of the devaluation scale indicated an overall main effect for writing condition, $F(3, 148) = 166.64, p < .001$. A Tukey HSD indicated that the devaluation participants rated significantly higher on the scale than all other groups. Devaluation participants scored higher than exposure and benefit-finding conditions. There was no difference between exposure and benefit-finding conditions. There was also a main effect for session, $F(1, 148) = 32.74, p < .001$, and the interaction, $F(3, 148) = 13.01, p < .001$. The effect appeared to be due both the devaluation and standard writing conditions increasing on the devaluation sub-scale from session 1 to session 2. In contrast, judges rated the exposure and benefit-finding condition as remaining constant throughout the three sessions. Further analysis was conducted on one item of the devaluation sub-scale 'Successfully found ways to re-evaluate what was specifically upsetting to make them feel less upset.' This item represented the final step in the devaluation process as rated by judges. A rating of 4 (out of a possible score of 7) was considered to represent a moderate amount of devaluations developed. Percentages indicated that that 32.3% at session 1, 48.7% at session 2, and 51.3% at session 3 of devaluation participants, obtained at least this rating.

Analysis of the benefit-finding scale indicated an overall main effect for writing condition, $F(3, 148) = 280.60, p < .001$. A Tukey HSD indicated that the benefit-finding participants rated significantly higher on the scale than all other groups. There were no significant differences between the other three groups. There was a main effect for session on the benefit-finding scale, $F(1, 148) = 12.30, p = .001$, as was the interaction between group and session, $F(3, 148) = 2.86, p < .05$. The standard writing condition and benefit-finding increased reporting on the benefit-finding scale, particularly between session two and three. However, the exposure and devaluation participants remained relatively constant over the three sessions. Overall,

independent judge ratings strongly indicate that participants followed instructions and improved with instruction compliance over the three sessions. It is also noteworthy that standard writing participants gradually described less about the event and engaged in more devaluation and benefit-finding as sessions progressed.

LIWC analysis.

Finally, the Linguistic Inquiry Word Count (2001) was run on all typed essays. Eight categories were chosen that were considered relevant for differentiating between writing conditions. These categories included use of positive emotion words, negative emotion words, sensory words, motion words, use of insight, use of causal language, and the use of past, present, and future tense. Mean amounts for the use of these word categories are presented in Table 3.11. These categories were analysed in a 4 (Experimental Group) x 3 (Session Number) x 8 (Word Categories) mixed subjects repeated measures ANOVA. Between subjects effects are reported below.

As expected, there was a significant effect of writing condition on use of positive emotion words, $F(3, 148) = 37.27, p < .001$. Those in the benefit-finding condition wrote with more positive emotion than all other groups, while those in the exposure condition wrote with the least amount of positive emotion words. There was also a significant group main effect on the use of negative emotion words, $F(3, 148) = 21.66, p < .001$. As expected, those in the exposure and devaluation writing conditions wrote with more negative emotion words than those in the benefit finding condition. Significant between condition effects were also found for the use of sensory related words, $F(3, 148) = 21.40, p < .001$ and motion-related words, $F(3, 148) = 20.43, p < .001$. As expected, those in the exposure condition wrote more sensory and motion descriptors than those in the other groups. Examination of tense descriptors revealed significant effects for past tense, $F(3, 148) = 92.19, p < .001$,

Table 3.11

Percentages of Words Used in Essays Within Emotional Writing Groups

		Standard	Exposure	Devaluation	Benefit-Finding
Positive Emotion	M	2.01 ^a	1.58 ^{bc}	2.20 ^{bd}	3.48 ^{acd}
	SD	0.77	0.55	0.72	1.11
Negative Emotion	M	2.86 ^a	3.17 ^b	3.40 ^c	1.64 ^{abc}
	SD	0.99	1.39	0.99	0.59
Sensory Processes	M	2.68 ^{ac}	3.77 ^a	2.96	2.11 ^c
	SD	0.78	1.02	1.08	0.70
Motion Words	M	1.26 ^{ab}	1.53 ^{cd}	0.72 ^{ac}	0.76 ^{bd}
	SD	0.57	0.65	0.55	0.32
Past Tense	M	8.37 ^{abc}	10.48 ^{ade}	4.61 ^{bd}	4.11 ^{ce}
	SD	1.82	2.31	1.82	1.79
Present Tense	M	8.48 ^{abc}	5.61 ^{ace}	11.91 ^{ad}	12.00 ^{ae}
	SD	2.41	2.11	2.53	2.40
Future Tense	M	0.80 ^a	0.54 ^{bc}	1.43 ^{ab}	1.17 ^c
	SD	0.43	0.28	1.33	0.46
Causation	M	1.23 ^{ab}	0.84 ^{acd}	1.80 ^{bce}	1.43 ^{cde}
	SD	0.45	0.36	0.86	0.58
Insight	M	3.10 ^a	2.69 ^{cd}	3.20 ^c	3.67 ^{bd}
	SD	0.81	0.65	0.86	0.94

Note. Means with the same superscript are different from each other at the $p < .05$ level.

present tense, $F(3, 148) = 62.76$, $p < .001$, and future tense, $F(3, 148) = 10.13$, $p < .001$. As expected, those in the exposure and standard writing condition used more past tense words, while devaluation and benefit-finding participants employed more present and future tense words. Finally, an effect of group was also found for causal language, $F(3,148) = 17.11$, $p < .001$, and insight words, $F(3,148) = 8.82$, $p < .001$. As expected, devaluation participants employed more causal language and benefit-finding participants employed more insight related words than all other groups. In summary, results of the content analysis provide convergent evidence that participants wrote their essays in accordance with given instructions.

Self-Reports of Affect After Writing

Ratings of affect, distress, and arousal provide valuable information about the degree of stress each writing task placed on participants over each writing session and the degree of habituation for those in the exposure condition. A repeated measures ANOVA was conducted on both the Positive and Negative Affect Scale pre-writing over the three sessions to ensure there were no differences between groups. Examination of the positive affect scale pre-session did not reveal a main effect for group, $F(4, 178) = 1.13, p > 0.05$. However, a main effect for session number was found, $F(2, 178) = 29.46, p < .001$. Overall, it appeared participants decreased their rating of positive affect before writing from the first writing session to the last ($M = 19.51, SD = 7.10$). There was no interaction effect between the two, $F(8, 178) = 0.29, p > 0.05$. Examination of the negative affect scale did not reveal a main effect for group, $F(4, 173) = 0.87, p > 0.05$, session, $F(2, 173) = 0.25, p > 0.05$, or an interaction of group on session, $F(8, 173) = 1.01, p > 0.05$.

As there were no effects of group on pre-session scores, examination of the post-session reports of the PANAS was conducted without controlling for pre-session scores. Post-session affect means and standard deviations are presented in Table 3.12. Analysis of the positive affect scale indicated a significant between subjects effect for group, $F(4, 178) = 6.70, p < .001$. A Tukey HSD test indicated that the benefit-finding writing condition experienced higher levels of positive affect post-session than the standard, exposure, and devaluation writing conditions. This effect is clearly illustrated in Figure 3.1. A second main effect for session number was also significant, $F(2, 178) = 8.05, p > .001$. The time session effect indicated a decrease in positive affect from the first session to the last session. There was no interaction between group and session, $F(8, 178) = .95, p > 0.05$.

Table 3.12.

Post-Writing Affect Rating Means and Standard Deviations According to Writing Condition

Session			Control	Standard	Exposure	Devalue	Benefit-Finding	Total
PA	1	M	24.20	21.89	20.75	21.51	27.92	23.29
		SD	8.31	8.11	8.37	6.98	8.35	8.35
	2	M	22.88	20.76	18.86	20.51	26.31	21.95
		SD	8.44	6.89	7.47	6.55	8.03	7.88
	3	M	20.95	20.70	18.24	20.63	27.32	21.64
		SD	8.63	8.01	8.17	7.98	11.14	9.30
Total	M	22.68	21.09 ^a	19.07 ^b	20.60 ^c	27.05 ^{abc}	22.22	
	SD	7.71	6.52	6.66	6.47	7.90	7.54	
NA	1	M	11.12	19.13	19.05	17.29	13.15	15.87
		SD	1.63	9.02	5.74	6.80	3.31	6.66
	2	M	11.98	16.14	16.47	15.11	14.74	14.82
		SD	3.54	6.82	4.90	5.98	5.67	5.65
	3	M	11.58	14.86	15.91	13.63	12.50	13.62
		SD	2.83	4.95	5.71	5.06	4.22	4.82
Total	M	11.58 ^{abc}	16.59 ^{ad}	17.45 ^{be}	15.46 ^c	13.54 ^{de}	14.80	
	SD	2.02	6.26	4.86	5.28	3.58	5.02	

Note. Means with the same superscript are different from each other at the $p < .05$ level (Total Means Only).

Analysis of the negative affect scale indicated a significant main effect for writing condition, $F(4, 180) = 9.98, p < .001$. A Tukey HSD indicated the exposure and standard writing conditions reported higher levels of negative affect than the control and benefit-finding conditions. The devaluation condition reported higher levels than the control condition. This is clearly illustrated in Figure 3.2. A significant main effect for session number was also found, $F(2, 180) = 21.46, p > .05$. Overall, there was a large decline in negative affect from session 1 to session 2. Finally, an interaction between group and session number was found, $F(8, 180) = 5.00, p < .001$. For the standard, exposure and devaluation conditions, there were significant drops

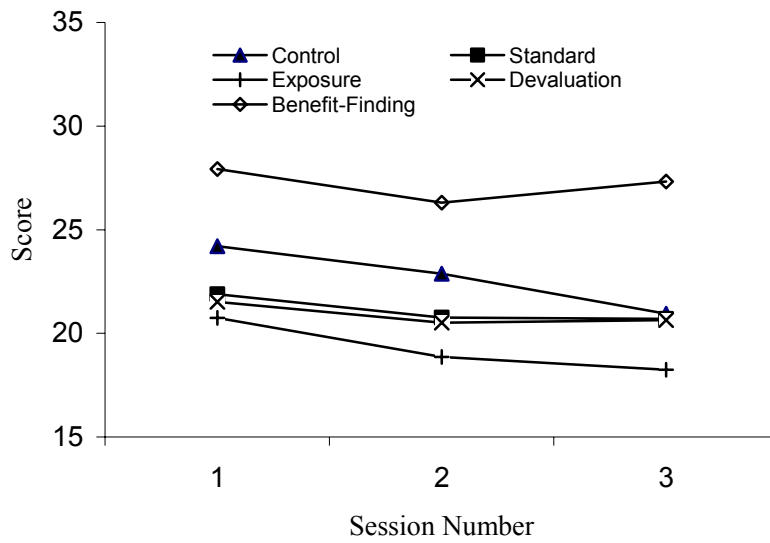


Figure 3.1. Degree of self-reported positive affect post-session within writing groups.

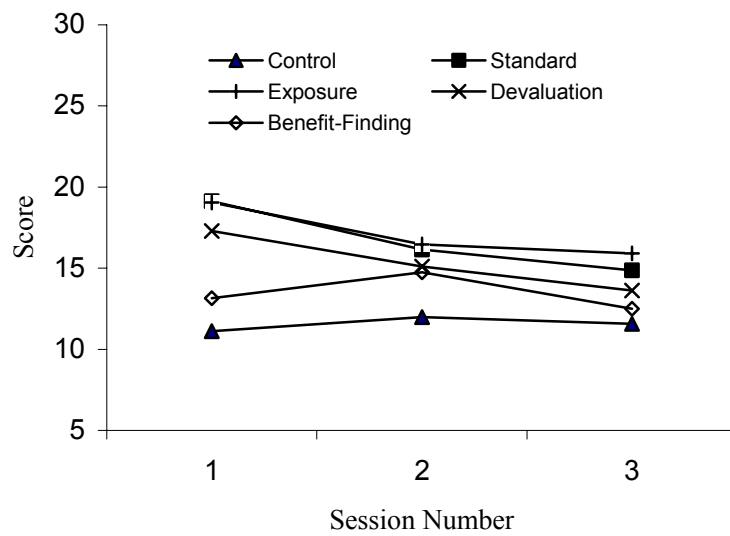


Figure 3.2. Degree of self-reported negative affect post-session within writing groups.

between each session in the level of negative affect experienced. However, for the control and benefit finding conditions, the degree of negative affect remained relatively low over sessions.

In summary, the PANAS indicated that individuals felt gradually less positive before writing over the course of the three writing sessions. Benefit-finding participants experienced more positive emotion and less negative emotion than all other trauma writing groups post-session. All trauma-writing participants experienced an increase in negative affect post session. However, exposure and standard writing participants experienced more negative affect than control and benefit-finding. Three groups decreased their post-ratings of negative affect, devaluation and standard writing conditions. Other groups remained relatively constant.

Body Sensations and Distress While Writing

Scores on the PANAS provide information on affect after writing. However, the data provides no information of distress whilst writing. Both the BSQ and an average SUDS rating provided an index for this information. Concurrent validity between these measures was demonstrated with significant correlations between them for session 1 ($r = 0.54, p < .01$), session 2 ($r = 0.52, p < .01$), and session 3 ($r = 0.44, p < 0.01$).

A repeated measures ANOVA was conducted on participant SUDS rating of the average level of distress they experienced over each of the three sessions. Analysis indicated an overall main effect for group, $F(4, 191) = 30.93, p < .001$. As expected, Tukey HSD test indicated that exposure, devaluation, and standard writing condition participants experienced significantly more distress while writing, in comparison to benefit-finding and control participants (See Table 3.13). Furthermore, benefit-finding participants reported significantly more distress than control. These effects are clearly

illustrated in Figure 3.3. A within subjects main effect for session was also found, $F(2, 191) = 16.45, p < .001$. Ratings of distress gradually decreased from session 1 ($M = 36.32$) to session 3 ($M = 29.45$). A group by session interaction was not found, $F(8, 191) = 0.90, p > 0.05$.

