Counterfactual Thinking and Posttraumatic Stress Reactions

Sharif El Leithy
Traumatic Stress Service, St. George’s Hospital, London

Gary P. Brown
Royal Holloway University of London

Ian Robbins
Traumatic Stress Service, St. George’s Hospital, London and University of Surrey

Preoccupation with alternative outcomes (counterfactual thinking) is a central component of the ruminations of trauma victims. The questions investigated were whether such thinking should be distinguished from general rumination and whether elements of counterfactual thinking might relate to the process of adjustment. A sample of assault victims was interviewed. They completed a battery of self-report scales and thought-listing procedures. Frequency of counterfactual thinking was closely associated with continuing levels of posttraumatic distress. However, high availability of counterfactuals (as indexed by verbal fluency) was related to potentially adaptive outcomes, such as the generation of behavioral plans. In addition, as expected, levels of different aspects of counterfactual thinking were moderated by metacognitive control strategies as a function of time since the trauma.

Keywords: posttraumatic stress, rumination, emotional processing, heuristics

Virtually all victims of a traumatic event will initially experience an acute psychological reaction characterized by intense emotional arousal and recurring distressing thoughts and images (Bisson & Shepherd, 1995). For the majority of the victims, these reactions gradually diminish. However, some victims do not adjust successfully and subsequently develop posttraumatic stress disorder (PTSD). Whereas the prevailing theories of PTSD (e.g., Foa, Steketee, & Rothbaum, 1989; Brewin, Dalgleish, & Joseph, 1996) are predominantly grounded in an associative learning and information processing perspective, earlier theories (e.g., Horowitz, 1979, 1986; Janoff-Bulman, 1989, 1992) were more concerned with the pervasive impact a trauma experience has on a person’s consciously held general worldview and higher order sense of personal meaning. Despite the different levels of analysis, common to all of these theories is the basic notion that PTSD develops as a consequence of disrupted emotional processing of the traumatic event (Rachman, 2001).

A full understanding of PTSD will depend on bridging these parallel levels of analysis to relate higher-order sense making to more basic processes (Brewin et al., 1996) and to provide an account of the mechanisms that enable (and impede) emotional processing of traumatic events. Further, because emotional processing requires tolerating intrusive and disturbing memories in working through the trauma, individual differences in responding to such thoughts appear to be potentially informative. One line of relevant research has yielded a small but consistent body of findings on the relationship of PTSD symptoms to thought control strategies using the Thought Control Questionnaire (TCQ; Wells & Davies, 1994). Reynolds and Wells (1999) found that the strategies of social control, reappraisal and distraction were predictive of recovery in individuals with either depression or PTSD, whereas worry and punishment were associated with continuing symptoms.

That similar strategies are predictive of recovery in depression and PTSD suggest that research concerning how individuals with depression respond to distressing thoughts might shed light on comparable processes in PTSD. Of particular potential relevance is the research on ruminative response style. Lyubomirsky and Nolen-Hoeksema (1993) reported that ruminators were motivated to fixate on their mood as a means for seeking greater self-understanding. This served to perpetuate the mood rather than to alleviate it (as hoped), to make more adaptive strategies like distraction more unlikely and to have adverse effects on accurate appraisal and social problem-solving (Lyubomirsky & Nolen-Hoeksema, 1993). Extending this research, Watkins and Baracaia (2002) drew on Kuhl’s (1994) conceptualization of rumination as a mode of thought that reflects a state orientation, in the midst of which focus on the causes and consequences of internal and
external states becomes an end in itself instead of a means to effective action. State orientation is characterized by preoccupation with simulating alternative plans and by the analysis and evaluation of past successes and failures, all of which tend to work against the initiation of new actions. In contrast, action orientation is characterized by action planning and effective self-monitoring (Watkins & Baracaia, 2002). Watkins and Baracaia (2002) were able to induce an action-oriented state and improved problem solving in a sample of currently depressed and recovered depression patients who had initially tended to respond with a state orientation.

