

# What might not have been: an investigation of the nature of counterfactual thinking in survivors of trauma

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## ABSTRACT

**Background.** Counterfactual thinking (CFT) refers to the process of reflecting on an event and changing aspects of it so as to alter the eventual outcome. Such thinking appears frequent in survivors of trauma (e.g. ‘If only I had stayed at home then I wouldn’t have had the accident’), but has received little systematic empirical investigation. Four studies examined the nature of CFT in both trauma survivors and non-traumatized controls.

**Method.** Participants generated CFT to their own trauma or to written scenarios.

**Results.** Three key findings emerged. Firstly, trauma survivors overwhelmingly produced CFT that mutated aspects of their own behaviour during the traumatic event (self-referent CFT) and that improved the event’s outcome (upward CFT; Studies 1 and 2). Secondly, self-referent CFT style in trauma survivors was generalized to non-autobiographical scenarios and was independent of how much control the protagonist in the scenarios had over the outcome. In contrast, never-traumatized controls tended to generate more self-referent CFT to scenarios where the protagonists had some control than to scenarios where the protagonist had little control (Study 3). Thirdly, this self-referent, upward CFT style of trauma survivors was not related to frequency of post-traumatic stress symptoms (Studies 1 and 3) or Posttraumatic Stress Disorder (PTSD) caseness (Study 2).

**Conclusions.** These results are interpreted in terms of a self-referent, upward CFT style that is normative following trauma for all survivors, regardless of levels of trauma-related distress, and that is applied to any negative events that are encountered.

## INTRODUCTION

Recently, there has been a proliferation of interest in the nature and function of particular patterns of thinking reported by individuals who have experienced psychological trauma (e.g. Ehlers *et al.* 1998, 2000; Dunmore *et al.* 1999, 2001). In particular, it has been shown that certain patterns of thinking following trauma predict a poorer long-term prognosis in the form of chronic posttraumatic stress disorder (PTSD). For example, interpreting the

intrusive symptoms of post-traumatic stress as a sign of not coping or of losing one’s mind represents a particularly toxic thought pattern (e.g. Ehlers *et al.* 1998).

One type of thinking pattern following trauma that has received surprisingly little research interest from trauma psychologists is counterfactual thinking (CFT). CFT refers to the interrogation of memory to generate alternative outcomes to past events – to think about what might or might not have been. CFT seems particularly prevalent following negative experiences (Roese, 1997). This suggests that something about CFT might be important or adaptive in processing such experiences and this should also apply to processing traumatic

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events. Furthermore, following negative events, CFT tends to focus on how things could have been better (what is known as upward CFT; Roese, 1994) rather than on how things could have been even worse (downward CFT; Sanna & Turley, 1996). Unsurprisingly, such upward CFT following negative events makes people feel worse (e.g. Markman *et al.* 1993; Roese, 1994, 1997; Medvec *et al.* 1995).

To date no published studies have examined the content of CFT in individuals who have been personally involved in a trauma or the relationship of CFT content to symptoms of post-traumatic stress. However, four published studies speak indirectly to such questions. Davis *et al.* (1995) report two studies in which bereaved individuals who had experienced either the loss of a spouse or child in a motor vehicle accident or the loss of an infant to Sudden Infant Death Syndrome were asked about any upward CFT following the bereavement. Upward CFT following bereavement was frequently reported, and focused on the bereaved's own behaviour (i.e. was self-referent). Moreover, frequency of upward CFT was associated with greater distress.

In two further studies, Dunmore *et al.* (1999, 2001) included CFT as one aspect of a more general questionnaire subscale on 'undoing'. Undoing was more frequent in the month following a violent assault in survivors with PTSD than those with no PTSD. However, undoing did not significantly explain any of the variance in PTSD symptomatology after gender and history/severity variables were controlled for and was not independently associated with persistence of PTSD (Dunmore *et al.* 1999, 2001).

It is not clear from these studies what the predominant direction of CFT following trauma might be as participants were asked only about upward CFT. Furthermore, in the studies by Dunmore *et al.* (1999, 2001) it is not clear whether participants were referring to self-related or non-self-related CFT or to what extent the data that are reported are specifically about CFT as opposed to the forms of undoing. Finally, in none of these studies is it clear whether or how the content of the most frequent CFT relates to distress or symptoms of emotional disorder as the authors only looked at CFT frequency.

Study 1 therefore looked at the content of CFT in those personally involved in trauma and how that content relates to symptomatology.

## STUDY 1

### Method

#### *Participants*

Forty-seven people responded to media advertising for trauma survivors, of whom 37 [22 women; mean age = 47.78 years (s.d. = 12.18)] agreed to participate in the study. All participants had experienced a traumatic event that met Criterion A of a DSM-IV (APA, 1994) diagnosis of a PTSD according to the Structured Clinical Interview for the DSM-IV (SCID; First *et al.* 1997).