A repeated measures ANOVA was conducted on participant SUDS ratings of peak distress while writing over each of the three sessions. A main effect of writing condition was found, $F(4, 191) = 25.95, p < .001$. A Tukey HSD test indicated all trauma writing groups experienced higher peak levels of distress than control ($M = 16.90, SD = 11.67$). Furthermore, the exposure ($M = 59.01, SD = 21.08$), devaluation ($M = 51.39, SD = 20.20$) and standard writing ($M = 50.98, SD = 22.33$) conditions all experienced significantly greater peak distress levels in comparison to the benefit-finding ($M = 36.30, SD = 20.16$) writing condition. There was also a significant within subjects main effect for session number $F(191, 2) = 28.77, p < .001$ indicating that participant's peak distress decreased from session 1 ($M = 48.37, SD = 27.91$) to session 2 ($M = 42.63, SD = 25.82$) to session 3 ($M = 37.83, SD = 27.04$). There was no interaction of group and session number on peak distress $F(4, 191) = 1.20, p > .05$.

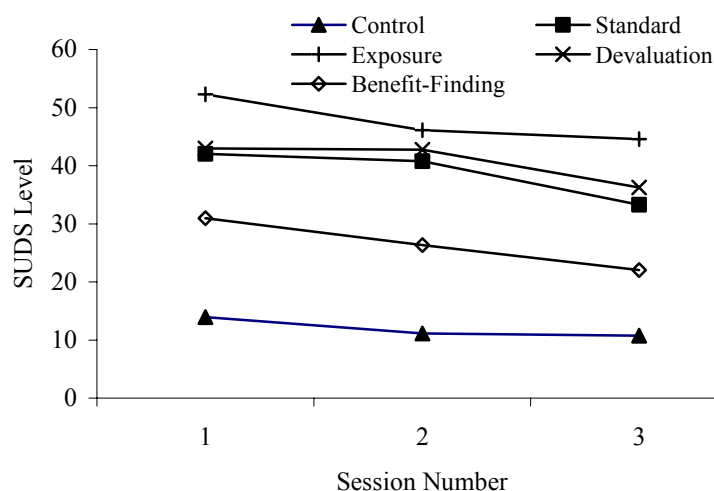


Figure 3.3. Average SUDS level during each session for each writing condition.

Table 3.13

Mean and Standard Deviations for Body Sensation, SUDS and Within Session Habituation According to Writing Condition.

Session		Body Sensations While Writing			Average SUDS (0-100)			SUDS Within- Session Habituation		
		1	2	3	1	2	3	1	2	3
Control	M	23.37	21.59	21.17	13.93	11.12	10.76	8.22	5.49	4.54
	SD	6.23	4.44	4.28	14.52	9.48	9.42	13.33	7.24	8.48
Standard	M	31.71	26.68	23.38	42.03	40.78	33.26	18.10	15.08	11.76
	SD	10.98	9.17	7.88	21.09	20.39	24.63	18.23	13.51	11.71
Exposure	M	34.97	30.44	30.40	52.26	46.13	44.59	16.05	9.19	11.23
	SD	9.18	10.05	11.60	19.05	20.66	23.41	17.89	11.71	12.58
Devalue	M	29.58	26.30	23.90	42.98	42.73	36.24	19.27	15.71	15.16
	SD	10.15	8.48	7.99	20.83	18.56	18.73	17.41	16.23	13.11
Benefit Finding	M	27.56	24.33	21.69	30.97	26.33	22.05	16.31	9.28	11.74
	SD	10.05	7.68	5.67	13.04	18.41	15.04	18.87	14.19	17.18
Total	M	29.12	25.74	23.95	36.19	33.26	29.11	15.56	10.88	10.78
	SD	10.02	8.55	8.33	23.01	22.07	22.17	17.50	13.34	13.25

A repeated ANOVA was conducted on participant SUDS ratings of anxiety reduction within sessions. Results indicated a main effect for group, $F(4, 184) = 6.00$, $p < .05$, indicating that all trauma writing conditions experienced more within session habituation than control. Tukey HSD analysis indicated the difference was greatest between control and the standard and devaluation writing groups. A significant main effect for session number was also found, $F(2, 368) = 11.90$, $p < .001$. The highest amount of anxiety reduction occurred in the first writing session as opposed to the second or third session. There was no interaction between writing condition and session, $F(8, 184) = 0.98$, $p > 0.05$. Given that only the exposure participants were requested to focus on describing the upsetting aspects of the event for the entire writing session, habituation would be artificially amplified by diverting attention in other groups. Therefore, it was expected that participants in the devaluation and

standard writing condition may experience the most anxiety reduction. In groups, other than exposure, it should be considered unlikely that anxiety reduction would represent true ‘within session habituation’ as referred to by Foa and Kozak (1986).

Finally, a repeated measures ANOVA was conducted on participant self-rating of body sensations (BSQ) over each of the three sessions. Means and standard deviations for each session on the BSQ are presented in Table 3.13. Analysis indicated that there was a significant main effect for writing condition group, $F(4, 181) = 8.19, p < .001$. Tukey HSD indicated that the exposure participants reported higher levels of body sensations in comparison to benefit-finding and control. Standard and devaluation participants also reported more bodily sensations than control. There were no other significant differences. These effects are clearly illustrated in Figure 3.4. There was also a within subject main effect for session, $F(4, 181) = 60.90, p < .001$ such that participants decreased reporting body sensations from session 1 to session 3. Finally, an interaction was found between session and writing condition, $F(8, 181) = 2.13, p < .05$. Three groups, the standard, devaluation

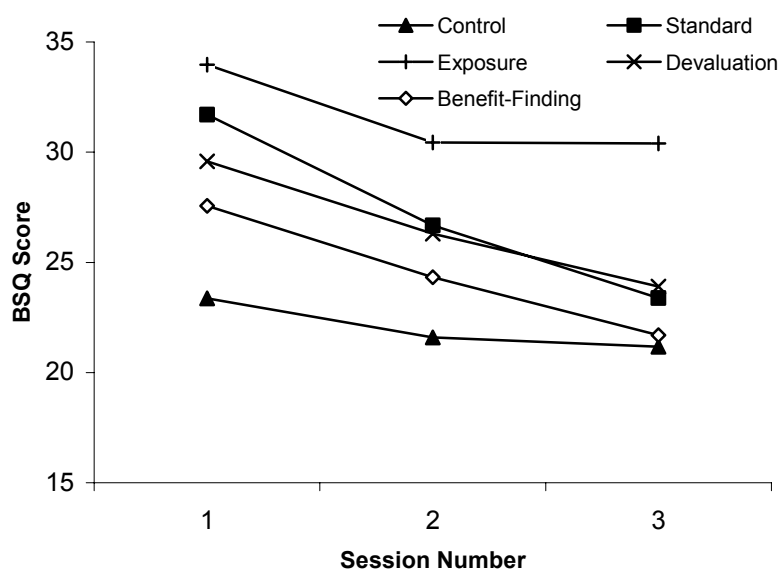


Figure 3.4. Body sensations during each session for each condition.

and benefit-finding writing condition reported a significant decrease in body sensations over the three sessions. In comparison, participants did not report the same level of decrease in the exposure condition or the control writing condition.

Overall, results indicated exposure, devaluation, and standard writing participants experienced the greatest distress while writing, as indicated by both SUDS ratings and the BSQ. While exposure participants consistently reported higher ratings of anxiety and distress, differences were not significantly different from devaluation or standard conditions. Benefit-finding and control experienced the least distress. The standard and devaluation groups experienced large amounts of anxiety reduction within session. The greatest within session anxiety reduction occurred in session 1. The greatest drop between sessions was from session 1 to 2.

Heart Rate Responses While Writing

Self-reports provide a very specific and easily attainable measure of arousal and distress. However, objective measures, such as heart rate, can be used to provide a concurrent assessment of both arousal and habituation. The primary purpose of this analysis was to determine whether the physiological data supports self-reports that the trauma writing condition participants experienced increased arousal while writing.

Heart-rate responses were recorded continuously for all participants. However, due to equipment malfunction and noise in the recordings, there were missing data across the 6 data points (3 baseline and 3 writing tasks sessions). These missing data points were on average only about a few per condition for each session. However, when aggregated over a repeated measures ANOVA, the overall effect was a significant loss of data (about a third of all participants). Consequently, all analysis was conducted as a one-way ANOVA controlling for copy task baseline levels. Means and standard deviations are presented in Table 3.14. Analysis of the average

Table 3.14.

Heart Beats Per Minute According to Condition, Session Number, and Testing Phase.

		Mean Heart Rate For Each Session (BPM)					
		Copy Tasks			Experimental Session		
Session		1	2	3	1	2	3
Control	M	77.13	78.62	81.00	75.06 ^a	76.83	77.86
	SD	11.16	11.85	13.32	9.16	10.46	11.36
Standard	M	79.21	80.29	80.47	77.36	75.99	75.90
	SD	10.85	11.43	12.24	9.16	9.93	9.04
Exposure	M	80.76	80.33	79.60	80.56 ^a	76.83	78.10
	SD	13.25	14.07	10.79	14.09	9.77	11.21
Devalue	M	80.82	83.45	82.80	78.52	78.71	79.32
	SD	10.20	9.30	8.81	8.83	7.16	6.96
Benefit-Finding	M	77.09	77.92	79.39	76.38	76.12	76.62
	SD	9.09	9.31	11.23	9.50	8.39	9.53
Total	M	79.05	80.08	80.68	77.67	76.86	77.54
	SD	11.01	11.30	11.34	10.44	9.19	9.74

Note. Means in the same vertical column with the same superscript are different from each other at the $p > .05$ level.

heart-beats per minute (BPM) for session 1 indicated borderline statistical significance, $F(4, 166) = 2.33, p = .05$. Post-hoc analysis indicated that the exposure participants experienced higher BPM in comparison to all other conditions. This is clearly illustrated in Figure 3.5. There were no other significant effects. Analysis for session 2, $F(4, 159) = 0.86, p > .05$, and session 3, $F(4, 163) = 0.70, p > 0.05$, failed to reveal any main effects for group.

Overall, the results of heart rate analysis failed to replicate the increased arousal demonstrated for trauma writing conditions over control across all three sessions. However, they did suggest that during the first session of writing, exposure participants experienced increased arousal in comparison to all other groups. This information provides evidence to suggest that exposure participants experienced the

highest amount of arousal in the first session and more so than participants experienced in other groups.

As a final point, it should be noted that in almost all cases, the average heart rate actually dropped from the copy task to the experimental writing condition. This may be due to a number of factors. The copy task was only 10-minutes long, while the writing task was 30 minutes long. The copy task was previous to the writing task and participants may have experienced anticipatory anxiety. Further, participants may have been writing at a faster pace or more vigorously during the copy task and differences in somatic movement could account for such findings. In summary, all of the essay content analysis support the manipulation of the process of change. A summary of these process specific measures is provided in Table 3.15.

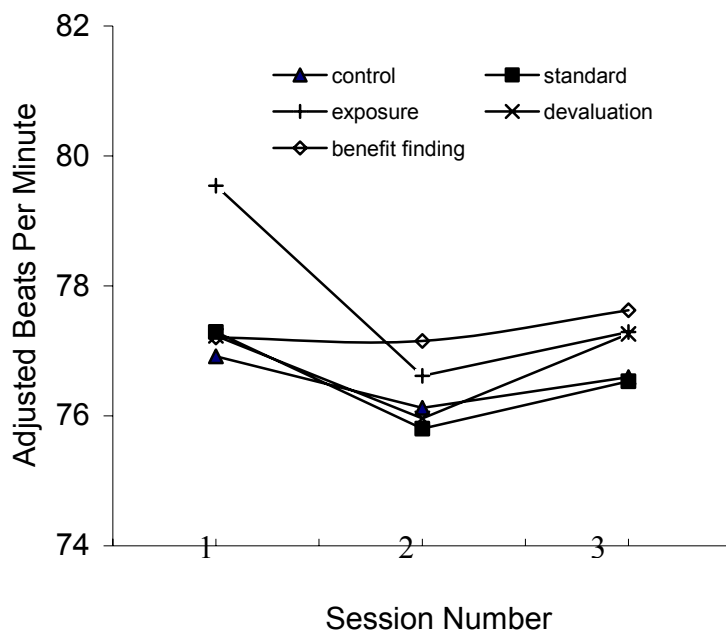


Fig. 3.5. Adjusted Average Beats Per Minute During each Session for each Condition

Table 3.15.

Summary of Process Specific Measures According To Group.