Ehlers and Clark (2000) note that the mechanism by which rumination might operate within PTSD is as yet unclear. As is the case in depression, focus on alternative outcomes to the traumatic event in PTSD ruminations has been frequently noted. The various terms that have been used include “mental undoing” (Dunmore, Clark, & Ehlers, 1999), “wishful thinking” (Valentiner, Foa, Riggs, & Gershuny, 1996), “denial by fantasy” (Freud, 1920/1963), and “what if...” thoughts (Ehlers & Clark, 2000). Regarding effects, rumination on alternative outcomes is generally seen as serving to maintain PTSD symptoms (e.g., Resick, Schnike, & Markway, 1991; Dunmore, Clark, & Ehlers, 2001). It is reasonable to expect that, as is the case with depression, focus on alternative outcomes among trauma victims is motivated by a search for meaning and self-understanding. And, as is true of depression, because of the attendant dysphoric mood, this carries with it the risk of becoming self-perpetuating if not terminated, for example, through the timely redeploymen of attention (Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2002). The potential benefit of considering developing personal meaning has also been noted, and it is generally regarded as a component of emotional processing. For example, Horowitz (1986) regards rumination in general as facilitating assimilation and accommodation of the traumatic event, and Janoff-Bulman (1989) suggests that “denial and recurrent thoughts are the psychological processes that facilitate the course of cognitive integration” (p. 122). Taylor and Schneider (1989) argue that finding meaning involves understanding different aspects of the event and that rerunning events through one’s mind may contribute to the development of meaning.

Within general psychology, the term counterfactual thinking is used to refer to thinking about alternative outcomes and is seen as the key psychological process underlying such emotions as regret, relief, disappointment (Kahneman & Miller, 1986), shame and guilt (Niedenthal, Tangney, & Gavanski, 1994). The fact that counterfactual thinking is accompanied by negative affect and also potentially contributes to adaptive outcomes has been recognized in this literature. Roese and Olson (1997) review a range of experimental studies showing that counterfactual thinking is most often prompted by negative affect, the so-called “affect-driven hypothesis.” Besides negative affect, perceived closeness of the actual event to the alternative (e.g., how closely the goal was nearly achieved) also makes counterfactual thinking more likely. Counterfactual thoughts have also been categorized with respect to the direction of comparison relative to the actual event. Upward counterfactuals refer to imagined alternatives that are preferable to what has actually happened (often begun with “if only...”), while downward counterfactuals refer to alternatives that are worse than reality (often begun with “at least...”). Upward counterfactuals produce comparatively greater distress but, paradoxically, can lead to better adaptive outcomes than downward counterfactuals. Roese and Olson (1997) reason that, although accompanied by negative affect, upward counterfactuals nevertheless point to the means by which the relevant situation may be improved and highlight future adaptive behavioral plans. In contrast, downward counterfactuals enhance mood in the short term and provide consolation but do little to prepare the individual for the future (Sanna, 1996). Other similar distinctions in counterfactual thinking have also been examined. Roese and Olson (1993) found that additive counterfactuals (where something is added to the imagined scenario) were more frequently generated than subtractive counterfactuals (where something that actually happened is taken away) and more often suggested novel or creative solutions. McMullen, Markman, and Gavanski (1995) proposed a further distinction between self-referent and other-referent counterfactuals.

Thus, counterfactual thinking following negative events appears to potentially further emotional processing and understanding but with sometimes considerable concurrent distress. And, depending on factors that are not yet understood, the balance of costs and benefits can shift such that preoccupation with what could have been can contribute to the development and maintenance of traumatic stress reactions. According to Roese and Olson (1997), under normal circumstances, the negative affect accompanying counterfactual thinking becomes less frequent over time, whereas the logical inferences generated in the course of considering counterfactuals continue to be available and inform the person’s subsequent adaptive coping efforts. The failure of counterfactual thinking to diminish likely increases the likelihood of negative consequences. For example, Ehlers and Clark (2000) contend that the focus on what could have been can potentially strengthen problematic appraisals of the trauma and interfere with processes essential to recovery. It is likely that deploying counterfactual thinking maladaptively in this way may be linked to inflexible metacognitive beliefs about the efficacy of such strategies, as described by Wells and colleagues (Wells & Davies, 1994), and might account for the findings noted above employing the TCQ.

The present study was undertaken to explore and further develop some of these concepts. A sample of assault victims was recruited from the maxillofacial surgery and accident and emergency departments of a large urban hospital. The victims were interviewed concerning the assault and completed a battery of measures. To probe for the availability and accessibility of counterfactual inferences (representing the putative benefit of counterfactual thinking) in a manner that was not confounded with current level of counterfactual frequency, methods were used that were drawn from previous research on the simulation heuristic (Kahneman & Tversky, 1982) based on the fluency (see MacLeod, 1999) and coherence (e.g., Brown, MacLeod, Tata, & Goddard, 2002) of verbal productions.