#### *Materials and procedure*

Participants were prompted to write down the most prominent and frequent CFT that they had experienced following the event ('After situations like this it is not uncommon to imagine how things might have been different. People sometimes say "If ...". What are the most frequent "If ..." thoughts have you had about the trauma that you experienced?'). Participants were asked to report CFT that had most affected them emotionally.

CFT was coded as self-related/non-self-related and as upward/downward. Self-related CFT was that in which the individual's own action(s) were mutated. Non-self-related CFT was that in which the actions of another individual and/or the configuration of other inanimate aspects of the world were mutated. Upward CFT was where events were mutated to bring about a more favourable outcome. Downward CFT mutated events to bring about a less favourable outcome. So, for example, following a motor vehicle accident, CFT such as 'if only I had driven more slowly, then the crash wouldn't have happened' would be coded as self-related because it mutated the participant's own behaviour and upward because the hypothetical outcome was better than the actual outcome.

Participants completed the Impact of Event Scale (IES; Horowitz *et al.* 1979), a self-report measure of PTSD symptomatology assessing re-experiencing and avoidance/numbing symptom

clusters on two subscales. Participants completed the various measures in a booklet format that was sent to them through the post.

## Results

Participants reported a wide range of traumas. Median time since trauma was 5 years 8 months (range = 6 months to 51 years). The mean IES score of 29.22 (s.d. 19.17) was comparable to that of survivors of the *Herald of Free Enterprise* ferry disaster (mean = 27.02) at 5 years post-trauma (Joseph *et al.* 1996) and higher than the recommended clinical cut-off of 26 (Horowitz *et al.* 1979).

Participants generated a mean of 2.03 (s.d. = 0.93) CFT concerning their trauma. Analyses were conducted on the first CFT generated. CFT from 20% of respondents was coded by a second rater with 100% agreement between raters.

The amount of CFT in the different categories was: self/upward 25 (68%); self/downward 4 (11%); non-self/upward 7 (19%); and, non-self/downward 1 (2%). The distribution of these data differed significantly from that expected by chance,  $\chi^2(3) = 37.7$ ,  $p < 0.001$ .

Participants were divided into two groups based on a median split on the IES. The high-IES group ( $n = 19$ ) had a mean IES score of 44.53 (s.d. = 11.60), comparable with that of a stress clinic population (Horowitz *et al.* 1979). The low-IES group ( $n = 18$ ) had a mean IES score of 13.06 (s.d. = 9.85). The two groups did not differ on age, time since the trauma, sex ratio or education,  $p$ 's  $> 0.3$ .

The amount of CFT for the two groups was: High-IES: self/upward 13 (68%); self/downward 2 (11%); non-self/upward 4 (21%); and, non-self/downward 0 (0%). Low-IES: self/upward 12 (67%); self/downward 2 (11%); non-self/upward 3 (17%); and non-self/downward 1 (5%). Both groups made similar proportions of self-related and non-self-related CFT (Fisher's exact test,  $n = 37$ ,  $p = 1.0$ ). Similarly, there was no support for a relationship between group status and CFT direction (Fisher's exact test,  $n = 37$ ,  $p = 0.66$ ).

## Discussion

Study 1 examined the nature of CFT content in individuals personally involved in a psycho-

logical trauma; 79% of the participants' most frequent CFT following trauma was self-related and 87% of CFT was in an upwards direction. To my knowledge, this is the first study to show that, when given a free rein, trauma survivors will report that their most frequent CFT about their trauma concern things that they could have done to improve the outcome.

The data provided no support for a relationship between CFT content and post-traumatic stress. This was a surprising finding given that Davis *et al.* (1995) found that, in a bereaved sample, the frequency of upward CFT was associated with increased bereavement-related distress. The present data are more consistent with the data of Dunmore *et al.* (1999, 2001) which showed no relationship between the frequency of undoing (a blanket category that included upward CFT) and PTSD, once gender and history/severity variables were controlled for.

However, before we can interpret this lack of a relationship between CFT and post-traumatic stress, three further issues merit clarification. The first concerns the hazards of interpreting isolated null results. For this reason it is important to examine the replicability of the finding in a new sample.

The second issue concerns the possibility that self-referent CFT happened to be the most sensible way for the trauma survivors to reason about the trauma. This would be true if the majority of the events had been directly caused by the trauma survivors' own actions as these actions would then be the most obvious target for CFT. Study 2 therefore only included trauma survivors who were judged as not principally liable for their traumas, and who attributed the occurrence of the traumas to the actions of a third party. This allowed examination of the possibility that self-referent, upward CFT predominates following trauma, even when the trauma survivors do not feel that the trauma was principally a result of their own actions.