	EEQ Ratings	PIQ Ratings	LIWC Words	Post-Writing Affect	Arousal While Writing
Control	Low: traumatic, personal, emotional, thoughtful, meaningful and less sense-making	N/A	N/A	Positive: moderate Negative: low	BSQ: low SUDS: low HR: low
Standard	High: personal, emotional. Mod: traumatic, meaning making, thoughtful, and sense-making	Mod: devaluation and exposure processing. Shifts from exposure to devaluation and benefit-finding across sessions	Mod: neg emotion, sensory and motion, insight, past-tense, present tense, and causation	Positive: low Negative: high	BSQ: moderate SUDS: high HR: low
Exposure	High: personal, traumatic, emotional Mod: thoughtful	High: exposure processing	High: past tense, motion, sensory and neg emotion	Positive: low Negative: high	BSQ: high SUDS: high HR: high in first session
Devaluation	High: personal, emotional, thoughtful, sense-making Mod: traumatic, meaning-making	High: devaluation processing	High: neg emotion, present-tense, future-tense, and causal Mod: pos emotions, insight and sensory	Positive: low Negative: moderate	BSQ: moderate SUDS: high HR: low
Benefit-Finding	High: personal, emotional, thoughtful, meaning-making Mod: sense-making	High: benefit-Finding processing	High: pos emotion, present- tense, and insight Mod: future tense and causation	Positive: high Negative: low	BSQ: low SUDS: moderate HR: low

Note. High, moderate and low distinction made in comparison to other groups as opposed to real cut-off points

3.5 Standard Trauma Writing Effects on Health

Control Versus Standard Trauma Writing

The following analyses address central hypothesis. This study should be able to replicate past studies by demonstrating that the standard trauma writing condition had positive effects on psychological and physical health, in comparison to control.

Psychological Health Measures.

Repeated Measures MANOVA examining the effect of writing condition on the dependent psychological variables at pre, post 2-month and post 6-month were run. Psychological measures included the DAS-R, IES, CNS, PTGI, EPA and ENA. Multivariate analysis indicated a significant main effect for time, $F(12, 63) = 8.21, p < .001$. Examination of univariate analysis indicated that scores gradually decreased from pre-writing to post 2-months on both the IES and CNS. These scores decreased further again from post-2 months to post-6months. Multivariate analysis failed to indicate a main effect for writing condition, $F(6, 69) = 0.95, p > 0.05$. In contrast to the central hypothesis, the interaction of time and writing condition also failed to reach significance, $F(12, 69) 1.70, p = 0.09$. Table 3.15 presents the mean and standard deviations for outcomes measure collapsed across groups at pre, 2-months follow-up and 6-month follow-up. Table 3.16 presents means and standard deviations for each of the writing conditions, with the first two rows containing information relevant for both the control and standard writing conditions.

Physical Health Outcome Measures.

Physical health measures are influenced by seasonal variation as participants enter the winter period. Therefore, time effects are not considered important for these measures. Consequently the majority of past studies use ANCOVA analysis controlling for pre-measures to assess change on post-assessments. Scores on the PSS

Table 3.16.

Means and Standard Deviations Collapsed Across Standard and Control Groups at Pre, 2 and 6-months for Outcome Measures

		Pre Measure	Post 2 Months	Post 6 Months
DAS-R Total	M	34.85	33.30	33.11
	SD	9.51	8.20	9.04
Impact of Events Scale	M	27.72 ^{ab}	20.09 ^a	16.00 ^b
	SD	17.46	14.48	14.50
CNS	M	71.02 ^{ab}	68.21 ^a	63.12 ^b
	SD	16.41	14.62	15.27
Post-Traumatic Growth	M	57.19 ^{ab}	57.23 ^a	54.24 ^b
	SD	22.05	21.90	22.14
Positive Affect (Exp)	M	21.30	19.60	19.41
	SD	8.78	7.67	7.43
Negative Affect (Exp)	M	22.69	15.70	15.72
	SD	8.79	5.62	5.30
Physical Symptoms	M	37.51	37.85	35.27
	SD	9.26	9.73	8.34
Illness Visits	M	0.11 ^{ab}	0.19 ^a	0.17 ^b
	SD	0.20	0.35	0.24

Note. Means with the same superscript are different from each other at the $p > .05$ level.

indicated there was no effect for writing condition on self-reports of physical symptoms at two months, $F(1, 79) = 0.20, p > 0.05$, or at six months, $F(1, 76) = .70, p > .05$. Examination of illness visits at two-months failed to indicate a main effect for writing condition, $F(1, 70) = 0.38, p > 0.05$. However, analysis at six-month follow-up indicated a trend in the expected direction, $F(1,76) = 3.15, p = 0.08$. That is, it appeared that at six-months individuals in the standard writing condition visited the doctor less for illness reasons than those assigned to the control writing condition.

There are a number of reasons not to dismiss this trend. Firstly, this is the most common finding reported by past writing studies and represents the single most reliable indicator of improvement in the writing paradigm. Secondly, the baseline for

Table 3.17.

Means and Standard Deviations on Outcome Measures for each Writing Condition

		Control Writing			Standard Writing			Exposure			Devaluation			Benefit-Finding		
		Pre	F1	F2	Pre	F1	F2	Pre	F1	F2	Pre	F1	F2	Pre	F1	F2
DAS-R	<i>M</i>	34.76	33.31	34.38	34.95	33.28	31.92 ^a	34.55	34.95	37.22 ^a	35.37	35.61	33.36	35.05	32.78	34.00
	<i>SD</i>	10.67	8.05	10.37	8.27	8.46	7.51	9.45	12.75	14.10	10.71	9.30	8.51	9.77	8.90	11.92
IES	<i>M</i>	29.24	19.88	17.08	26.15	20.30 ^a	14.97	25.45	12.53 ^a	10.68	26.90	15.88	12.97	27.00	17.05	12.98
	<i>SD</i>	16.28	15.21	15.67	18.68	13.90	13.41	17.57	12.70	11.90	12.70	13.82	13.16	18.59	16.83	14.13
CNS	<i>M</i>	71.98	66.73	60.84	70.05	69.73	65.28	66.82	60.00	56.69	65.71	62.29	62.44	69.51	66.41	61.03
	<i>SD</i>	16.64	14.99	13.84	16.32	14.25	16.39	13.02	14.16	14.86	13.00	12.80	12.14	15.76	12.74	13.04
PTGI	<i>M</i>	58.05	55.84	54.32	56.30	58.65	54.15	52.42	50.00 ^a	49.43	49.32	49.37	49.97	55.72	62.32 ^a	53.33
	<i>SD</i>	22.63	22.83	22.00	21.69	21.09	22.58	24.76	26.01	28.76	18.44	19.05	20.32	18.80	17.84	23.29
PAE	<i>M</i>	21.41	20.05	19.24	21.18	19.15	19.56	20.05	16.34 ^a	16.68	17.76	17.90	17.03	20.54	21.74 ^a	20.82
	<i>SD</i>	9.64	8.30	7.68	7.93	7.04	7.28	7.62	5.31	7.04	6.33	5.66	6.00	7.01	6.94	7.88
NAE	<i>M</i>	21.15	15.85	15.05	24.28	15.55	16.36	24.05	16.08	14.89	24.27	16.10	14.49	23.82	15.49	15.18
	<i>SD</i>	7.90	5.88	5.10	9.44	5.41	5.47	9.20	5.77	4.20	7.06	6.15	5.76	7.88	6.27	5.55
PSS	<i>M</i>	35.88	36.44	33.54	39.18	39.30	36.92	37.61	38.00	35.46	38.49	37.17	35.49	36.28	35.56	34.41
	<i>SD</i>	6.62	8.21	5.95	11.20	11.00	9.90	8.56	10.92	10.56	7.94	9.63	9.18	7.99	7.93	7.51
Illness	<i>M</i>	0.11	0.24	0.23	0.12	0.16	0.14	0.09	0.13	0.22	0.14	0.26	0.21	0.12	0.14	0.14
	<i>SD</i>	0.21	0.42	0.32	0.19	0.37	0.18	0.15	0.26	0.26	0.24	0.40	0.26	0.21	0.26	0.21

Note. Means with the same superscript are different from each other at the $p > .05$ level.

this study is lower than previous studies, making it more difficult to demonstrate effects. Finally, it would equally be incorrect to accept the null hypothesis and conclude in contradiction to multiple studies that have found the effect. Instead, this trend should be treated cautiously but with some optimism.

3.6 Structured Trauma Writing Effects on Health

Unstructured Versus Structured Emotional Writing

The second question examined whether the experimental trauma writing conditions had any greater effect on health measures in comparison to the unstructured, standard writing condition. This question is central to the identification of important process of change variables. For this analysis, the control group was removed from analysis.

Psychological Health Measures.

Repeated measures MANOVA examining the effect of writing condition on the dependent psychological variables at pre, post 2-month and post 6-month were run. Psychological measures included the DAS-R, IES, CNS, PTGI, EPA, and ENA ratings. The data to be presented indicated numerous time effects again. To illustrate the changes, Table 3.17 presents means and standard deviations for outcome measures collapsed across trauma groups at pre, 2-months follow-up, and 6-month follow-up. Means and standard deviations according to group at each assessment point are presented in Table 3.16, with the latter four columns representing the data under examination.

Multivariate analysis indicated a significant main effect for time, $F(12, 136) = 27.38, p < .001$. Examination of univariate analyses indicated that scores gradually decreased from pre-writing to post 2-months on the IES, CNS, and ENA ratings for the experience. Both the IES and CNS scores decreased further again from post-2

Table 3.18.

Means and Standard Deviations Collapsed Across Trauma Groups at Pre, 2-months and 6-Months for Outcome Measures

		Pre Measure	Post 2 months	Post 6 Months
DAS-R Total	M	34.99	34.15	34.08
	SD	9.51	9.94	10.85
Impact of Events Scale	M	26.38 ^{ab}	16.48 ^a	13.24 ^b
	SD	17.98	14.52	13.69
CNS	M	68.01 ^{ab}	64.64 ^a	61.45 ^b
	SD	14.59	13.88	14.38
Post-Traumatic Growth	M	53.41	55.07	53.09
	SD	21.01	21.69	23.65
Positive Affect (Exp)	M	19.86	18.79	18.53
	SD	7.29	6.53	7.22
Negative Affect (Exp)	M	24.11 ^a	15.80 ^a	15.24
	SD	8.39	5.86	5.29
Physical symptoms	M	37.91	37.51	35.57
	SD	9.01	9.94	9.29
Illness Visits	M	0.12	0.18	0.16
	SD	0.19	0.33	0.21

Note. Means with the same superscript are different from each other at the $p > .05$ level.

months to post-6months, with the ENA scores remaining level. Multivariate analysis indicated a trend for the main effect of writing condition, $F(18, 432) = 1.52, p = 0.08$. Univariate analyses for the main effect of group indicated this trend was largely accounted for by a highly significant difference between groups on the measure of EPA, $F(4, 437) = 4.98, p = .003$. Post hoc analysis indicated that the positive benefit-finding condition experienced a substantially higher amount of positive affect in relation to their experience in comparison to devaluation and exposure writing conditions. In support of the central hypothesis, the interaction of time and writing condition was significant, $F(36, 414) 1.55, p = 0.02$. Univariate analyses of the time

by group interaction indicated that the interaction was significant for the DAS-R, $F(6, 193) = 2.36, p = 0.03$. However, Tukey HSD post-hoc analysis failed to identify the sources of the interaction, despite the salience of these interactions shown in Figure 3.6. Each dependent measure by time and group is presented in Figure 3.6.

In order to better detect the source of the multivariate interaction, a planned comparisons (ANCOVA) analysis was conducted comparing groups on each of the dependent measures at two and six-month follow-up intervals while controlling for pre-assessment scores.

Scores on the DAS- R indicated there was no effect for writing condition at two month follow-up, $F(3, 153) = 1.27, p > 0.05$. However, results at 6-month follow-up indicated a significant main effect for writing condition, $F(3, 149) = 3.86, p = 0.01$. A bonferroni test indicated a significant difference between the exposure condition and the standard trauma writing condition. In contrast to the hypothesis, participants assigned to the exposure condition became more depressed, anxious, and stressed at six-months in comparison to the standard writing condition.

Scores on the IES indicated a main effect for group at two-months, $F(3, 152) = 2.93, p = .03$. A bonferroni test indicated that participants in the exposure condition experienced a greater reduction on the IES at 2-months follow-up than the standard writing condition. This effect was equal to a difference of half a standard deviation between exposure and standard writing participants. This effect was not maintained at six-months follow-up, $F(3, 148) = 0.80, p > 0.05$.