The general question investigated was whether counterfactual thinking should be distinguished from general rumination and whether a fine-grained examination of its different aspects might provide insights into the process of adjustment to a trauma. Among the specific predictions were (1) activation of counterfactual thinking (as indexed by how frequently it was reported to have occurred) would be associated with greater posttraumatic symptom-
atology (the affect driven hypothesis); (2) in contrast, availability of counterfactual thought and inferences, as shown by the ability to generate a variety of relevant counterfactuals, would be a marker of successful emotional processing that would be associated with the preservation or “repair” of fundamental assumptions and the development of adaptive behavioral plans. This would be especially true of upward, self-referent and additive counterfactuals; and (3) counterfactual activation and availability of counterfactuals would be moderated by cognitive control strategies.

Method

Participants were adults (37 men and 9 women) who had been victims of a nonsexual physical assault between three and 15 months prior to the interview and who had been subsequently treated for their injuries at St. George’s Hospital, London. They were recruited from the Maxillofacial Surgery (N = 32) and Accident and Emergency departments (N = 14). Exclusion criteria were: (1) assaulted by a family member; (2) non-English speaker; and (3) diagnosed with a brain injury. The final sample reflected a response rate of 24.9% from the potential pool of 185 invited to participate.

Impact of Events Scale—Revised (IES-R; Weisz & Marmar, 1997). The IES-R is a widely used instrument for assessing the psychological consequences of traumatic events that produces a dimensional rating of subjective distress over the previous week. A score of 26 on the combined Intrusion and Avoidance scales has been suggested as a cut-off for clinically significant reactions (Horowitz, Wilner, & Alvarez, 1979).

World Assumptions Scale (WAS; Janoff-Bulman, 1989). The 32-item WAS was developed to test the “assumptive worlds” model and consists of sets of beliefs that are thought to be particularly threatened by trauma. Its 32 statements are rated on a six-point scale of agreement, with four items on each of eight theory-derived subscales. In the present study, a global measure of world assumptions was desired, so a principal components analysis was conducted of the subscale score totals. Six of the scales (Benevolence of People, Benevolence of the Impersonal World, Justice, Controllability, Randomness, Self-Worth, Control by the Self, and Luck, but not Randomness and Self Worth) loaded at least .40 on the unrotated first component. These were summed to produce a total WAS score.

Thought Control Questionnaire (TCQ: Wells & Davies, 1994). The TCQ was developed to assess individual differences in the use of thought control strategies related to the maintenance of and recovery from psychological difficulties; it consists of five subscales describing strategies engaged in response to unwanted thoughts (Distraction, Social Control, Reappraisal, Worry and Punishment). Wells (2000) reported internal consistency coefficients for the subscales ranging from .64 to .79 and 6-week test-retest reliabilities ranging from .68 to .83.

Thought listing tasks. These tasks were used to generate data on the availability of counterfactual thoughts regarding the assault and were based on an adapted verbal fluency paradigm (MacLeod & Byrne, 1996). A speeded task was seen to be more likely to tap into participants’ current working model of their experience rather than more complex reasoning processes. The standard verbal fluency task (Lezak, 1976) was administered first; participants were asked to list as many words as they could that begin with each of the letters F, A and S within 60 s. Participants were then asked to generate in the same way different types of thoughts or behavioral plans to complete specific sentence stems. Following each thought listing task, participants were asked to make ratings of their frequency and intensity from 1—very rarely or never or very weak to 6—allmost all the time or very strong. Counterfactuals were coded as (i) upward versus downward; (ii) self-referent versus other-referent; and (iii) additive versus subtractive. Good interrater reliability was found between two raters who coded a random sample of 16 participants’ responses (N = 73, upward/downward, K = .89; self/other, K = .92; and additive/subtractive, K = .86).

Results

To minimize multicollinearity, independent variables were centered prior to regression analyses.