The third issue concerns the measurement of psychological distress in Study 1. CFT content might only be related to emotional disorder, for example PTSD caseness. PTSD was not formally assessed in Study 1. Study 2 therefore included trauma survivors with or without a diagnosis of PTSD.

## STUDY 2

### Method

#### Participants

A PTSD group [ $n = 17$ ; 9 men; mean age = 39.47 years (s.d. = 18.51)] and non-PTSD group [ $n = 19$ ; 6 men; mean age = 39.47 years (s.d. = 13.98)] were recruited from Addenbrooke's Hospital, Cambridge, UK. Forty-three individuals were screened and 39 participants were invited to take part in the study of whom 36 agreed (92%).

All participants met DSM-IV Criterion A for PTSD according to the SCID. Only those participants where it seemed clear that the liability for the trauma was non-self-related were included. The coding of self- *v.* non-self liability was rated by a second blind rater for a subset of participants ( $n = 10$ , 28%), with 100% agreement between first and second raters. All of the participants were asked whom or what they blamed most for the trauma. In all cases the principal blame was deemed to be external to themselves. Participants in the PTSD group satisfied the remaining criteria for a SCID DSM-IV diagnosis of PTSD. Participants in the non-PTSD group did not meet criteria for a PTSD diagnosis. Participants were excluded from the study if they had any history of psychotic symptomatology and/or organic brain damage. Additional diagnoses assessed were Major Depressive Disorder (MDD), Adjustment Disorder (AD), and other anxiety disorders. Four of the PTSD group and two of the non-PTSD group met criteria for MDD, one of the non-PTSD group met criteria for AD, and two of the PTSD group and three of the non-PTSD met criteria for a specific phobia.

#### Materials and procedure

The materials and procedure were as for Study 1, except that all participants were assessed with the SCID prior to carrying out the CFT task and all participants were assessed in person rather than by postal questionnaire.

### Results

The two groups did not differ in age [ $t(34) = 0.42$ , n.s., sex ratio,  $\chi^2 = 1.69$ , n.s.], educational background (Fisher's exact test,  $n = 36$ ,  $p = 0.41$ ) or length of time since the trauma [ $t(32) = 1.6$ , n.s.]. The PTSD group had higher mean IES

Table 1. *Patterns of counterfactual thinking (CFT) responding in Study 2 for the Posttraumatic Stress Disorder (PTSD) and non-PTSD groups*

CFT reference/direction	PTSD group ( $n = 17$ )	Non-PTSD group ( $n = 19$ )
Self/upward	12	14
Self/downward	1	1
Non-self/upward	2	3
Non-self/downward	0	0
Other	2	1
Total	17	19

scores than the non-PTSD group: PTSD-mean = 57.12, s.d. = 9.02; non-PTSD-mean = 35.05, s.d. = 22.87;  $t(24) = 3.88$ ,  $p < 0.001$ .

First-generated CFT was coded as for Study 1 CFT for one non-PTSD and two PTSD participants did not fit any of the four categories and these data were set aside.

Two tests of independence were carried out to examine the relationship of group status to both CFT reference and CFT direction (see Table 1). There was no support for a significant relationship either between group and CFT reference (Fisher's exact test,  $n = 33$ ,  $p = 1.0$ ) or between group and CFT direction (Fisher's exact test,  $n = 33$ ,  $p = 1.0$ ). As in Study 1, conflated across groups the data significantly differed from the pattern expected by chance [ $\chi^2(3) = 31.10$ ,  $p < 0.001$ ].

### Discussion

Results from Study 2 replicated the basic finding of the first study and also revealed that trauma survivors whose accounts of their trauma are rated in terms of the trauma being principally the fault of others or of external circumstances still predominantly generate self-related, and upward CFT about the trauma. Indeed, the levels of such CFT are comparable across the two studies. Furthermore, this pattern did not differ statistically as a function of PTSD case-ness, thus providing no support for the view that CFT style differs in individuals with psychiatric levels of symptoms and replicating the essence of the null result from Study 1 of no relationship between CFT content and posttraumatic stress measures.

The fact that the data provide no support for a relationship between the content of CFT

and degree of post-traumatic distress suggest that upward, self-referent CFT, even though it is distressing, is simply normative following trauma.