Scores on the CNS indicated a main effect for group at two-months, $F(3, 153) = 4.02, p = .009$, and at six-months, $F(3, 149) = 2.78, p < .05$. A bonferroni test indicated that participants assigned to the standard writing condition employed more

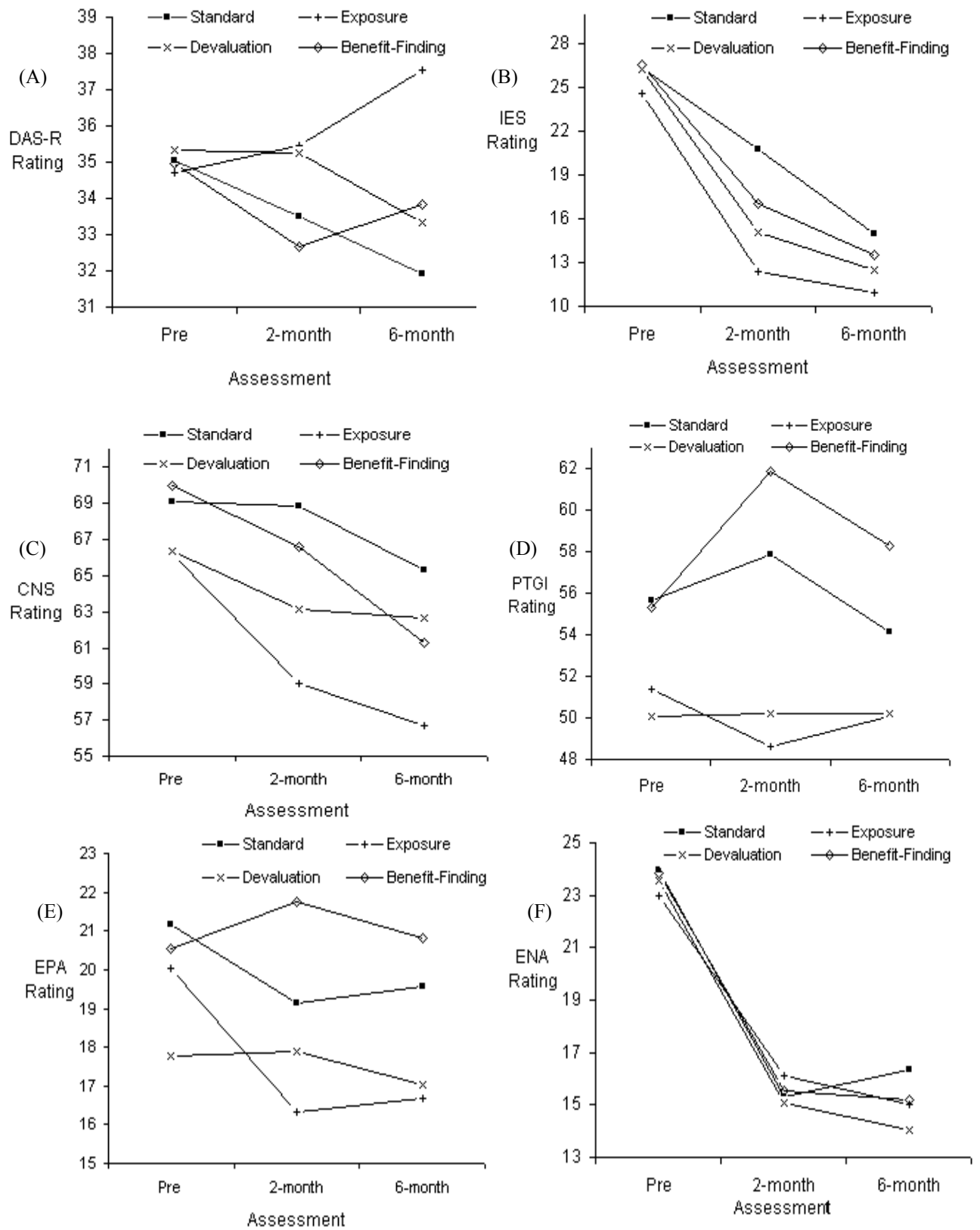


Figure 3.6. Trauma writing groups by time for each outcome measure.

CNS strategies than those in the exposure condition at both time-points. Devaluation participants also used more CNS strategies at six-month follow-up than those in the exposure condition. These differences were equal to three quarters (2-month) and half (6-month) a standard deviation for standard writing participants over exposure.

Scores on the PTGI indicated a significant effect for writing condition at two-month follow-up, $F(3, 153) = 3.58, p = .01$, but this was not maintained at six-month follow-up, $F(3, 149) = 0.87, p > 0.05$. As expected, the benefit-finding condition reported the highest score on the PTGI at two-month follow-up. A bonferroni test indicated a significant difference between the benefit-finding condition and the exposure condition. There was also a trend ($p = .07$) indicating the benefit-indicating participants reported more growth than devaluation participants. Overall, the difference scores between benefit-finding participants and the exposure and devaluation conditions was slightly under half a standard deviation.

Finally, analysis was conducted on the trauma experience PANAS ratings. Scores on the EPA indicated a main effect at two-months, $F(3, 153) = 5.26, p = .002$. A bonferroni test indicated that the benefit finding participants reported higher positive affect for their experience than exposure participants. This difference was equal to almost one standard deviation. Standard and devaluation writing participants did not differ significantly from other groups. While a similar pattern emerged at six-months, the main effect for group was not significant, $F(3, 148) = 2.16, p = .09$. Scores on the ENA did not indicate a significant difference for writing condition at two-months, $F(3, 153) = 0.15, p > .05$, or at six months, $F(3, 148) = 0.97, p > .05$.

Physical Symptoms.

ANCOVA analysis, controlling for pre-assessment levels, was run on physical health measures to determine whether there was any significant differences between

groups. Scores on the PSS indicated there was no effect for writing condition on PSS scores at two month follow-up, $F(3, 153) = 0.75, p > 0.05$, or at six-month follow-up, $F(3,149) = .20, p > 0.05$. Examination of illness visits indicated that was no effect for writing condition at two-month follow-up, $F(3, 141) = 0.71, p > 0.05$, or at six-month follow-up, $F(3, 140) = 0.78, p > 0.05$. These results do not provide any evidence to suggest any one of the hypothesised mechanisms of change are associated with physical health benefits.

Summary.

Overall, results indicate different outcomes and benefits according to group assignment. Exposure participants experienced the greatest reduction on a trauma symptoms measure (IES) at two months, however the effect was not maintained at six-months and there may have been costs with the exposure task. Participants in this group reported using the least amount of cognitive neutralising strategies, least amount of positive growth, and least amount of positive affect in relation to the experience. Furthermore, these participants reported an increase in depression at six-month follow-up. In contrast, benefit-finding participants reported the most positive growth and most positive affect, particularly at two-months. Standard writing participants reported the most CNS strategies, and it also appeared that devaluation participants also reported the use of more CNS strategies at six-months. There appeared to be no detrimental effects reported by these other writing conditions. There were no physical health effects in comparison to the standard writing condition.

3.7. Effect of Trauma Severity

The results presented did not replicate the health benefits for the standard condition over control, as indicated by illness visits to the doctor. This finding was inconsistent with the majority of past research. However, it was not isolated.

Greenberg and Stone (1992) also failed to initially reveal an effect for the standard writing condition, as indicated by doctor visits and self-reports of physical symptoms. However, on further analysis they found that physical health benefits were indicated for individuals who self-rated their trauma experience as severe and highly stressful. Due to this, it has been assumed that individuals who discuss more stressful experiences are more likely to obtain physical benefits.

To examine whether individuals who rated their trauma as more severe obtained benefit, a median split was taken of severity ratings across the population, as done by Greenberg and Stone (1992). Those who rated their trauma event as either 9 or 10 out of 10 were selected for the analysis. This left 18 control, 15 standard, 15 exposure, 20 devaluation, and 17 benefit-finding participants for analyses.

Control VS Standard Trauma Writing

Means and standard deviations are presented in Table 3.18. At two months, examination of self-reported physical symptoms indicated a main effect for time, $F(1, 33) = 11.72, p < .01$ indicating an increase from pre-to post levels. However, there was no effect of group on physical symptoms, $F(1, 33) = 0.01, p > 0.05$. Examination of illness visits indicated a main effect for time, $F(1,31) = 7.22, p < 0.05$, with an increase from pre to post two months. Once again, there was no effect for group, $F(1, 31) = 1.72, p > .05$. At 6-months follow-up, examination of self-reports of physical symptoms indicated a main effect for time, $F(1, 28) = 36.54, p < .001$. As with previous analysis, physical symptoms increased from pre to post. There was no main effect for writing condition, $F(1, 28) .00, p > 0.05$. Illness visits were examined at six-month follow-up. The analysis indicated a main effect for time, $F(1, 31) = 23.00, p < .001$, with an increase from pre to post 6-months ($M = 0.18, SD = 0.25$). There was also a main effect for writing condition, $F(1, 31) = 4.23, p = 0.04$,

Table 3.19.

Means and Standard Deviations for High Severity Standard and Control Trauma Writing Groups on Physical Outcomes

		Control Writing			Standard Trauma Writing		
		Pre	2 Mths	6 Mths	Pre	2 Mths	6 Mths
Physical symptoms	M	34.17	37.88	33.88	39.60	42.20	37.64
	SD	5.33	7.81	6.78	9.23	12.26	7.73
Illness Visits	M	0.10	0.29	0.23 ^a	0.15	0.18	0.13 ^a
	SD	0.17	0.47	0.33	0.21	0.25	0.13

Note. Means with the same superscript are different from each other at the $p > .05$ level.

indicating those in the standard writing condition experienced fewer illness related health visits than those in the control group.

Unstructured Trauma Writing Vs Structured Writing

Once again, analysis was conducted to determine the effect of experimental instructions on individuals classified as disclosing highly stressful experiences. Means and standard deviations are presented in Table 3.19. At two-month follow-up, analysis of self-reports of physical symptoms indicated that there was a main effect for time, $F(3, 67) = 79.79, p < .001$. As previously found, there was an increase in symptom reporting from pre to post. However, there was no effect of condition, $F(3, 67) = 0.78, p > 0.05$. Similarly, for illness visits, there was a main effect for time, $F(3, 58) = 13.71, p < .01$, indicating an increase from pre to post two months. Examination for the effect of writing condition on illness visits at two-months indicated no main effect for writing condition, $F(3, 58) = 2.07, p > 0.05$.

As indicated previously, self-reports of physical symptoms increased from pre to post 6 months, $F(3, 65) = 41.40, p < .001$. Once again, there was no effect of condition, $F(3, 65) = 0.13, p > 0.05$. Analysis of illness visits indicated a main effect for time, $F(3, 58) = 15.34, p < .001$, again indicating an increase from pre to post 6-

Table 3.20.

Means and Standard Deviations for High Severity Experimental Trauma Writing Groups on Physical Outcomes

		<u>Exposure</u>			<u>Devaluation</u>			<u>Benefit-Finding</u>		
		Pre	F1	F2	Pre	F1	F2	Pre	F1	F2
Health Sym	M	37.22	37.07	34.14	39.1	38.52	37.65	38.18	39.06	36.12
	SD	9.67	10.97	11.45	7.40	9.32	10.71	9.33	8.18	7.89
Illness Visits	M	0.13	0.04	0.12	0.19	0.36	0.28	0.19	0.23	0.16
	SD	0.19	0.14	0.18	0.25	0.51	0.31	0.24	0.33	0.26

months. However, there was no effect for condition, $F(3, 58) = 1.68, p = 0.10$. Post-hoc analysis indicated that the trend was largely due to a reduction in illness visits for the exposure participants in comparison to the devaluation participants. Overall, the results failed to reveal that any one experimental instruction resulted in increased physical benefits for participants with more severe trauma topics, in comparison to the standard writing condition.

3.8. Analysis of Individual Differences

The final phase of analysis addressed whether any individual difference variables moderated change on outcome variables. This has implications for identifying who would be likely to benefit from the writing paradigm, and who would not. This analysis may also highlight certain variables that may be important in terms of the process of change.

To conduct the analysis, regressions were first conducted on pre-assessment scores and post-assessment scores. These set of analyses have important implications for studies that address risk and resilience factors in predicting health. However, this study was more interested in identifying how these variables moderate change. Thus, it was the analysis of change scores that were of most interest.

All individual difference variables were entered into a regression with demographic variables in block 1 (i.e., age, gender), individual difference variables in block 2 (i.e., repression, optimism, absorption, alexithymia, positive affect, negative affect), and trauma variables in block 3 (i.e., event type, severity, disclosed previously), for each of the dependent variables. Variables that appeared to have no effect on data were removed from the regression to increase power. Thus, regressions were repeated with gender in block 1, optimism (LOT-R), positive affect (trait), negative affect (trait) absorption (TAS), and alexithymia (TAS-20) in Block 2, and social support and the participant initial severity rating of the trauma in Block 3. Results for each regression using psychological pre-assessment health measures as dependent variables are presented in Table 3.20. Results for regressions on psychological health measures at two-month follow-up are presented in Table 3.21. Results for regressions on change scores for psychological health measures are presented in Table 3.22. Table 3.23 presents the pre, post and change score regressions for physical health measures.

Individual differences predicted all pre-measures, except for illness visits. A combination of negative affect, optimism, absorption, and trauma severity predicted 44% of the variance of the DAS-R pre-assessment score. All measures, except optimism, were positively related. At two-month follow-up the amount predicted decreased to 35% of the variance with negative affect, optimism, and alexithymia being the most predictive factors. Once again, optimism was the only variable negatively related. The model did not predict change scores on the DAS-R.

