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Relatives' expressed emotion (EE) and PTSD treatment outcome

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ABSTRACT

Background. Expressed emotion (EE) is a measure that has been used to assess the quality of the relationship between patient and their key relative. It has been shown to be strongly predictive of clinical outcome in a range of psychiatric and medical disorders. This study investigated the effect of EE on treatment outcome in chronic post-traumatic stress disorder (PTSD).

Methods. A prospective design was adopted. The key relatives of 31 PTSD patients participating in a treatment trial comparing imaginal exposure with cognitive therapy were interviewed and rated on EE prior to treatment allocation. The effect of EE on post-treatment clinical outcomes was assessed.

Results. Sixteen patients (52%) had high EE and 15 (48%) low EE relatives. Patients with high EE relatives showed lesser change scores on the main outcome variable of the trial, the total CAPS score, and on all the secondary outcome variables than those with low EE relatives. Using different multiple regression models the EE scales of criticism and hostility predicted just under 20% of the outcome variance. These two scales were highly correlated and criticism marginally predicted the greatest variance (19·7%).

Conclusions. The results highlight the importance of the quality of the patient's social environment in influencing their response to cognitive and behavioural treatments.

INTRODUCTION

There can be little doubt that the home environment and the nature of the relationship that a traumatized individual has with their significant others is likely to exert a strong influence on their recovery and response to treatment. However, there has been little research on this topic in PTSD research even though a methodology exists that has received considerable attention in other areas of mental health. The measure of expressed emotion (EE) has been used widely in psychiatric research to assess the quality of the relationship between the patient and their relative, carer or significant other. The measure was originally developed with family members of schizophrenic patients (Leff & Vaughn, 1985) and was used to predict outcome in these patients. There now exists a considerable literature showing that EE predicts the course of schizophrenia (Kavanagh, 1992; Bebbington & Kuipers, 1994; Butzlaff & Hooley, 1998). EE is assessed from a semi-structured audio-taped interview, known as the Camberwell Family Interview or CFI (see chapter 2 of Leff & Vaughn, 1985 for a detailed description of the CFI) conducted by a trained rater with the relative or significant other. The interview is so structured as to give the respondent opportunity to express their feelings about the patient or aspects of their behaviour without the use of leading or direct questions. Two types of information are obtained, one on events and activities and the other on attitudes and feelings. From the audio-tape of the interview it is possible to rate the five operationalized scales that constitute the measure of EE. These scales are: criticism or critical comments; hostility;

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marked emotional over-involvement (EOI); warmth; and positive comments. Special attention is paid to the emotional tone of the respondent's utterances as well as their content when rating the audio-tape. It is possible for a trained rater to achieve satisfactory reliability on the overall classification of EE and ratings on the five scales. Three of the five scales, criticism, hostility and EOI, are used to classify the respondent as either high EE or low EE. Each of these three scales has a threshold and if this is reached on one or more of these scales then the respondent is classified as high EE. The respondent is classified as low EE by default if none are reached. Details of the development and rating of EE are described by Leff & Vaughn (1985).

The measure of EE has been most widely used in prospective studies to predict outcome in schizophrenia. Returning to live with a high EE relative after discharge from hospital has been consistently shown to be associated with significantly higher relapse rates in more than 20 studies (Kavanagh, 1992). This finding has been demonstrated as substantial and robust over 12 months (Butzlaff & Hooley, 1998) and the effect has been reported up to 8 years post-discharge (Tarrier *et al.* 1994). EE was thought to reflect the quality of the emotional atmosphere in the home environment. Psychophysiological studies carried out both in the patients home and in the laboratory found that patients exposed to the presence of a relative rated as high EE would show increased levels of electrodermal arousal whereas those exposed to the presence of a low EE relative showed decreases in arousal (Tarrier *et al.* 1979, 1988). These results were interpreted as demonstrating that patients were sensitive to the atmosphere created by their relative and that this environment could have an impact on the physiological reactions of the patient. Living or having close contact with a high EE relative, who behaved in a critical, hostile, or over-involved manner would result in chronic and accumulating stress.