This possibility has been the focus of some of the theoretical literature on stress response (Horowitz, 1986; Janoff-Bulman, 1992; Dalgleish, in press). For example, Janoff-Bulman (1992) proposed that certain types of thinking in trauma survivors indicate attempts to maintain adaptive pre-trauma core beliefs or schemas; for example, about the controllability of the world. For instance, thinking about how one could have prevented the occurrence of a trauma, however ostensibly irrational any given thought might seem, may maintain a schema that the world is in principal controllable, i.e. that there were things that could have been done to prevent the occurrence of the traumatic event. Therefore, although specific upward, self-referent CFT following trauma may be distressing, it may still be preferable to compromising schemas coding the world as controllable and the self as competent (Roese, 1997).

If it is the case that self-referent, upward CFT following trauma is serving to protect quite general schemas about personal control (Janoff-Bulman, 1992), then such thinking should be evident for all uncontrollable negative events, not just the original trauma. This issue of generalizability was examined in Study 3 in which trauma survivors were compared with controls who reported never experiencing a Criterion A trauma. The two groups were asked to generate CFT to artificial scenarios describing non-autobiographical traumatic events. Some of the scenarios described events rated as potentially highly controllable and some described events rated as potentially highly uncontrollable. In line with Janoff-Bulman's theory the hypotheses were: (1) both groups of participants would generate predominantly self-referent CFT for the highly controllable events, reflecting the fact that there were things that could reasonably have been done by the protagonist to prevent the trauma; (2) the two groups would differ in their proportions of self-referent, upward CFT to the highly uncontrollable scenarios. The never-traumatized controls would generate relatively less self-referent, upward CFT, reflecting the fact that there was little that could have reasonably been done by the protagonist to

prevent the trauma, whereas the traumatized group would generate relatively more self-referent, upward CFT, reflecting the generalization of this style of responding to these non-autobiographical events.

Finally, additional analyses were planned to investigate whether any generalizability of CFT style to non-autobiographical trauma scenarios was related to post-traumatic distress levels.

### STUDY 3

#### Method

##### *Participants*

Seventy-seven trauma survivors from Studies 1 and 2 were re-contacted by post and 65 (97%) responded. Of these, the youngest 30 were included in the main analyses in the study. The reason for selecting the youngest participants was that the control group who had not experienced Criterion A trauma tended to be relatively young, presumably because they had therefore had less time to encounter such an event.

Ninety-two potential controls (university students and members of the department participants' panel) were recruited via advertisements. Of these, 83 (90%) did not meet PTSD Criterion A as assessed by the SCID. Of these 83, the oldest 30 were included in the main analyses in order to maximize comparability in terms of age with the trauma group.

##### *Materials and procedure*

Participants in each group were allocated to one of two conditions – high-control and low-control. There were 15 participants from each group in each condition. In the high-control condition, participants received one of two possible scenarios involving a motor vehicle accident (MVA). The scenario was constructed such that the protagonist appeared to have considerable control over the vehicle and consequently over whether it crashed. The scenarios varied in the level of injury incurred. Approximately half of the participants in the high-control group received each of the scenarios.

In the low-control condition, participants again received one of two possible scenarios, this time involving a freak hurricane. Scenarios were constructed such that the protagonist appeared to have little control over the negative



Table 2. Demographic details and Impact of Event Scale-Intrusion (IES-I) and -Avoidance (IES-A) scores for the four subgroups in Study 3

Scenario condition	Trauma group		Control group		Test statistic	<i>p</i>
	High Control (n=15)	Low Control (n=15)	High Control (n=15)	Low control (n=15)		
Age (years) [mean (s.d.)]	33.40 (8.33)	29.47(7.52)	27.20 (7.49)	27.53 (9.64)	<i>F</i> = 1.77	0.16
Educational status (16:18:C/U:P)	6:2:7:0	2:4:9:0	2:2:8:3	4:3:7:1	Fisher's exact	0.46
Sex ratio (male:female)	6:9	6:9	2:13	5:10	Fisher's exact	0.38
Time since trauma (years) [mean (s.d.)]*	7.91 (7.49)	5.16 (8.99)	—	—	<i>t</i> = 0.90	0.38
IES-I [mean (s.d.)]*	21.27 (7.89)	17.00 (11.02)	—	—	<i>t</i> = 1.19	0.25
IES-A [mean (s.d.)]*	21.87 (9.80)	15.43 (13.02)	—	—	<i>t</i> = 1.51	0.14

16:18:C/U:P=leaving school at 16:leaving school at 18:college/university educated:postgraduate qualification.

\* Data for one participant in the low control condition were missing.

outcome which involved either the same major or minor injuries as the MVA scenarios. Again, approximately half of the participants in the group received each of the two scenarios.

Participants were allocated to a particular condition on a pseudo-random basis with the proviso that trauma-survivors who had been involved in an MVA were allocated to the hurricane condition. The four scenarios are presented in the Appendix.