Table 3.21

Degree Individual Difference Variables Predict Pre-Outcome Psychological Measures

Measures		DASR			IES			CNS			PTGI			Trauma Pos Affect			Trauma Neg Affect		
		r	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2
B 1	Gender	.09	-.02	.01	.24	.19**	.06	.00	.02	.00	.14	.12	.02	-.10	-.11	.01	.09	.04	.01
B 2	Pos Aff	.25	-.05		-.15	-.03		.36	.28***		.25	.21**		.32	.30***		.02	.13	
	Neg Aff	.58	.46***		.35	.22**		-.09	.01		-.02	.00		.03	.15*		.39	.35***	
	Alexith.	.28	.05		.24	.12		-.04	.05		-.05	.02		-.10	-.06		.22	.09	
	Optim.	-.47	-.25***		-.31	-.09		.24	.09		.07	-.04		.18	.02		-.18	-.01	
	Absorp.	.14	.14*		.11	.06		.20	.13		.25	.20**		.09	.05		.11	.06	
				.00			.16			.16			.09			.13			.18
B 3	Severity	.15	.11*		.22	.18**		-.24	-.21**		.11	.14*		.00	.02		.17	.13*	
	Soc Sup	-.14	.01		-.30	-.19**		.17	.12		.21	.22**		.23	.19**		-.25	-.18**	
				.01			.07			.06			.06			.03			.05
	R ²		.44			.28			.22			.18			.17			.24	
	F	F(8,190) = 19.16***			F(8, 189) = 9.34***			F(8, 190) = 6.62***			F(8, 190) = 5.19***			F(8, 190) = 4.80***			F(8, 190) = 7.38***		

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

Table 3.22

Degree Individual Difference Variables Predict Two-Month Outcome Psychological Measures

Measures		DASR			IES			CNS			PTGI			Trauma Pos Affect			Trauma Neg Affect		
		r	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2
B 1	Gender	.05	-.03		.11	.08		.05	.06		.19	.19**		-.02	.00		-.01	-.05	
				.00			.01			.00			.04			.00			.00
B 2	Pos Aff	-.24	-.07		-.14	-.05		.28	.20**		.26	.18*		.20	.21**		-.01	.16*	
	Neg Af	.48	.32***		.24	.12		.04	.09		-.01	.00		.04	.05		.37	.30***	
	Alexith.	.38	.20**		.23	.14		.12	.20**		.00	.10		.09	.14		.26	.13	
	Optim.	-.41	-.18*		-.23	-.06		.19	.18*		.14	.09		.06	.03		-.26	-.15	
	Absorp.	.10	.09		.05	.04		.24	.17*		.27	.21**		.02	-.02		.01	-.03	
				.33			.10			.16			.11			.06			.20
B 3	Severity	.11	.08		.18	.16*		-.10	-.07		.16	.20**		.22	.23**		.21	.18**	
	Soc Sup	-.21	-.07		-.25	-.16*		.10	.08		.15	.16*		.07	.09		-.19	-.10	
				.01			.05			.01			.06			.05			.04
	R ²		.35			.16			.18			.21		.08			.24		
	F	F(8, 190) = 12.55***			F(8, 190) = 4.55***			F(8, 190) = 5.12***			F(8, 190) = 6.20***			F(8, 190) = 3.02**			F(8, 190) = 7.47***		

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

Table 3.23

Degree Individual Difference Variables Predict Change Scores for Psychological Measures

Measures		DASR			IES			CNS			PTGI			Trauma Pos Affect			Trauma Neg Affect		
		r	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	r	B	ΔR^2
B 1	Gender	-.05	.00		-.16	-.13		.05	.05		.08	.07		.08	.11		-.11	-.08	
				.00			.03			.00			.01			.01			.01
B 2	Pos Aff	.01	-.02		.04	-.02		-.13	-.12		.02	-.03		-.14	-.11		-.03	-.02	
	Neg Aff	-.13	-.16		-.18	-.14		.17	.10		.00	-.00		.01	-.11		-.15	-.16*	
	Alexith.	.10	.15		-.06	-.00		.19	.17*		.07	.12		.18	.18*		-.04	-.01	
	Optim.	.07	.09		.12	.04		-.08	.10		.09	.18		-.12	.00		-.01	-.11	
	Absorp.	-.05	-.05		-.07	-.04		.03	.04		.04	.02		-.07	-.06		-.12	-.09	
				.04			.03			.06			.03			.06			.03
B 3	Severity	-.05	.04		-.09	.07		.19	.19**		.08	.09		.19	.18**		-.02	-.01	
	Soc Sup	-.07	.08		.11	.08		-.11	.05		-.08	-.09		-.17	-.11		-.13	.13	
				.01			.01			.04			.02			.05			.02
	R ²		.05			.07			.10			.05			.11			.06	
	F	F(8, 190) = 1.31			F(8, 189) = 1.68			F(8, 190) = 2.68**			F(8, 190) = 1.14			F(8, 190) = 2.97**			F(8, 190) = 1.59		

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

Table 3.24

Degree Individual Difference Variables Predict Physical Health, Pre, Post, and Change Scores

Pre-Measures		HSQ						Illness Visits						2-Month Post Measures						HSQ						Illness Visits						Change Scores						HSQ						Illness Visits					
		r	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2	R	B	ΔR^2															
B 1	Gender	.19	.14*		.09	.07		.16	.11		-.04	-.05		-.01	-.01		-.06	-.09																															
				.04			.01			.03			.00			.00																																	
B 2	Pos Aff	-.01	.04		.07	.10		-.17	-.15		.04	.01		-.19	-.02		-.04	-.05																															
	Neg Aff	.37	.31***		.02	.04		.27	.18*		-.07	-.01		-.07	-.02		-.10	-.03																															
	Alexith.	.22	.15*		-.08	-.09		.19	.12		-.14	-.15		-.01	-.13		.01	-.11																															
	Optim.	-.15	.01		-.01	-.03		-.19	.02		.08	.06		-.07	-.01		.07	.08																															
	Absorp.	.23			.01	-.02		.19	.19**		-.00	.00		-.02	.00		-.02	.02																															
			.18**																																														
				.17			.01			.12			.02			.05																																	
B 3	Severity	.05	.04		.10	.09		.15	.15*		.04	.03		.13	.14		-.02	-.02																															
	Soc Sup	-.05	.03		-.06	-.07		-.01	-.01		-.15	-.20		-.07	-.05		.02	-.18																															
				.00			.01			.02			.04			.02																																	
	R ²		.21			.03			.17			.06		.08			.05																																
	F		F(8, 190) = 6.45***			F(8, 175) = 0.78			F(8, 190) = 4.89***			(8, 175) = 1.36			F(8, 190) = 1.94			F(8, 175) = 1.14																															

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

On the pre-assessment IES measure, a combination of gender, negative affect, trauma severity, and social support predicted 28% of variance. All but social support were positively related. However, at two-month follow-up, the amount predicted decreased to 16% with only trauma severity and social support remaining as significant predictor variables. Once again, social support was the only variable negatively related. While it is consistent with past research that these variables should be able to predict trauma severity, it was more important to assess whether these variables could predict the change over time in these scores. The model did not predict the IES change score.

On the pre-assessment CNS measure, positive affect and trauma severity were significant in predicting 22% of the variance. Positive affect was positively associated while trauma severity was negatively associated. The model predicted a total of 18% of the variance at two-months. Significant predictors included positive relationships with positive affect, alexithymia, and optimism. The model predicted 10% of the change scores. Significant positive correlations were demonstrated with trauma severity and alexithymia such that higher alexithymia and trauma severity scores were associated with higher scores on the CNS.

The model predicted 18% of the variance for the PTGI pre-assessment scores. A combination of absorption, positive affect, trauma severity, and social support were significant predictors and positively related to the pre scores. At two-month follow-up, a combination of gender, positive affect, absorption, trauma severity and social support were positively related and predicted 21% of the variance. The model did not predict change scores.

The model predicted both PANAS experience ratings. For ratings of pre-assessment positive affect for the experience, a combination of positive affect (trait),

negative affect (trait) and social support were positively related and significantly predicted 17% of the variance. At two months, a combination of positive affect (trait) and trauma severity predicted 23% of the variance. Both were positively related. The model also predicted 11% of the variance for change scores. Both alexithymia and trauma severity were positively related and significant predictors such that higher alexithymia and trauma severity was associated with higher scores on the PAE.

The model predicted 24% of the variance for pre-assessment negative affect ratings of the experience. Negative affect, trauma severity, and social support were significant predictors. Social support was the only negatively associated variable. At two-months, the model predicted 24% of the variance. Positive affect (trait), negative affect (trait), and trauma severity were positively related and significant predictors. The model did not significantly predict change scores.

Finally, the model predicted 21% of the pre-score on the PPS. A combination of gender, absorption, alexithymia, and negative affect were significant predictors and positively related. The model predicted 17% of the variance at follow-up. Only absorption and negative affect were positively related. However, the model was unable to predict the change score.

Overall, this analysis found that all pre and post assessment measures, except for illness visits, were associated with some individual difference variables. However, analysis of change variables indicated most of the hypotheses were not supported. Only two individual differences predicted change scores. Alexithymia and trauma severity predicted change for cognitive neutralising strategies and positive affect ratings of the experience.

Interactions between Individual Difference Variables and Experimental Group

Two variables were identified to predict change scores, alexithymia and trauma severity. Higher levels of trauma severity and alexithymia at pre-assessment was associated with improvements in positive affect and use of cognitive neutralising strategies. To determine whether individual differences interacted with group to alter change scores, a median split was taken for both alexithymia and trauma severity. A 4(writing condition) x 2(high, low) ANCOVA analysis, controlling for pre-test scores was run on both cognitive neutralising strategies and positive affect scores at two-months.

Cognitive Neutralising Strategies.

Firstly, the interaction between alexithymia and group was examined. This analysis indicated a main effect for alexithymia, $F(1, 188) = 8.33, p = .004$. Post-hoc analysis indicated that individuals high in alexithymia used more cognitive neutralising strategies than did individuals lower in alexithymia. As discussed previously, there was a main effect for group, $F(4, 188) = 3.00, p = .02$. However, the interaction was not significant, $F(4, 188) = 0.68, p > 0.05$. The interaction between trauma severity was then examined. This analysis indicated a main effect for writing condition, $F(4, 188) = 2.34, p = .05$. However, the main effect for severity was not significant, $F(1, 188) = 0.46, p > .05$, nor the interaction, $F(4, 188) = 1.29, p > 0.05$.

Positive Affect for the Experience.

The interaction between alexithymia and group was initially examined. As previously discussed, analysis indicated a main effect for group, $F(4, 188) = 4.10, p = .003$. A main effect for alexithymia was also indicated, $F(1, 188) = 5.29, p = .02$. Individuals who were classified as high in alexithymia felt more positive affect for the experience at the two-month follow-up. However, the interaction was not significant,

$F(4, 188) = 0.98, p > 0.05$. The interaction between severity and group was then examined. As previously discussed, this analysis indicated a main effect for group, $F(4, 188) = 4.36, p = .002$. A main effect for trauma severity was also found, $F(1, 188) = 12.08, p = .001$. Post-hoc analysis indicated that individuals who identified a more traumatic experience felt more positive affect for their experience than did individuals who identified a low-severity topic. The interaction was not significant, $F(4, 188) = 1.77, p > 0.05$. Overall, results were only suggestive of main effects. No interaction between writing condition and any individual difference was found.

3.9 Habituation, Individual Differences, and Exposure

One of the interesting aspects of the results was a curious dissociation between trauma symptoms and depression for participants in the exposure condition. It appeared that at two months, individuals in the exposure condition experienced fewer trauma symptoms than other participants, but at six-months they became more depressed. These results make it difficult to infer that exposure was beneficial for participants. It is important to explain given the significant implications of such findings.

The aim of the next set of analyses was to examine the role of previously hypothesised variables that influence exposure processes. This analyses was theoretically driven and central to the hypotheses as indicated in Figure 1.1. However, it was not planned and was post-hoc. The significance criteria was reduced to $p < .01$ to control for the risk of a type 1 error. Variables examined included both process and individual differences variables. Processing variables identified by Foa and Kozak (1986) EPT included both within and between session habituation. According to the model presented earlier (Figure 1.1), individual differences variables hypothesised to

influence the exposure condition included imagery skills (QMIT), absorption (TAS), alexithymia (TAS-20), and negative affect. These will also be examined.

All other groups were excluded from the analysis¹. There was no other group that was instructed to engage in exposure processes and therefore these hypothesised processes were viewed as irrelevant to them. Given the low numbers within this analysis ($N = 36$) and therefore a lack of power, a regression could not be conducted to examine the role of these processes. Correlations were run on each of these variables to determine if there were associative relationships between these variables and response to IES scores and DAS-R scores. Table 3.24 presents the correlations table for these variables.

The correlations suggest a number of interesting and relevant associations for members of the exposure writing condition. In relation to process variables, within-session habituation was positively related to the amount of decrease on the IES at two months. Further, the effect was significant at the 0.05 level at six-months. Given the

Table 3.25.

Correlations Between Outcome, Process, and Individual Difference Variables for Exposure Participants.

	IES Change		DAS-R Change		With. Hab.	Bet. Hab.	QMIT	TAS	TAS- 20
	2 mth	6 mth	2 mth	6 mth					
With Hab	0.43**	0.40*	-0.09	-0.31					
Bet Hab	-0.12	0.03	-0.24	-0.50**					
QMIT	0.17	0.18	0.04	0.03	0.11	-0.03			
TAS	0.36*	0.24	0.11	-0.14	0.13	-0.02	-0.25		
TAS-20	0.12	0.19	0.38*	0.36*	-0.09	-0.50**	0.31	0.05	
NA	0.34*	0.27	-0.07	0.05	0.05	-0.11	0.38*	0.22	0.27

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

finding at two-months the latter was also accepted. That is, the greater the amount of average within session habituation, the greater the decrease on IES. Between session habituation was unrelated to within session habituation or change on the IES. Instead, it was significantly negatively correlated with DAS-R scores six months later. That is, the less between session habituation, the more participants felt depressed, anxious, and stressed six-months later.

There were also some interesting associations for the individual difference variables. Firstly, the Tellegan Absorption Scale was positively related to IES change scores at 2-months. However, the effect was only significant at the $p < .05$, indicating that it should be cautioned. Secondly, negative affect was also associated with IES scores only at the $p < .05$ level. While also cautioned, these effects were in the hypothesised direction indicating the greater the score of negative affect and absorption, the greater the reduction in IES symptom scores.

In contrast to the effect of absorption, alexithymia (TAS-20) was unrelated to the IES change scores, but was related to the depression outcome at both 2 and 6 month follow-up. Once again this effect was only at the $p < .05$ criterion. However, alexithymia was highly negatively correlated with between session habituation scores. Therefore, the greater the individual scored on the alexithymia construct, the less likely they were to habituate between sessions and the more likely they would increase on scores of depression, anxiety and stress six months later.