Men (N = 37, 80%) were the majority of the sample. Forty-one percent of the sample had experienced trauma in childhood, and a similar proportion had experienced another traumatic event in adulthood. Whereas only 13% reported previous psychological difficulties, 46% reported such problems after the assault. The assaults ranged in duration from very brief (30 s) to up to 30 minutes. Ten percent reported being threatened with a weapon, and almost half were assaulted with a weapon. Over half of the sample sustained some form of bone fracture. Thirteen percent reported some form of permanent disability, such as loss of vision or sensation. Mean IES-R was 29.8, SD = 19.8, with just over two-fifths (N = 17) currently reporting clinically significant PTSD symptoms (IES-R > 26).

There were no significant differences between men and women on reported frequency of any background or assault characteristics. However, women perceived more threat of serious injury (M = 91.6, SD = 11.64, mean rank = 36.17) during the assault than men (M = 48.8, SD = 36.3, mean rank = 20.4), Mann–Whitney U(44) = 52.5, p = .002. In addition, there was a significant point-biserial correlation of gender and IES-R score (rpb = .38). However, the higher symptom scores for women appeared to be an indirect effect of their already noted higher levels of perceived threat of serious injury. With the latter variable held constant, the correlation between gender and IES-R was no longer significant. Furthermore, when subsequent analyses covaried out perceived threat, there was no difference compared to the findings without this covariate, and it was therefore not used as one. Also, associated with higher IES-R scores, and consistent with numerous previous reports, was assault duration (r = .37), with longer assaults associated with more severe PTSD symptoms.

Correlations concerning the relationship between current thinking and PTSD symptom severity are shown in Table 1. General verbal fluency (FAS) was used as a covariate to control for individual differences in verbal fluency. The correlations in the bottom panel of the table are partial correlations controlling for FAS. Consistent with the affect-driven hypothesis, counterfactual frequency was highly correlated with current PTSD symptoms (r = .72 with IES-R) and appeared to diminish as a function of time since the assault (r = −.42). Likewise, as expected, WAS score was inversely related to current symptoms (r = −.30, p < .05) and to counterfactual activation (r = −.35 with counterfactual frequency). Individuals whose beliefs in a just and benevolent world had been less undermined by their trauma or had been restored to some extent (the lack of an inverse association of WAS with time since assault makes the latter interpretation less supportable) tended to have lower PTSD symptom levels and were less preoccupied with alternative outcomes.

In contrast, controlling for general verbal fluency, counterfactual frequency (reflecting the aggregate availability of relevant counterfactuals) was not correlated with IES-R (r = .10) but was related to the generation of behavioral plans (r = .54). In terms of
counterfactual subtypes, neither upward (r = .25) nor downward (r = -.26) counterfactuals were associated with PTSD symptoms, although these represent trends in the predicted direction. As predicted, upward (r = .53) but not downward (r = .01) counterfactuals were associated with the generation of behavioral plans. Additive and self-relevant counterfactuals were not correlated with PTSD symptoms (r’s with IES-R = -.03, and .13, respectively) but both were, as predicted, associated with the generation of behavioral plans (r = .41, and .45, respectively).

Activation and inhibition of counterfactual thinking. The hypothesis that was tested was that general thought control strategies are likely to be key factors in determining whether, over time, the emotional states experienced in the course of working through a trauma eventually diminish or become self-perpetuating and impede rather than aid recovery.

Two subscales of the TCQ were formed, the first—TCQ-A—included the subscales that Reynolds and Wells (1999) found predicted recovery from PTSD and depression (Distraction, Reappraisal, and Social Control); the second—TCQ-B—included the subscales that remained unchanged or decreased among those victims whose symptoms improved (Worry and Punishment). Regression analyses were carried out with TCQ subscale and time since assault as predictors and counterfactual fluency and counterfactual frequency, in turn, as dependent variables. A significant interaction was found between TCQ-B, but not TCQ-A, and time since assault predicting counterfactual frequency, $\beta = .30, \Delta R^2 = .08, F(1, 42) = 5.36, p < .05$. As shown in Figure 1, participants employing counterproductive thought control strategies (i.e., those with high TCQ-B scores) tended to only show a nominal decrease in counterfactual frequency as a function of time, whereas those who reported employing these strategies less frequently showed a sharp decrease. For counterfactual fluency, TCQ-A, but not TCQ-B, had a significant interaction with time since assault, $\beta = -.36, \Delta R^2 = .11, F(1, 42) = 6.77, p < .05$. Participants with high TCQ-A scores tended to have higher counterfactual fluency shortly after the assault than those with low TCQ-A, but lower fluency than those with low TCQ-A at longer time points. The counterfactual fluency of those with low TCQ-A did not change as a function of time. This pattern is consistent with the notion that those with higher TCQ-A scores tended to confront and process the implications of the trauma earlier than those with low TCQ-A scores.