Following the presentation of the scenario, participants were asked to write down their CFT about it with no time limit specified.

## Results

The demographic details of the participants are shown in Table 2. As can be seen from the table, the subgroups did not differ on age, sex ratio or educational status. Furthermore, the two trauma subgroups were comparable on time since trauma, and on their scores on the Impact of Event Scale.

Participants generated a mean of 1.93 (s.d. = 0.94) CFT. This did not differ across subgroup ( $F < 1$ ). Analyses were conducted on the first CFT generated. CFT was coded as for Studies 1 and 2. A subset of 20 CFT (33%) was coded by a second rater. There was 96% agreement between raters, with the allocation of the one CFT that was differentially coded being agreed after discussion. Analyses comparing the high-physical-injury *v.* low-physical-injury scenarios revealed no effects of injury level ( $p > 0.4$ ),

which was therefore excluded from subsequent analyses.

The patterns of CFT responses across the four age-matched subgroups are shown in Fig. 1. Omnibus tests of independence revealed a significant overall effect involving reference (Fisher's exact test,  $n = 60$ ,  $p < 0.001$ ). This effect was deconstructed using  $2 \times 2$  analyses to test the *a priori* hypotheses that the data would not support a difference between groups on the high-control scenarios but would show that the trauma group exhibited more self-referent CFT than the controls for the low-control scenarios.

As predicted, the data did not support a difference between the trauma and control groups for the high control scenarios (Fisher's exact test,  $n = 30$ ,  $p = 0.48$ ). However, the trauma group produced significantly more self-referent CFT compared to the controls, for the low control scenarios (Fisher's exact test,  $n = 30$ ,  $p < 0.02$ ). The omnibus test for CFT direction was also significant (Fisher's exact test,  $n = 60$ ,  $p < 0.03$ ). As predicted, for high-control scenarios the  $2 \times 2$  test was not significant (Fisher's exact test,  $n = 30$ ,  $p = 0.48$ ). However, the  $2 \times 2$  test was also not significant in the case of low-control scenarios (Fisher's exact test,  $n = 30$ ,  $p = 0.17$ ), although the pattern of results was in the predicted direction.

### *Additional analyses on the whole sample who responded to postal follow-up*

All 65 trauma survivors who responded to postal follow-up were included in a further

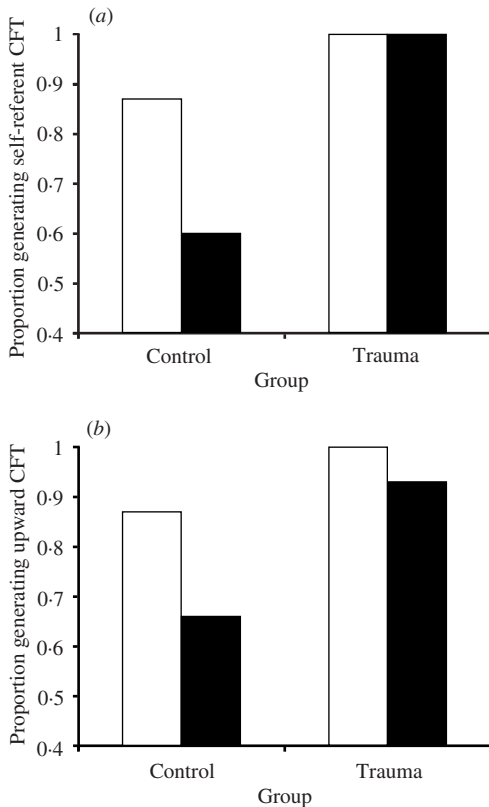


FIG. 1. Proportions of participants generating self-referent (a) and upward (b) counterfactual thinking (CFT) across the two scenario types for the age-matched trauma and control groups in Study 3. □, High control scenarios; ■, low control scenarios.

analysis to examine whether the pattern of generalized responding described above was related to post-traumatic distress. Survivors ( $n=65$ ) were divided into two groups based on a median split on their IES scores. The high-IES group had an IES score  $>40$  [mean = 54.63 (S.D. = 9.14)], somewhat higher than the published norms for a stress clinic population (Horowitz *et al.* 1979). The low-IES group had an IES score  $\leq 40$  [mean = 19.53 (S.D. = 13.18)].

Participants were allocated to one of the two conditions (high-control: MVA scenarios; low-control: hurricane scenarios) at the point of postal contact. The four subgroups; high-IES, high-control ( $n=18$ ; 8 male); high-IES, low-control ( $n=13$ ; 6 male); low-IES, high-control ( $n=17$ ; 6 male); and low-IES, low-control ( $n=17$ ; 6 male), did not differ in terms of age, gender ratio or educational background (lowest  $p=0.67$ ).