Research and theory about the attributions of relatives of the mentally ill suggest that the relatives' beliefs about the nature and symptomatology of the disorder may help explain differences in relatives' response to the patient (Greenley, 1986; Brewin, MacCarthy *et al.* 1991; Weissman *et al.* 1993; Barrowclough *et al.* 1994; Barrowclough & Parle, 1997). These studies suggested that high EE critical relatives tend to be more likely to view the patient's behaviour as problematical and to attribute the cause of behaviour as due to factors that are personal and internal to the patient. Hostile relatives also perceive that the patient's behaviour was controllable by the patient whereas over-involved relatives believed that the patient's behaviour was caused by factors external and beyond their control (Barrowclough *et al.* 1994). It has been suggested that such beliefs held by the relative would mediate different coping strategies (Greenley, 1986; Hooley *et al.* 1987; Barrowclough *et al.* 1994). Attributions explaining problem behaviours as being internal to, and controllable by, the patient lead to attempts to coerce the patient back to a normal level of functioning. While the idea that the patient cannot help themselves because their problem results from factors outside of their control lead to strategies of taking control and doing things for the patient (Barrowclough *et al.* 1996). Hence it can be hypothesized that if high EE is a proxy measure of coercive or over-controlling response styles on the part of the relative it would be detrimental to the recovery of patients suffering from PTSD.

Although the vast majority of studies have been carried out with schizophrenia there is an increasing literature on the predictive value of EE and other psychopathology. In a meta-analysis Butzlaff & Hooley (1998) concluded that EE was a robust predictor of outcome in mood disorders and eating disorders and was actually a better predictor of outcome in these two disorders than for schizophrenia. The CFI and EE measure have also been used to study other disorders and clinical problems, such as: depression, bipolar disorder, eating disorders, alcohol abuse, agoraphobia, obsessive–compulsive disorder, personality disorder, conduct and psychiatric disorders in children, Alzheimer's disease and dementia, mental handicap, asthma, childhood epilepsy, haemophilia, diabetes, rheumatoid arthritis, cardiac surgery, Parkinson's disease, and bowel disorders (Wearden *et al.* 1999).

In an earlier paper (Tarrier, 1996) it was argued that EE was potentially an important measure that could be used in the investigation of PTSD. The modification of the CFI for use

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with the significant others of PTSD patients was described as were the preliminary findings, including acceptable inter-rater reliability, of a sample of PTSD patients and their key relatives. There are a number of reasons that can be advanced as to why EE could be pertinent to PTSD research: (*i*) the evidence that social support has an ameliorating action on the long-term effecs of trauma (Green *et al.* 1985; Keane *et al.* 1985); (*ii*) the disruptive effect that living with a traumatized individual can have on significant others and the family (Solomon *et al.* 1987; Verbosky & Ryan, 1988; Jordon *et al.* 1992; Riggs *et al.* 1998); (*iii*) psychiatric morbidity in traumatized populations being predicted by family instability and quality of relationship with the partner (Romans *et al.* 1995; King *et al.* 1996); (*iv*) the iterative nature of stressful interactions between traumatized patient and stressed relative; (*v*) the possible action of a critical or hostile relative in reinforcing negative schema in traumatized patients and of a warm and supportive relative in assisting in the processing of a traumatic experience; (*vi*) clinical reports that working with war veterans suffering from PTSD and their families can be beneficial (Figley, 1990; Rabin & Nardi, 1991; Glynn *et al.* 1995); (*vii*) the finding in schizophrenia research that the presence of a high EE relative can result in elevated levels of autonomic arousal (Tarrier *et al.* 1979, 1988; Tarrier & Turpin, 1992) given the central importance of arousal symptoms in PTSD; and (*viii*) findings from EE research indicating that high EE relatives behave in a more intrusive and negative way towards the patient compared to low EE relatives (Strachan *et al.* 1986*a*, *b*; Hahlweg *et al.* 1989). Thus, contact with a high EE relative may be supposed to have a detrimental effect on a patient suffering from PTSD while living with a low EE relative may facilitate recovery.