The findings present an interesting association between exposure and outcome that were consistent with hypothesis. Firstly, increased within-session habituation was associated with a decrease on the IES at both 2 and 6 months follow-up. Secondly, decreased between session habituation was related to increased depression at six-months. Thirdly, alexithymia was negatively related to the amount of between session

habituation an individual was able to attain. The following findings were not significant at the reduced criterion but were consistent with hypothesis and cautioned. Increased absorption and negative affect was associated with a greater decrease on the IES at two-months. Increased scores of alexithymia was associated with increased degree of depression. This latter finding implies an interesting interaction between alexithymia, between session habituation, and depression.

DISCUSSION

The following is separated into sections. The first provides an overview and summary of the results without elaboration. Sections that follow systematically discuss the central issues relating to the results, linking to the broader literature. Limitations, recommendations, and the conclusion is then provided.

4.1. Overview of the Findings

This study sought to replicate and extend previous findings that the trauma-writing paradigm improves physical and psychological health. It aimed to identify the process of change by emphasising each of three hypothesised processes in the writing paradigm. This study also examined multiple individual differences to determine their role in moderating these benefits.

Overall, comparisons between control and standard writing conditions failed to indicate there were any psychological benefits associated with completing the trauma writing task. Examination of illness visits did suggest a trend to indicate that at six-months, standard trauma writing participants visited the doctor less than control. This trend was significant when participants with more severe ratings of their trauma were isolated in analysis.

There was no evidence of illness visit reduction in the experimental trauma writing groups, beyond that of the standard writing condition. Thus, the mechanism underlying physical health benefit remains unknown. However, results indicated different experimental writing groups led to different types of psychological health outcomes. This result implies different operating mechanisms serve different functions and this has important implications for emotion processing research. Exposure led to the greatest reduction on trauma symptoms measures, at two months. Tentative evidence suggested benefit-finding led to the greatest increase of positive

growth and positive affect for the experience. Negative effects were also identified. Exposure led to an increase in depression, anxiety, and stress six-months later.

Apart from the observed differences in health outcomes, there was strong evidence to suggest that participants engaged in different emotional processes. Self-reports, independent judge reports, and computerised text analysis provided convergent and consistent evidence to suggest that participants followed instructions and engaged in the hypothesised processes of change. As expected, all trauma-writing participants wrote more personal, traumatic, emotional, and thoughtful essays than control. Further, exposure participants wrote about the event from beginning to end, focused on the most distressing aspects of the event, and described perceptions and reactions at the time of the event. Devaluation participants explored what made them upset now, attempted to identify core beliefs, explored ways they could think to make them feel less upset, and attempted to identify new ways to make themselves feel better. Finally, benefit-finding participants identified and described positive changes to themselves, their relationships and their world-view. In relation to the standard writing paradigm, content analysis generally indicated that participants began with descriptions of the event and essays gradually involved more exploration, devaluation, and benefit processes as sessions progressed.

Furthermore, distress, affect, and arousal ratings generally indicated that participants reacted in the expected manner. Exposure, devaluation, and standard writing participants were more distressed and aroused than control and benefit-finding participants whilst writing and experienced more negative affect after writing. Finally, benefit-finding participants reported more positive affect after writing in comparison to all other writing groups.

Individual difference analysis, in general, failed to replicate previous research (Cameron & Nicholls, 1998; Peaz et al., 1999) to suggest there was any one particular trait that moderated the beneficial effects of emotional disclosure. Given the startling psychological health effects associated with the exposure condition, individual difference analysis was also conducted on this condition in isolation. Results were in the expected direction to suggest that alexithymia was associated with increased depression, anxiety, and stress and less between session habituation. In contrast, higher ratings of absorption was associated increased reductions of intrusion and avoidance symptoms. Although flagged for caution due to a lowered significance criterion, higher negative affect was also associated with a greater reduction of trauma symptoms.

4.2. Failure To Replicate: Implications for the Pennebaker Writing Paradigm

Psychological Benefit and Time Effects

The results of this study extend a developing body of research that has employed the standard writing paradigm and failed to demonstrate statistically significant effects on psychological measures of health (Greenberg & Stone, 1992; Greenberg, et al., 1996; Honos-Webb et al., 2000; Kloss & Lisman, 2002; Rosenberg et al., 2002; Smyth et al., 2001; Stanton et al., 2002; Stroebe, et al., 2002). This study supports claims (Honos-Webb et al., 200) suggesting strong conclusions about the psychological benefit from completing the standard writing task may be premature.

While psychological benefits were not indicated for the standard writing paradigm, highly significant time effects between pre and post assessment at two-months for the IES, ENA, and CNS were indicated. Significant time effects have been reported by two past studies that employed the IES scale (Klein & Boals, 2001; Smyth et al., 2002). Evidence of such large time effects requires elaboration and

suggests numerous hypothesis for future research. Firstly, the time effects could represent a natural reduction in negative symptoms that occur over time in the general population. That is, participants might choose events most distressing to them at pre-assessment but, due to other general factors in non-clinical populations, the event is no longer considered as upsetting two months later. However, effects on the IES suggested a highly significant reduction over a very short interval that would not be expected in the absence of intervention.

Similarly, the time effects could result from control participants attaining psychological benefits due to completing aspects of this study. Methodologically, control participants in this study were significantly different from participants in past studies in one particular way. Control participants completed an extensive questionnaire about a traumatic experience. Observations indicated filling out the questionnaire booklet had a greater initial impact on students than what was initially expected. In fact, many students were as upset on completion of the booklet as they were after writing. Participants made a range of statements after completing the booklet. These included that the questionnaires made them consider an aspect of the event they had never thought about, they thought about the experience for some time after they completed the booklet and they disclosed their event to others after completing the booklet.

This raises further issues for research in relation to the writing task. Past research suggests simply stating the facts about a trauma (Pennebaker & Beal, 1986), writing event characteristics in point form (Smyth et al., 2001), and writing for very short periods of time (Paez et al., 1999) produces little benefit. These manipulations have not focused on the role of emotional activation and involvement. Pennebaker and Beal (1986) provide one clue to the role of emotional activation. They found that

individuals instructed only to write about their emotional feelings experienced similar amounts of distress, some psychological benefits, and no physical benefits. Findings from this study, for instance, could suggest that participants who become emotionally involved, even from completing the questionnaire, may experience psychological benefits. Involvement in such tasks may lead to health benefits directly or indirectly. For instance, upon completion of these tasks individuals may actively seek social support (Lazarus, 1999) or involve themselves in other activities that could lead to psychological benefit outside of the writing paradigm.

These explanations raise the question of whether it was appropriate that the control group was exposed to evocative traumatic material. Past studies have not required control participants to identify any traumatic experiences. Completion of this questionnaire was necessary to determine whether standard writing participants obtained benefits on trauma symptom measures. If the control condition did not fill out these measures, it may have been incorrectly concluded that standard-writing participants did experience benefits on trauma measures. In this study, the aim was to identify specific factors associated with change in the writing paradigm. Thus, the control group was suggested to provide a good comparison by controlling for other spurious factors that may lead to benefits when individuals are exposed to trauma questionnaires.

A final explanation may be that these time effects represent a positive response bias. Positive response biases may represent a confound for many self-report and intervention based studies. Where the research involves emotional disclosure, response biases may be accentuated (Hood & Back, 1971). In this study participants in control and trauma writing conditions knew this study was interested in trauma symptoms and that they were instructed to engage in a task which they were told was

beneficial. This would have set up an increased expectation of catharsis or benefit (Hood & Back, 1971). Therefore, participants may be more likely to over-estimate their experience of negative symptoms at pre-assessment, or over-estimate the benefit obtained from completing the task at post-assessment. Evidence for a possible response bias may be found by the sub-clinical level of trauma symptoms reported at pre-assessment, which is not consistent with previous research using student populations (Paez et al., 1999). While response biases may have influenced results, this study controlled for the effects of a response bias by including control participants in all aspects of the study, except for the actual trauma writing. Past studies that have not involved control participants in these aspects of the study, such as a wait list control (Schoutrop et al., 2002), may be confounded by such variables. The effects of response bias in the writing paradigm requires further examination and could explain the inconsistent findings in the literature on psychological measures of health.

Physical Health Benefits

While research is equivocal as to the amount and nature of psychological benefits to be attained, evidence more strongly supports the existence of physical benefits as measured by illness visits, although inconsistencies in this area also exist (Greenberg & Stone, 1992; Kelley et al., 1997; Kovac & Range, 2000; Honos-Webb et al., 2000). While a trend was indicated, there are a number of explanations for the failure of this study to reveal significant physical benefits.

The first supports Greenberg and Stone (1992) who suggest that individuals who discuss more severe and personal experiences are more likely to obtain physical benefits. In this study it did seem that individuals who disclosed stressful and personal experiences obtained benefit in the standard writing condition, at least at six-month

follow-up. However, this conclusion does not explain why previous studies with similar power have revealed benefits for all participants and at earlier follow-ups. Further, participants in this study reported more trauma symptoms than previous research using student populations. Therefore, according to this hypothesis, this study should be more likely to reveal effects.

A second explanation may be that the experimental manipulation did not work. However, all of our manipulation checks confirm that participants wrote in the expected manner. A third explanation considered most likely is suggested to be related lower base rates for illness visits as compared to previous studies. For instance, Greenberg et al. (1996) report a mean number of visits for the control group for one month post-writing that was over two standard deviations more than that reported by control participants in this study. In fact, if the control participants in this study reported the same number of health visits, strong effects would have been indicated for the trauma writing paradigm.

Therefore, it is possible that the lower base rates resulted in a lack of power to record the effect in this sample. This would explain why an effect was not revealed at two months and only a trend was revealed at six-months. The amount of data recorded at two-months was much less than the amount recorded at six-months and perhaps the larger interval provided more power to demonstrate the effect. If this hypothesis is combined with that of Greenberg and Stone (1992), one may conclude that power difficulties would be particularly detrimental for participants with less stressful experiences. The reasons for these lower base rates are unclear and could be the result of three identified factors. These include: illness visits were particularly low at the time of collection, Australia differs from other countries in relation to number of

illness visits for university students, and measurement error. These will now be reviewed

This study aimed to measure illness visits post-writing during the months between May and January, with most participants between May and November. According to the annual Australian reports from the National Influenza Surveillance Scheme, the period between May and October is of highest influenza infection (Halliday, Roberts, & Hampson, 1999; Roche, Spencer, Merianos, & Hampson, 2001; Thomson, Lin, & Hampson, 2000). Therefore, it can be assumed that data was collected at the most appropriate time. There are no other writing studies demonstrating illness visits data in university populations within Brisbane or Australia. It is impossible to determine if university students visit the doctor less in Brisbane, Australia, than what is demonstrated in other areas of Canada and America. Some annual national reports suggest that influenza outbreaks may not exacerbate absenteeism from work in Australia (Halliday, Roberts, & Hampson, 1998). Thus, findings that the writing paradigm reduces illness and therefore reduces absenteeism from work (Spera et al., 1994) are unlikely to be replicated in Australia. These issues require further research.

A final explanation for the lower base rates may be measurement error. Researchers had less control over data collection procedures. This study, more than any past study, relied on private health centres. This creates two problems. Firstly, participants may forget they visited a particular health centre and the centre may never be contacted. Alternatively, the health centre may not record the information correctly. Poor recording occurred on at least two cases where participants stated they had been to the doctor more than that provided by the health centre. On both of these occasions, the centres were re-contacted and it was revealed that the health centre had

recorded the information incorrectly. The mistake was subsequently corrected. Unfortunately, not all participants were able to check the validity of the health data provided by the health centre and it is possible this resulted in higher measurement error than that for previous studies. Measurement error in studies that employ private health centres has been a cause for concern previously (Greenberg et al., 1996). To correct for this problem, a different health measure would need to be identified.

4.3. Manipulation of the Process of Change

One of the main goals of this study was to manipulate the trauma writing condition to emphasise processes of change. These manipulations have theoretical importance in identifying important emotion-processing mechanisms, and clinical importance in linking the writing paradigm to theoretical frameworks (Bootzin, 1997).

As previously discussed, manipulation checks converge to demonstrate that individuals engaged in the instructed task. The compliance with instruction for each of the three paradigms supports claims made by Esterling et al. (1999) that the writing paradigm provides a research tool to examine emotion-processing variables. However, manipulation checks are confounded by instructional biases and it may be difficult to state that participants definitely engaged in the hypothesised change variable. That is, did participants actually re-appraise the situation or find the significant positive benefits as discussed in the literature. These issues will be discussed in context of each of the hypothesised processes of change.

Exposure

Overall, findings partially supported Foa and Kozak's (1986) Emotion Processing Theory in predicting response to the exposure condition, as well as the schematic representation delineating change processes in Figure 1.1. In the short term, EPT predicted that imaginal exposure through writing would allow the individual to

engage with the trauma memory. This would be evidence by increased ratings of distress and, in particular, physiological and somatic activation. To support these conclusions, exposure participants reported substantial increases in distress and arousal within session, as indicated by SUDS levels, heart rate, and body sensations. EPT specifically suggested that engagement would be greatest in the first session. In support, exposure participants experienced higher heart rate levels in comparison to all other groups. This was in the first writing session.

EPT suggests that exposure is effective by modifying the fear structure so that the feared memory may be incorporated into everyday working models. Results supported the idea that the fear structure was modified over the writing sessions, as measured by habituation. Average SUDS ratings and body sensations while writing, and negative affect ratings post-writing, all decreased over the three sessions. Participants also reported small levels of within session habituation, on average. In partial support for the utility of exposure in reducing trauma symptoms, it appeared that exposure writing was the most effective writing paradigm in reducing trauma symptoms at two-month follow-up. However, the effect was not maintained at six-months. It may be that for non-clinical samples, exposure speeds the reduction of trauma symptoms that naturally occurs over a longer period of time.