Table 3. Patterns of counterfactual thinking (CFT) responding in Study 3 for the four subgroups from the whole sample of trauma survivors

CFT reference/direction	High-IES group		Low-IES group	
	High control ( $n=8$ )	Low control ( $n=13$ )	High control ( $n=17$ )	Low control ( $n=17$ )
Self/upward	14	10	13	14
Self/downward	3	1	2	1
Non-self/upward	1	1	1	2
Non-self/downward	0	1	1	0

IES, Impact of Event Scale.

The patterns of CFT responses across the four subgroups are shown in Table 3. [Again, approximately half of each group received a high-injury scenario and half a low-injury scenario (see Appendix). Analyses examining level of injury revealed no significant effects and this variable was excluded from subsequent analyses.] Omnibus tests of independence revealed non-significant overall effects for both reference (Fisher's exact test,  $n=65$ ,  $p=0.87$ ) and direction (Fisher's exact test,  $n=65$ ,  $p=0.78$ ), suggesting that level of symptomatology is not a significant contributory factor to the pattern of CFT responding.

## Discussion

Study 3 examined the hypotheses that the tendency towards self-referent, upward CFT in trauma survivors following events rated as uncontrollable in terms of their own actions, as shown in Study 2, would generalize to hypothetical (non-autobiographical) traumatic events with a different content, rated in a similar way. The data revealed that trauma survivors, relative to those who had never experienced a (Criterion A) trauma, were indeed more likely to generate self-referent CFT following scenarios rated as highly uncontrollable. In contrast, there was no evidence for a difference between groups in the generation of self-referent CFT to traumas that were rated as highly controllable. This finding did not hold up for CFT direction, although the pattern of results and the interaction effect were significant and similar to that for reference (see Fig. 1). These data also indicate that self-referent CFT is unlikely to be a global response style found in everybody to any negative event,

as the non-traumatized comparison group showed variations in their degrees of self-referent CFT responding as a function of the controllability of the events.

Additional analyses provided no support for the idea that the generalizability of self-referent CFT to non-autobiographical situations was related to levels of post-traumatic distress and this is at least in line with the view that the proclivity to respond to uncontrollable events, real or hypothetical, with self-referent CFT is a function of having experienced a trauma *per se*, rather than as a result of one's reaction to the trauma as indexed by post-traumatic stress symptoms.

An interesting aspect of the data from Study 3 was that, although self-referent CFT responding seems to generalize to non-autobiographical material, this was not the case for upward CFT responding. Arguably, self-referent CFT, irrespective of its direction of comparison, codes self-efficacy or controllability. So, for example, responding to the hurricane scenario along the lines of 'If only I had left town that day, I would have escaped being hurt' (upward) as compared to 'If I had not chosen such a strong house, I would have died' (downward) confers the same level of personal control. In contrast, upward CFT responding is only related to personal control if it is self-referent. So, for example, a thought along the lines of 'If only someone had warned us that the hurricane was coming ...' is unlikely to augment the individual's sense of personal control. This difference between upward and self-referent CFT responding might account for the different strengths of the patterns of results for the two types of CFT here.

#### STUDY 4

A key finding of Study 3 was the fact that the non-traumatized control group did not evidence an upward, self-referent CFT style to low-control scenarios, suggesting that this pattern of CFT is not just a global response style. However, one possible confounding factor was that the trauma survivors' memories of trauma may well have been primed during the task as a function of the recruitment process, whereas, by definition, no such memories were available for priming in the controls (for ethical reasons

trauma survivors had to be informed about the reasons for their selection). It may be the case that the non-traumatized control participants would also have generated upward, self-referent CFT to low-control scenarios if they had been primed with negative events from their own life. If this was true it would cast doubt on the view that such upward, self-referent CFT responding is a function of having experienced a Criterion A trauma.

To examine this potential confound, Study 4 examined the content of CFT generated by unselected student participants who had been primed to think either about negative or about neutral autobiographical events. The hypothesis (based on the possibility that priming was indeed a confound in Study 3) was that priming of highly negative (relative to neutral) autobiographical material might lead to an increase in self-referent CFT responding.

#### Method

##### *Participants*

Participants were 43 unselected undergraduate students (22 women).

##### **Materials and procedure**

The test materials consisted of a two-section booklet. Section A involved instructions to recall an autobiographical event. Control participants were instructed to think of an 'emotionally neutral' event, examples of which were provided. Priming participants were instructed to think of the 'most negative' event that they could. The priming condition group was further subdivided into participants who were instructed to generate a negative event over which they felt they either had little or no control (priming-uncontrollable) or a great deal of control (priming-controllable). After generating an event, participants answered a series of questions concerning their feelings about the event, to ensure a suitable depth of processing.