The number of methodologically robust controlled clinical trials of psychological treatments of PTSD is relatively small but there is encouraging evidence that cognitive–behavioural treatments such as *in vivo* and imaginal exposure, stress inoculation, cognitive re-structuring are effective (Keane *et al.* 1989; Foa *et al.* 1991; Resick & Schnicke, 1992; Vaughan *et al.* 1994; Marks *et al.* 1998). However, there is little evidence from these studies that any one technique was consistently superior to the others. Thus, it is important to investigate other factors, such as the psychosocial environment of the patient reflected by the EE of key relatives, which may influence treatment outcome. Furthermore, should EE be found to influence outcome it could be used as a basis to intervene with the patient and their relative so as to change the adverse effects of the home environment.

This present report was part of a larger study, which investigated the relative efficacy of imaginal exposure and cognitive therapy in the treatment of chronic PTSD (Tarrier *et al.* 1999). It was hypothesized that the EE of the key relative would have an impact on outcome in patients receiving behavioural or cognitive treatment for PTSD. Specifically, that patients living, or having regular contact, with key relatives rated as high EE would show less improvement over treatment on outcome measures than those living with low EE relatives.

METHOD

Design

This study was part of a randomized controlled trial in which possibly suitable patients were referred from primary and secondary health services and appropriate voluntary services such as Victim Support in the north west of England. Once referred and informed consent had been obtained the patients underwent an initial quick screening interview to assess the likelihood of them meeting the project entry criteria. If they were assessed as probably suitable then they underwent the full assessment procedure (Assessment 1). Patients who fulfilled the following entry criteria were entered into Stage 1 of the study: a DSM-III-R diagnosis of PTSD elicited by the Clinician Administered PTSD Scale (CAPS, Blake *et al.* 1990) (retrospective analysis indicated all patients would also have met DSM-IV criteria); duration of PTSD of at least 6 months but not more than 10 years; childhood sexual abuse was not the index trauma; not suffering from a psychotic or organic brain illness; not suffering from alcohol or substance abuse as a primary problem; if receiving psychotropic medication then medication must have been constant for 3 months prior to entry to, and for the duration of, the study; not re-

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ceiving any concurrent psychological or psychosocial intervention and not having received any type of cognitive–behavioural intervention in the 6 months preceding referral.

Since our pilot work had found that simply monitoring symptomatology was sufficient to bring about improvements in some patients so that they no longer met criteria for PTSD 'caseness' (Reynolds & Tarrier, 1996) Stage 1 of the project involved 4 weeks of self-monitoring, which consisted of the patient keeping daily recordings of their symptoms and attending weekly out-patient appointments to discuss their monitoring records. At the end of this period patients were re-assessed and those who remained PTSD 'cases' at this assessment (Assessment 2), as defined by the CAPS, were entered into the trial. At Stage 2 patients who were PTSD 'cases' were allocate through a process of minimization stratified on: trauma category; duration of PTSD (6–24 months, 24–120 months); gender; whether they were receiving psychotropic medication, to either treatment by cognitive therapy or by imaginal exposure. Treatment consisted of 16 sessions of 1 hour duration and was followed by post-treatment assessment (Assessment 3) and follow-up at 6 (Assessment 4) and 12 months (Assessment 5) after the post-treatment assessment. The results of this treatment trial and follow-up are reported in another paper (Tarrier *et al.* 1999). At Assessment 1 patients were asked to identify their key relative, who was defined as a person they lived with, or lived close to, with whom they had frequent contact and close emotional ties. The key relative of those patients who were able and willing to identify one was then interviewed using the CFI. The interview was carried out and rated by an experienced EE rater (N.T.). Thus, interviews and ratings of EE were made prior to treatment allocation.

Sample

Sixty-two patients suffering from PTSD completed treatment. The key relative of 43 patients were interviewed using the CFI and of these 31 were of patients who entered and completed therapy. Of the remaining 31 patients who completed therapy, 14 did not have a key relative and 17 either refused to allow their key relative to be interviewed, the key relative refused to be interviewed or failed repeatedly to attend for interview. Twelve patients whose key relative were interviewed initially either dropped out of the trial (9), or improved during monitoring (3) and were not included further. This paper reports on the 31 patients who completed therapy.