Results also supported the idea that the modification of the fear structure, as measured by habituation, is related to trauma symptom reduction. Within-session habituation, as measured by SUDS, was associatively related to trauma-symptom reduction at both 2 and 6-months follow-up. The greater the within session habituation while writing, the more the reduction on the IES. However, between session habituation was not associated with this change.

Unlike this study, the two past studies (Jaycox et al., 1998; Van Minnen & Hagedaars, 2002) found that between session habituation was more likely to be related to positive outcome. Differences between the findings of this study and previous ones may be accounted by three explanations. The first is related to the type of outcome the past two studies used. Both studies combined PTSD symptom measures and depression measures to produce a variable for treatment responders. It is possible that if trauma symptoms were separated from depression symptoms, the same pattern may emerge as found in this study. Van Minnen and Hagedaars (2002) provide a second explanation for the discrepancy. In this study participants were instructed to engage in exposure at home, as well as a clinical setting under the supervision of a therapist. Within-session habituation was significantly associated with symptom outcome only for the exposure sessions conducted at home (self-exposure). This suggests that within-session habituation may be particularly important when participants engage in self-exposure as it occurs in the writing paradigm. Alternatively, between session habituation may be more important when exposure is administered by a therapist. A final explanation may be that this study employed a non-clinical sample, while the past two studies used a clinical sample. Differences in these population characteristics may be related to alternate outcomes.

Negative effects.

In contrast to EPT, negative effects were identified from completing the exposure writing paradigm². These participants reported less use of cognitive neutralising strategies, less post-traumatic growth, and less positive emotion in relation to the trauma. The most worrying aspect of these results was the increasing depression, stress, and anxiety for individuals in the exposure condition over time.

Negative effects in PTSD populations, particularly in flooding procedures, have been reported previously (Foy et al., 1993, Mueser & Butler, 1987; Mueser et al., 1991). Recent studies have found that individuals who experience particularly intense levels of distress during exposure may experience negative effects (Jaycox et al., 1998). Therefore, one explanation may be that the writing paradigm in an exposure-based format is particularly intense in isolation from therapeutic support and the intensity may overwhelm the individual.

In a review of studies that have found long-term negative effects from exposure based procedures, Foy et al. (1996) argued that exposure may be more likely to lead to negative effects in PTSD populations when the individual has low coping resources. Foy et al. (1996) specifically suggested that participants with co-morbid psychiatric disorders, particularly depression and substance use, are most vulnerable to experience an exacerbation of their co-morbid disorder. Alternatively, Brewin et al. (1996) suggested that negative effects are most likely where issues relating to meaning are found to contribute to intense emotional difficulties (i.e., anger) in PTSD.

The existence of co-morbid disorders such as depression and substance use or intense emotional difficulties with the trauma were not assessed within this population and cannot be evaluated. However, one participant did state that she believed her exposure sessions may have triggered another relapse of her ongoing difficulties with depression. Another of the participants who required referral was found to experience a cluster of symptoms associated with an axis two diagnosis. Therefore, the role of co-morbid difficulties within an exposure writing paradigm requires further research and represents a particular note of caution for clinicians.

In relation to the writing studies conducted thus far, a number have found a small sub-group of participants who deteriorate (Greenberg & Stone, 1992; Gidron et

al., 1996; Greenberg et al., 1996; Honos-Webb et al., 2000; Smyth et al., 2002; Stanton et al., 2002). Two of these studies (Greenberg et al., 1996; Smyth et al., 2002) suggested that a single writing session may have exposed individuals to the trauma without providing a follow-up opportunity for them to habituate to the memory. A third writing study that employed PTSD participants (Gidron et al., 1996) suggested that the writing paradigm may not provide enough direction, support, or opportunity for people who experience intense distress to habituate to the feared memory. Research has not assessed this possibility.

One associative finding provides tentative support for the conclusion that the exposure writing paradigm, as it was presented in this study, did not provide enough opportunity for individuals to habituate between sessions. Between session habituation was strongly associated with the degree of depression, anxiety, and stress symptoms at six-months. That is, the less between session habituation, the more likely the negative effects.. More sessions or support may have been required for many of the exposure participants. This finding also provides an explanation for why between session habituation may not have been related to IES reduction. If many exposure writing participants did not habituate between sessions, the measure may not then be associated with greater improvements.

In summary, the results suggest some benefit and cost associated with completing the exposure based writing task. The results from the exposure writing paradigm illustrates the effectiveness of the paradigm as a research tool for emotion processing research. Emotional process predicted by EPT were found to be related to the change on outcome measures two and six-months later. These findings provide exciting prospects for future emotion processing research. Further research is required

to determine what factors may be related to negative changes, or how the paradigm may be altered, so that the paradigm may be used more effectively.

Two caveats should be applied when making comparisons between this study and past studies using PTSD populations. Comparisons between this university-based study and past studies using complex PTSD participants could be erroneous and further research on the differences in response between clinical and non-clinical populations is required. It would also be unfortunate for the results of this study to be interpreted as supporting claims that exposure therapy leads to negative outcome. This study aimed to provide a primitive version of exposure therapy that is self-directed in a writing format. This study cannot be directly compared to exposure therapy which is provided by trained clinicians.

Devaluation

What is actually involved in a re-appraisal has been the focus of controversy (McNally, 2001). Littrell (1998) suggested there were two channels that may operate to produce a re-appraisal in the writing paradigm. The first developed automatically in response to painful material. The second was related to making conscious attempts to develop new cognitive responses in the absence of exposure to painful stimulus. This study is only able to address the latter. The fact that many participants throughout all conditions stated they thought differently about the trauma since completing the task, or even from filling out the questionnaire booklet, is evidence that controlling for the development of automatic changes is impossible. Therefore, this study does not contest theories such as Davey's (1997) that suggest cognitive mechanisms are important in relation to coping with stress and trauma.

There are a number of reasons to assume that participants assigned to the devaluation writing condition did not, as a group, successfully re-appraise their

situation. While improving as session progressed, by the third session just over 50% of participants were rated by independent judges as even moderately developing a new perspective which altered the reasons they were upset. They rated their essay as assisting them to make more sense of the experience, but did not rate higher than other groups on the development of insight. Participants, as a group, reported increases in negative affect post-writing but did not experience any increase in positive affect. It was expected that a successful devaluation would result in positive emotion post-writing.

In the long term there appeared to be minimal benefit from completing the devaluation task. Standard writing participants maintained the highest use of CNS and this effect was not demonstrated in comparison to control. Thus, the change experienced by participants may be an artifact of the decreased use of CNS by the exposure-writing group. The failure for individuals to demonstrate obvious changes from the devaluation task may be attributed to the nature of the paradigm itself. It may be too difficult for participants to change the way they think about a trauma in the absence of a therapist and within three writing sessions. It may be that true 'cognitive re-structuring' requires the assistance of another, such as a therapist. Alternatively, devaluation may be particularly useful when combined with exposure (Bryant et al., 2003). Finally, devaluation strategies could be particularly effective for particular types of trauma's, or for trauma that is on-going. These factors were not explored within this study. Therefore, on the basis of these results it is concluded that the devaluation writing did not enhance devaluation strategies of the trauma above other conditions or lead to additional benefits.

Benefit-Finding

In the short term, findings replicated past research that has employed a benefit-finding paradigm (King & Miner, 2000). Participants used more positive emotion and insight related words and experienced more positive affect than any other writing condition. In the long term, results provided minimal support for benefit finding models of change (Davis et al., 1998).

This study produced some evidence to suggest that writing about positive benefits resulted in increased positive growth above that attained by other trauma writing groups. Benefit-finding participants experienced the most change in reported positive growth and also reported higher levels of positive emotion in relation to the experience. This is the first known study which demonstrates that an intentional manipulation increases benefit finding processes or positive growth. In support for the hypothesis presented by King (2002) and King and Miner (2000), the task may enhance emotion regulation strategies so that individuals feel more positive when coping with their negative experiences. Alternatively, the task may assist individuals to feel better about their experience, themselves, others, and the world (Davis et al., 1998), so that they may be better equipped to place more resources into coping with other day-to-day problems.

However, the importance of this finding is attenuated. Firstly, physical health effects were not demonstrated for this group of participants, as reported previously (King & Miner, 2000). Previous limitations associated with the measure of illness visits have been discussed previously and may apply to this discrepancy. Secondly, this task did not result in a greater reduction on IES. The benefit of this task may be limited to more existential issues, as opposed to specific trauma symptom reduction. For instance, the benefit-finding task may be most useful when participants face

traumas that arouse intense shame, disgust, and other forms of negative emotion. Analysis in this study does not permit examination of such hypothesis. Anecdotal accounts from participants in this study seemed to support the conclusions that individuals who identified new benefits from trauma's they felt particularly ashamed about reported a greater appreciation for the benefit-finding task. Thirdly and of most pertinence, the effect could be partly explained by a reduction on the PTGI and PA in the exposure condition and therefore requires replication. Finally, the effect was not maintained at six-month follow-up.

4.4. Dis-inhibition

Pennebaker and Susman (1988) originally argued that dis-inhibition through the expression of emotion led to health benefits. This model appears limited in its capacity to explain the findings in this study, particularly both positive and negative effects for participants in the exposure condition. The original model would have predicted that exposure participants would obtain the most benefit due to the more extreme levels of engagement and disclosure with emotional material. Therefore, this study supports Littrell's (1998) and Pennebaker's (1997) evaluation that dis-inhibition may not provide a comprehensive evaluation of the current evidence for and against emotional expression in the writing paradigm.

More recent adaptations of the model have emphasised the cognitive changes within the essay, such as the development of insight (Pennebaker et al., 1997). While these factors were not specifically examined in this study, independent judge ratings and LIWC analysis suggested that the standard writing participants did change the structure of their essays over the writing sessions. Results suggested that essays began with a description of the event and gradually increased in the use of thoughtful and insightful analysis. Thus, the changes in writing style may be associated with the

observed physical health benefits attained at six-months. If cognitive changes in the essay and the development of insight is important to health, it is unclear why devaluation and benefit-finding writing tasks did not increase health benefits. Perhaps if participants were instructed to engage in all three paradigms, beginning with exposure and ending with benefit-finding, experimental conditions may benefit. This hypothesis requires further research.

4.5. Trauma Severity

This research supported Greenberg and Stone's (1992) claim that individuals who disclose highly personal and stressful experiences obtain the most physical health benefits as measured by illness visits. Unfortunately, this study did not replicate the findings at two-months, or findings on self-report measures of physical health. This study employed Greenberg et al. (1996) physical symptoms measure, rather than the PILL. It is possible, though unlikely, that the PILL is more sensitive to change. The PSS development was based on the PILL measure and has demonstrated change by Greenberg et al. (1996). In consideration of the majority of the literature, it does seem that self-reports of physical symptoms are notoriously inconsistent and conclusions based on this measure is difficult.

In contrast to the suggestion that severity may have a positive relationship to health improvements, past studies employing PTSD populations have failed to produce positive effects (Brown & Heimberg, 2001; Gidron et al., 1995). Furthermore, severity was not found by Smyth (1998) to be a major predictor of physical health benefits in the meta-analytic review. These equivocal findings suggest that the role of severity requires further research.

It may be that a threshold exists where the writing paradigm is effective for non-clinical populations. Such a perspective would support theorists who argue PTSD

is categorically different from all other types of trauma reactions (Porter & Birt, 2001; Van der Kolk et al., 1996). Alternatively, participants who experience more severe PTSD reactions may require longer periods of writing, graduated levels of exposure to the traumatic memory, or shorter intervals between writing sessions. A final explanation may suggest that the role of severity is less important than the factors that lead an individual to appraise a situation as more severe. These could be both situational and individual difference factors (Hemenover, 2001).

4.6. Individual Differences

This study provided minimal evidence that the chosen measures of individual differences moderated improvements. It was not surprising given there were very few improvements revealed. In general, this study did not replicate studies (Cameron & Nicholls, 1998; Paez et al., 1999) that suggest optimism and alexithymia are important mediators of change for physical symptoms. The results in relation to these particular studies are difficult to conclude upon based on the lack of significant effects between control and trauma writing groups and thus require further investigation.

Optimism

One interpretation may be made of the Cameron and Nicholls (1998) finding. They required participants to write about the experience of coming to college. It may be that optimism is a particularly important individual difference variable when one describes a stressful experience that is current and ongoing. Optimism may enhance coping strategies for this population. However, when dealing with an event that occurred months or years ago, optimism may be less important.

Alexithymia

Paez et al. (1999) found that scoring higher on a sub-scale of alexithymia was related to fewer health benefits and a possible deterioration of mood in the long-term.

They suggested that this was related to deficits of engaging in an evocative emotional disclosure. While the overall results do not support these conclusions, this is not surprising given the lack of findings overall. An examination of individual differences within the exposure condition does provide tentative support. In this condition, it was participants scoring higher on the alexithymia scale who experienced lower levels of between-session habituation and higher levels of depression six-months later. It appeared that these individuals did not cope with the emotional requirements of the intensive writing paradigm. The influence of this individual difference supports EPT, which suggests emotional engagement is critical to a positive outcome in an exposure paradigm (Jaycox et al., 1998).