Section B of the booklet comprised 10 short scenarios describing a variety of aversive occurrences, written in the second person. The participant was then prompted to generate a CFT response so that 'things might have turned out differently'. The scenarios were of three types: uncontrollable highly negative ( $n=3$ ); controllable highly negative ( $n=3$ ); and mildly



negative ( $n=4$ ). The order of the scenarios was randomized but constant across the participants. The scenarios were subjected to independent ratings of event controllability and intensity of emotional content by three independent raters. The uncontrollable scenarios were rated as significantly less controllable than the controllable scenarios and the two sets of highly negative scenarios did not differ from each other on ratings of emotional content but differed significantly from the mildly negative scenarios.

The participants were divided approximately equally across the three conditions: control condition ( $n=5$ ), priming condition-controllable ( $n=14$ ) and priming condition-uncontrollable ( $n=14$ ). The groups were comparable on age, educational status and sex ratio ( $p$ 's  $> 0.2$ ).

## Results

CFT was coded as in the previous studies. There was 100% agreement on CFT reference and direction across two blind raters.

Analyses revealed no differences in patterns of CFT responding between the two priming subgroups (controllable, uncontrollable) who were therefore conflated in the analyses reported, thus giving two groups: a control condition group and a priming condition group.

The patterns of CFT responding for the mildly negative, highly negative-uncontrollable, and highly negative-controllable scenarios across these two participant groups are presented in Fig. 2.

Two 2 (Group)  $\times$  3 (Scenario Type) repeated measures, analyses of variance (ANOVA) were conducted on the CFT data with, respectively, the proportions of self-referent CFT and of upward CFT as the dependent variables. The analysis of self-referent CFT revealed a significant effect of Scenario Type [ $F(2, 82) = 24.40$ ,  $p < 0.0001$ ], which was qualified by a Scenario Type  $\times$  Group interaction [ $F(2, 82) = 3.17$ ,  $p < 0.05$ ]. The main effect of Group was not significant ( $F < 1$ ). Three independent sample  $t$  tests comparing the two groups for each scenario type separately were performed to test the *a priori* hypotheses. The only near-significant result was a very weak trend for the priming group to generate less self-referent CFT to the uncontrollable scenarios compared to the

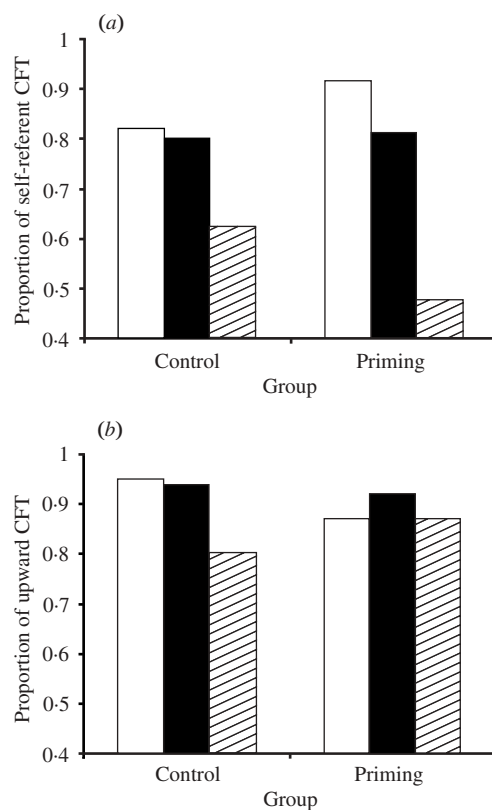


FIG. 2. Proportions of self-referent (a) and upward (b) counterfactual thinking (CFT) across the three scenario types for the priming and control group in Study 4. □, Highly negative, controllable scenarios; ■, mildly negative scenarios; ▨, highly negative, uncontrollable scenarios.

controls [ $t(41) = 1.64$ ,  $p = 0.11$ ]. Because the data pushed the assumptions regarding normality, sphericity and homogeneity of variance required for ANOVA, these key paired comparisons to test the *a priori* hypotheses were repeated using non-parametric Mann–Whitney tests. The pattern of data was unchanged with participants in the priming group exhibiting a weak trend to generate less self-referent CFT to uncontrollable scenarios relative to participants in the control group ( $U = 149.00$ ,  $p = 0.10$ ).