Discussion

The present study was undertaken to explore whether counterfactual thinking should be distinguished from general rumination and whether a fine-grained examination of different aspects of counterfactual thinking might provide insights into the emotional processing of traumatic events. A number of predictions drawn from this literature were tested in a sample of participants who had recently been the victims of a serious, nonsexual assault, and evidence was found to support these predictions. Concerning the form of processing, the results of the present study suggest that a critical consideration is the basic response strategy an individual adopts when unpleasant thoughts emerge. Responding to unpleasant thoughts with active reappraisal and reality testing (consistent with Kuhl’s [1994] action orientation) was associated with greater ease in generating counterfactual thoughts in the early aftermath of the assault but fewer counterfactual thoughts at longer time lengths. Strategies aimed at interrupting unpleasant emotional states by focusing on other negative thoughts or through “thought stopping,” consistent with Kuhl’s state orientation, were not associated with improvement and may be associated with continued counterfactual thinking.
Figure 1. Counterfactual fluency and frequency as a function of thinking strategy and time since assault.
Regarding the specific aspects of the content of counterfactual thinking, self-referent and additive inferences and the availability of thoughts concerning how the situation might have turned out better than it did (upward counterfactuals) were associated with the generation of future plans, corroborating laboratory research. A limitation is that data were not collected that would permit a judgment of whether the behavioral plans generated were adaptive, and it is conceivable that more counterfactual thinking could lead to generating plans that are maladaptive. However, there is evidence to suggest that the ability to generate counterfactual alternatives, per se, aids problem solving by counteracting reasoning biases (Koehler, 1991). In particular, hindsight bias, in which knowledge of an outcome leads to inflated estimates of its probability, appears to play a role in PTSD (e.g., Beckham, Feldman, & Kirby, 1998) and is a likely contributor to the characteristic sense of ongoing threat highlighted by Ehlers and Clark (2000). A number of reports in the experimental literature link ease of counterfactual generation to counteracting the hindsight bias as well as other related biases (e.g., Hirt, Kardes, & Markman, 2004).

Conversely, individuals who cannot as easily bring counterfactuals to mind may face a comparative disadvantage in making sense of their trauma experience. Bingham (2003), using a similar verbal fluency methodology to that of the present study to examine prospective positive and negative thinking in suicide attempters, found that participants asked to generate reasons for a positive outcome to a personal difficulty frequently could only generate one alternative, and that alternative was the simple undoing of the difficulty rather than a distinct positive alternative sequence of events. Thus, chronically elevated counterfactual activation may result from repetitively concentrating on a narrow range of available counterfactuals oriented around simple undoing, resulting in an adverse cost-benefit ratio of experienced discomfort relative to successful emotional processing. In this regard, McMullen et al. (1995) argue that counterfactual thinking becomes dysfunctional when only a limited set of highly accessible features is considered and the search for alternatives is terminated prematurely. It might be speculated further that not fully engaging in broad-based counterfactual reconsideration of what has occurred lends itself to maintaining a memory of the event that leaves intact the event’s most fear-inducing elements.

**Strengths and limitations.** A strength of the current study was that participants comprised a naturalistic sample, representing a broad range of experiences and levels of subsequent adjustment. However, a consequent limitation is that none were assessed during the first three months post trauma. In addition, further interview-based diagnoses were not carried out. Both of these limit the comparability of the present result to those of typical research in this area. Another fundamental limitation was the use of a cross-sectional design, which permits only limited inferences regarding a problem such as emotional processing of trauma that unfolds over time.

In summary, the current study was an exploration of the complex role of counterfactual thinking in posttraumatic stress reactions. The study appears to have been potentially successful in drawing together diverse and often contradictory strands from experimental and clinical psychology. The results, which need to be regarded as strictly provisional until replicated within a prospective design, suggest a potential unified framework for understanding the apparent intricacies of counterfactual thought following traumatic life events.

**References**


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