Participants

Of the 31 patients: 16 (52%) were male; their mean age was 36·3 years (S.D. 10·2); their mean age at which they finished full-time education was 16·3 years (S.D. 1·7); 26 (84%) were married; 26 (84%) were employed at the time of the trauma although only 5 (16%) were currently working; 17 (55%) were not taking medication; 23 (74%) were involved in a compensation claim. Different types of trauma had been experienced: 14 (45%) had been the victim of crime, 1 (3%) the victim of a sexual crime, 13 (42%) the victims of accidents and 3 (10%) in some other trauma; 22 (71%) had experienced a traumatic incident that lasted 60 min or less; 23 (74%) had symptoms of 12 months duration or more with 9 (29%) of 3 years or more; and 3 (10%) experienced delayed PTSD.

Of the 31 relatives: 21 (68%) of relatives were female, their mean age was 37·1 years (S.D. 9·1), 23 (74%) were spouses, 4 (13%) were parents and 4 (13%) were other family members or friends; and they had a mean face-to-face contact time with their key relative of 42·3 h (S.D. 24·6) with 13 (42%) having less than 36 hours contact per week. None of the relatives had been directly involved in the traumatic incident.

Assessment

Structured Clinical Interview for DSM-III-R (SCID-R)

The SCID-R (Spitzer *et al.* 1987) was used to assess co-morbid disorders and was completed at Assessment 1 only. The following clinical outcome assessments were carried out with the patient at each assessment.

Clinician Administered PTSD Scale (CAPS)

The CAPS (Blake *et al.* 1990) is an interview schedule, from which a total severity score for PTSD symptoms was computed by adding the severity and frequency score for each symptoms.

Impact of Events Scale (IES)

The IES (Horowitz *et al.* 1979) is a 15-item questionnaire which assesses an individual's

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response to a traumatic event. Two scales of Intrusions and Avoidance are derived from the responses.

Penn Inventory

The Penn Inventory (Hammarberg, 1992) is a 26-item questionnaire that assesses PTSD symptomatology. Each item is scored from 0 to 3 and a total score derived.

General Health Questionnaire (*GHQ*)

The GHQ-28 (Goldberg & Williams, 1988) is a 28-item questionnaire used to assess the respondent as a 'psychiatric case'. Each item is scored as absent or present and a total score of $\geqslant 5$ is indicative of 'caseness' or the presence of a psychiatric disorder.

Beck Depression Inventory (*BDI*)

The BDI (Beck, 1988) is a 21-item questionnaire to assess depression. Each item is scored 0 to 3 and a total score derived.

Beck Anxiety Inventory (*BAI*)

The BAI (Beck, 1990) is a 21-item questionnaire to assess anxiety. Each item is scored 0 to 3 and a total score derived.

The CAPS and questionnaire assessments were administered at each assessment. One patient refused to complete the questionnaires at Assessment 3 although they agreed to be interviewed with the CAPS. The total score on the CAPS was regarded as the main outcome measure with the questionnaire measures as secondary. Assessments were carried out by assessors blind both to the treatment allocation of the patient and to the EE status of the relative.

Camberwell Family Interview (*CFI*)

The CFI (Leff & Vaughn, 1985; Vaughn & Leff, 1976*b*) was conducted with the patient's key relative at Assessment 1. The interview is semi-structured and covers the following areas: household composition and time budgets of family members; psychiatric or illness history; current problems and symptoms, with special emphasis on irritability and areas of conflict between the patient and respondent or other family members; general activities of household members; and the quality of the relationship between patient and respondent and takes approximately 90 min to complete. The EE scales are: criticism, hostility, emotional over-involvement (EOI), warmth and positive remarks.

A trained rater administered the interview and rated the EE scales from the audio-tape. Raters undergo intensive training in administering the CFI and rating the EE scales, which involved rating test tapes to an acceptable reliability. The rater in this project (N.T.) was trained in 1981 and has extensive experience in the use of the CFI and rating EE. Inter-rater reliability on randomly selected tapes was good with 100% agreement on overall EE status and correlations of scale scores of: critical comments ($r = 0{\cdot}75$), hostility ($r = 1{\cdot}0$), EOI ($r = 0{\cdot}95$), warmth ($r = 0{\cdot}97$) and positive remarks ($r = 0{\cdot}55$).