The upward CFT ANOVA revealed a significant effect of Scenario Type [ $F(1.66, 68.13) = 3.42$ ,  $p < 0.05$ ] (see Fig. 2). (Degrees of freedom have been Greenhouse–Geisser corrected due to violations of the sphericity assumption for ANOVA.) However, this effect of Scenario Type was not qualified by a significant Scenario

Type  $\times$  Group interaction [ $F(1.66, 68.13) = 2.02$ , n.s.]. There was again no effect of Group ( $F < 1$ ).

### Discussion

The results of Study 4 indicated that priming of memories of negative autobiographical events does not seem to increase the likelihood of generating self-referent CFT in response to other non-autobiographical trauma scenarios, relative to a neutral-prime baseline, in an unselected sample. Indeed, if anything there was a tendency for the opposite to be true. This casts doubt on any suggestion that the pattern of findings in Study 3 was a function of differential priming across groups.

### GENERAL DISCUSSION

The four studies reported here revealed three key findings.

(1) Trauma survivors, from a range of Criterion A traumas (APA, 1994), exhibited a strong tendency to generate self-referent, and upward CFT concerning their own trauma when asked to report their most frequent CFT (Studies 1 and 2). This was true even for traumas where objective assessment of the survivors' accounts suggested that liability for the trauma did not lay with the survivors themselves and where the survivors blamed a third party for the occurrence of the trauma (Study 2).

(2) The self-referent CFT bias found in trauma survivors generalized to other non-autobiographical, uncontrollable traumas (Study 3). This was not the case with never-traumatized controls. This suggests that experiencing a Criterion A trauma, *per se*, has pervasive effects on basic cognitive processing that extend beyond the original trauma material.

(3) There was no support for either the tendency to generate upward, self-referent CFT to the individual's own trauma or for the generalization of this thinking style to other uncontrollable hypothetical traumas to be related to either levels of self-reported post-traumatic distress (Studies 1 and 3) or to PTSD caseness (Study 2). In summary, trauma survivors (irrespective of their post-traumatic stress symptom profile) tend to report upward, self-referent CFT when prompted about both their own trauma and (unlike never-traumatized controls) about other uncontrollable negative events.

It is important to comment on how the present data tie in with the study of Davis *et al.* (1995) on bereavement discussed in the Introduction. Davis *et al.* found a relationship between upward CFT and distress, whereas the present data showed no such relationship. One possible explanation for these discrepant findings is simply that it is the frequency and intrusiveness of upward CFT (as measured by Davis *et al.*), rather than the content of the most frequent CFT (as measured in the present study), that relates to symptomatology. However, it is important to note that the present data only provided no support for a relationship between relatively simple categorizations of CFT content and measures, specifically, of PTSD symptomatology or caseness. It may be therefore be the case that the strength of other emotions (not directly assessed by such PTSD measures) are a function of variations in CFT content across individuals. For example, shame and guilt are predictive of later distress in trauma survivors (Andrews *et al.* 2000) and these emotions might reasonably be expected to relate to self-referent, upward CFT. Alternatively, it is possible that the present CFT coding categories are too inclusive. For instance, self-referent CFT can vary in how 'reasonable' it is in the context of what actually happened, over and above the simple measure of liability assessed here in Study 2. It may be that such variation in the appropriateness of CFT is what relates to measures of psychopathology. These are areas that merit future research.

### ACKNOWLEDGEMENTS

Parts of this research were presented at the 13th Annual Meeting of the International Society for Traumatic Stress Studies, Montreal, November 1997, and the 27th Annual Conference of the British Association for Behavioural and Cognitive Psychotherapies, Bristol, UK, July 1999. This research was funded by the Medical Research Council of Great Britain. The author has no financial involvement or affiliation with any organization whose financial interests may be affected by material in the paper, or which might potentially bias it. Thanks are due to Keith Davies, Caroline Moss, Jacqui Wood and Jenny Yiend for help with data collection and coding.

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## APPENDIX

## The four scenarios used in Study 3

(1) *Low control (high injury)*

The town you are living in is hit by freak hurricane-like winds. There is enormous property damage. As a result of damage to your house you break 27 bones in your body, you are in traction for 9 months and you are left with a permanent disability.

(2) *Low control (low injury)*

The town you are living in is hit by freak hurricane-like winds. There is enormous property damage. As a result of damage to your house, you fracture a leg and have to stay at home for a couple of weeks after which you recover completely.

(3) *High control (high injury)*

You are driving your car along a winding road when, going round a bend, you lose control of the car and crash into the tree. In the accident you break 27 bones in your body, you are in traction for 9 months and you are left with a permanent disability.

(4) *High control (low injury)*

You are driving your car along a winding road when, going round a bend, you lose control of the car and crash into the tree. In the accident you fracture a leg and have to stay at home for a couple of weeks after which you recover completely.