The inability of these individuals to identify and describe emotional experiences is well documented (Bagby et al., 1994; Lumley, Tojek, & Macklem, 2002). In relation to the writing paradigm, Lumley et al. (2002) argued alexithymic individuals experience deficits in three steps of emotional processing. Firstly, alexithymic individuals may be unable to generate emotional responses when exposed to a stimulus that may normally activate high levels of emotion. Secondly, alexithymic individuals may be unable to recognise an affective response when they experience the emotion. Thirdly, if the alexithymic individual has been able to identify the affective response, they may be unable to understand the emotion. Any of these would explain the findings from this study. These hypothesis present an interesting proposal for further investigation.

Two conclusions may be made for the role of alexithymia in relation to the exposure writing paradigm. The first, labelled by Pennebaker et al. (1989), is the 'let sleeping dogs lie' hypothesis. It could be argued that the writing paradigm in its exposure-based format may be unsuitable for individuals high in alexithymia. That is,

revocation of intense emotional memories in a short and self-directed manner may lead to negative effects for individuals scoring highly on this construct and therefore high alexithymia is a contra-indication.

Alternatively, these individuals may obtain benefits from the paradigm if the paradigm is altered to suit their needs. For instance, alexithymia has been associated with poorer responses from insight-oriented therapies (Singer, 1977). To compensate, researchers have argued that alexithymic individuals may require more direction, attentional focus, and time spent understanding feelings with therapists (Greenberg & Safran, 1989). The writing paradigm may be useful for this sub-population if participants are provided an education session on understanding emotions. If more time was given to them to engage in the writing tasks, more sessions to habituate between sessions, and more tasks aimed at coping with negative emotion, these participants may not experience negative effects.

Imagery and Absorption

This study supported suggestions by Kwekkeboom et al. (1998) that the Bett's QMI and Tellegen Absorption Scale measure separate constructs. Very low correlations were observed between the two. While neither were related to outcome overall, absorption was related to outcome in the exposure condition. The higher the score on absorption, the greater the reduction on the IES. Reasons for this may be twofold.

Firstly, research suggests absorption facilitates affective engagement with tasks (Roche & McConkey, 1990) and the ability to engage in personal and emotional material has been associated with improved outcome in past writing studies (Pennebaker et al., 1988). Secondly, research indicates that absorption is positively related to the ability of individuals to engage with experiential instructions (Qualls &

Sheehan, 1981). The exposure instructions were designed to place greater emphasis on experiential involvement, more so than any other condition.

The positive influence of absorption in leading to outcome in the exposure paradigm also supports the emotional engagement hypothesis of EPT. However, one caveat should be noted. Participants did not complete the absorption questionnaire in the room they completed the writing sessions. Some researchers who claim absorption is a state based measure may suggest that absorption in this study was not accurately measured (Barnier & McConkey, 1999).

Negative Affect

Finally, negative affect (NA) was unrelated to change overall. There was a small but significant relationship between increased NA and reductions on the IES in the exposure condition. While cautioned as a possible type 1 error, Pennebaker et al. (1990) originally argued that individuals high in NA engage in higher levels of introspection and are more likely to disclose more deeply than individuals low in negative affect. Therefore, it may be that high NA is related to higher levels of emotional engagement in the exposure writing task. This finding does require replication.

In summary, no individual differences were found to be related to change overall. Three individual differences were found to be related to benefits or costs in the exposure paradigm. Individual differences that were hypothesised to enhance emotional engagement, such as absorption and negative affect, were positively correlated with reduced trauma symptoms. Individual differences that were hypothesised to restrict emotional engagement, such as alexithymia, were positively related to depression, anxiety, and stress change scores.

4.7. Practical And Clinical Implications

Theoretically, the findings from this study add to the exciting body of research examining the role of emotion processing in trauma and the writing paradigm. This study demonstrates that different types of emotion processing strategies lead to alternative outcomes. While support was provided for the therapeutic effects of exposure and benefit-finding, identified negative effects suggest extreme caution to any suggestion of clinical application of an exposure based writing paradigm.

While negative effects were most obvious for participants assigned to the exposure writing task, there is no reason to assume that the negative effects are limited to this task. A number of past writing studies that employed the unstructured standard writing task have also indicated that a sub-group of participants suffered in the long term (Greenberg et al., 1996; Honos-webb et al., 2000). Perusal of some of the unstructured writing essays in this study indicated that some participants did write their essay in an exposure-based format. Therefore, findings from this study could be generalised to suggest that individuals should be supervised when engaging in unstructured trauma writing tasks. Those who engage in exposure type processes in the standard writing procedure may also be at risk of experiencing negative reactions. These results are particularly relevant to settings where individuals engage in writing tasks alone or in user-pay services (Schoutrop et al., 2000).

Benefit-finding models of change (Davis et al., 1998) argue assigning positive value for past experiences may lead to existential changes to beliefs about oneself, others, and the world. Results tentatively indicated that benefit-finding participants increased positive growth and positive affect for the experience, but did not directly reduce the severity of trauma symptoms. Therefore, the benefit-finding writing task

may be most useful as a tool to be used in non-clinical populations to deal with more existential issues surrounding trauma. Replication in diagnostic groups is required.

Finally, blanket statements that suggest emotional writing is beneficial for the psychological and physical health of all individuals should be reviewed. Clinicians and researchers need to be more aware of limitations of the task and the failure of numerous studies to demonstrate benefits on reliable measures of health.

4.8. Limitations to the Present Study

There are a number of limitations to this study that need to be considered. These are related to the methodology employed, the way the participants were recruited, and to the specific measures employed.

This study aimed to dismantle the writing paradigm by directly instructing participants to write in a manner consistent with each hypothesised mediator. The benefit of this type of paradigm is that processes may be isolated so that its impact on the individual is increased. Processes are controlled in a manner that ensures randomly assigned participants engage in the process, as opposed to a self-selection approach. The overall strength of this paradigm is that differences found between groups may be attributed directly to the hypothesized process of change and overcomes limitations discussed by previous research relying on associative relationships and self-selection.

However, there are also limitations with this type of methodology. The direct instruction for each participant to engage in a process may effect self-reports. Participants may inflate the degree they report engaging in their instructed hypothesis and differences between groups could reflect an experimental bias. For example, a participant assigned to the benefit-finding condition was instructed to ‘identify positive changes to their lives as a result of the experience’. Based on this instruction,

participants assigned to this condition may be more likely to inflate ratings associated with identifying positive benefit in their essay and increases in positive growth two months later, regardless of whether they did or not.

While self-ratings were cross-validated by independent judge-ratings and LIWC analysis, outcome measures could not be cross-validated. So one explanation for the differences between exposure and benefit-finding participants on the PTGI and EPA is that it was artificially created by the instructional set. Results did suggest social desirability as measured by the Marlowe-Crowne Social Desirability Scale was unrelated to outcome measures. However, this can only provide tentative support contrary to this limitation. Hawthorne effects may be mediated by numerous factors other than trait social desirability.

Another concern related to methodology was the possibility that the control group were partially exposed to their past trauma's through the completion of the initial and follow-up trauma questionnaires. While this was done to control for all aspects of the writing study, trauma exposure for the control group may have adversely effected the outcome by lowering effect sizes.

A broader issue relates to recruitment and population bias in all writing studies. Participants were aware that they may be required to disclose an upsetting experience when they signed up for the study. This was an ethical requirement. Past research indicates that individuals who volunteer for these experiments may be more open to emotional disclosure than individuals who do not volunteer (Hood & Back, 1971). Therefore, individuals who prefer not to disclose their past experiences are less likely to be involved in these experiments. Research also suggests that when participants sign up for an experiment, particularly ones that involve emotional expression, there is an expectation that beneficial cathartic processes will occur (Hood

& Back, 1971). While this limitation should be considered, it is relevant to most writing studies conducted that use self-report measures to assess outcome. Finally, these results cannot be directly applied to clinical populations. The goal of this study was to apply clinical theory to a university population. While this research may provide a guide, further research is required to determine applicability of these findings to clinical populations.

There were limitations associated with the specific measures employed. There were differing base rates for illness visits between this study and past studies. This difference makes it difficult to make global statements in relation to the research field on the basis of these results. Furthermore, demonstrating improved health effects beyond that of the standard writing condition for those in the structured trauma writing tasks was extremely difficult given the already low-base rates, limiting conclusions made for this study. While there may be multiple reasons for this, one possibility discussed was measurement error. Unlike past studies, researchers had less control of data collection protocol in private health settings. Given that minimal variance in the data may be required to alter outcomes significantly, a more robust health measure needs to be developed to assess physical health in the future.

The heart rate measure was also limited in its capacity to provide specific information. Firstly, the copy task was only 10 minutes long. While this may be considered appropriate given the testing circumstances, an equal amount of time between copy and experimental condition would have been ideal. Secondly, due to extraordinary difficulties with the reliability of the Acqknowledge Biopac MP100 equipment, significant amounts of data were lost. Initially, the lost data was merely a few per condition for each session. When tallied, this totalled a third of participants

with one missing data file. This made it impossible to assess between session habituation or compare other changes across sessions for BPM.

4.9. Recommendations for Future Research

One of the most important outcomes was the demonstrated importance of providing comprehensive assessments, including a clear specification of process of change variables. This specification led to results which informs both the paradigm, emotion processing research, and trauma theory in a manner less influenced by the therapist.

It is recommended that comprehensive standards of practice need to be developed within the literature. As the review indicated, research should be more specific about the exact nature of benefits to be obtained, particularly in relation to psychological measures. It seems that participants are unlikely to obtain trauma symptom reduction from the standard writing paradigm. In terms of the illness visit measure, it seems that in areas such as Brisbane, Australia, students use private health centres and do not visit regularly. A sensitive measure of physical health is required.

It is recommended that future research address the effect of involving control participants in aspects of the trauma assessment and exposure cues outside of the writing paradigm. For instance, research should evaluate whether control participants may alter responding to self-reports and objective health measures based on the degree of exposure they receive to traumatic experience questionnaires or believe the task they are completing is beneficial. Such research were allow conclusions about whether benefits are associated with isolated factors within the writing task itself or associated with spurious factors outside of the task.

The exposure-writing paradigm also provides a base to examine the effects of self-exposure in clinical settings. University population are easier to recruit and

continued use of this paradigm to test EPT predictions seems warranted. Replications of these processes in clinical settings would provide increased understanding for theories associated with emotion processing, particularly examining differences between PTSD groups and student samples. It would be useful to examine whether increasing the number of sessions, the time of exposure, and therefore increasing the likelihood of within and between-session habituation leads to increased benefit and a reduced possibility of negative effects. Alternatively, graduating the degree of exposure may increase the effectiveness of the exposure writing paradigm.

Other methods to modify the exposure writing paradigm to decrease distress in the long-term should also be examined. For instance, the study did not evaluate the beneficial effects of combining the models of change presented. Given that alternate methods of writing lead to alternate outcome it would be advantageous to examine benefits individuals might achieve if they were to complete exposure, devaluation, and benefit-finding writing tasks. It may be that adding the benefit-finding writing task would negate the negative effects demonstrated from exposure writing. Alternatively, Brewin and Lennard (1999) report that typing, as opposed to handwriting, leads to lower levels of negative affect immediately after writing. Changing how the writing paradigm is administered may decrease negative effects.

4.10. Conclusion

A methodology where the writing paradigm was manipulated to emphasise hypothesised processes of change had theoretical and clinical importance. Manipulation checks indicated participants wrote in the instructed format and experienced a degree of affect and arousal that was consistent with the hypothesised process of change. It seemed different processes led to different outcomes in both the

short and long-term. Therefore, the study suggested the writing paradigm was a viable research tool for emotion processing research.

Results provided only partial support for the conclusion that the standard trauma-writing paradigm leads to a reduction in illness visits. In support of Greenberg and Stone's claim (1992), the effect was stronger when participants who identified a more severe traumatic experience were selected. There was no evidence of psychological benefits for standard writing participants over control. There was also no evidence to suggest that any of the hypothesised mechanisms led to a greater reduction for illness visits.

This study indicated that different emotional processing techniques were associated with alternate outcomes for psychological measures. In support of Emotion Processing Theory (Foa & Kozak, 1986), exposure was associated with reduced IES symptoms at two months. However, these participants also reported lower levels of positive growth and affect for the experience, and higher levels of depression, anxiety, and stress. Exploration of associated variables in the exposure condition indicated within and between-session habituation, alexithymia, absorption and negative effect were related to the alternate outcomes. In contrast, tentative evidence indicated benefit-finding was associated with increased positive growth and positive affect for the experience, but not a reduction for trauma symptoms.

Finally, this study suggested the importance of comprehensive health research that incorporates process, outcome, and individual difference measures. On the basis of these findings, and those from recent studies, it is suggested that blanket statements suggesting psychological and physical benefits for individuals undergoing the trauma writing paradigm without further specification of the nature or significance of these benefits may be premature.

Footnotes

1. This analysis was run for each of the experimental groups. This pattern of correlations did not emerge for any other writing condition.

2. The negative outcome demonstrated for participants in the exposure condition did not include two participants who were excluded from that writing condition. These two participants experienced significant distress over two weeks following the completion of the exposure writing task. They both reported self-harm behaviours. A supportive referral system was implemented to assist these participants. The lead experimenter provided supportive counselling on a number of occasions and referred to a clinical psychologist at the Griffith Health Service. The experimenter remained in contact with both individuals over the following six-months to monitor progress. At six-month follow-up, one individual reported that they felt the writing task had forced them to deal with issues that were dormant for over 20 years. They stated, on reflection, they had benefited from the opportunity to deal with these issues. The second participant did not believe they obtained any positive gain from re-visiting their trauma. At six-month follow-up, both stated they no longer felt any negative effects from completing the writing task.

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