The conventional scoring of the scales was used to classify EE, that is: $\geqslant 6$ critical comments and/or the presence of hostility and/or a score of $\geqslant 3$ on EOI (see Tarrier, 1996). Warmth and positive remarks do not contribute to the classification of EE as either high or low but by convention they are rated as they may have intrinsic value in themselves. Thus, the EE measure allows comparison as a dichotomous measure, high or low, and also analyses of the individual scales.

RESULTS

Initial expressed emotion status

The relatives of 43 patients initially completed the CFI of these 21 (49%) were high EE and 22 (51%) low EE. Of this group of 43 patients, 31 went into Stage 2 of the project and completed treatment and of these 31 the relatives of 16 (52%) patients were rated as high EE. There was a mean rating of 4·7 (S.D. 5·5, range 0 to 22) critical comments with 11 (36%) rating high EE on critical comments alone. Eight relatives (26%) rated high on hostility, with four being rated on generalization alone and four on rejection and generalization. Eight relatives (26%) rated high EE on EOI. The mean rating for warmth was 2·8 (S.D. 1·4) with nine (29%) scoring 4 or 5 on the 0 to 5 warmth scale. The mean score for positive comments was 1·2 (S.D. 1·5), with 13 (42%) making no positive comments.

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Correlation between EE and individual scales

Correlations (Spearman's rho) were performed on the EE measure and scales on the full set of 43 interviews. The overall EE rating was significantly correlated with critical comments ($r = 0{\cdot}68$, $P = 0{\cdot}000$), hostility ($r = 0{\cdot}66$, $P = 0{\cdot}000$) and EOI ($r = 0{\cdot}64$, $P = 0{\cdot}000$) but not warmth and positive comments. This is as would be expected as only these first three scales classify EE. Critical comments were very significantly correlated with hostility ($r = 0{\cdot}77$, $P = 0{\cdot}000$), moderately correlated with EOI ($r = 0{\cdot}349$, $P = 0{\cdot}02$) and showed a moderate negative correlated with warmth ($r = -0{\cdot}38$, $P = 0{\cdot}012$) but showed no significant correlation with positive comments. Hostility showed a moderate negative correlation with warmth ($r = -0{\cdot}39$, $P = 0{\cdot}01$) but no significant correlations with EOI or positive comments. EOI, warmth and positive comments were not significantly correlated with each other.

Comparison of patients with interviewed and non-interviewed key relative

Comparison of clinical outcome measures of patients who completed treatment and whose relative was and was not interviewed were made at Assessment 1 to ascertain whether these groups differed in any way on the dependent variables at the start of the study. Comparison was made between those patients whose relative was interviewed, those who had no key relative and those who refused to be interviewed. There were no significant differences except on the IES ($F(2, 59) = 3{\cdot}85$, $P = 0{\cdot}03$), *post hoc* test (Tukey-HSD) indicated a significant higher score for interviewed compared to no key relative (means; interviewed 56·2, no key relative 45·4). It was therefore concluded that patients with an interviewed relative did not differ systematically from the general population of patients in the study.

Comparison between EE and clinical outcomes

To investigate the possibility that EE was a response to some characteristic of the patient, analyses were carried out to test whether patients with high EE relative were different from those with low EE relative. These comparisons were made at both the assessments that occurred prior to treatment (Assessment 1 and 2). There were significant differences between patients with high and low EE relatives on the BDI ($t = 2{\cdot}19$, df = 29, $P = 0{\cdot}037$) and BAI ($t = 2{\cdot}34$, df = 29, $P = 0{\cdot}027$) at Assessment 1. There were no other significant differences between high and low EE groups at Assessment 1 or 2 which indicated that there were no systematic clinical differences between the two patient groups. The scores on both the BDI and BAI were higher for the Low EE group which was contrary to the prediction that a high EE response would be evoked by greater severity of psychopathology. Therefore, it is possible to conclude that High EE relatives are not simply reacting to the more severely disordered patient.

The influence of EE on treatment outcome

To investigate whether EE influenced treatment outcome a series of comparisons were made between the high and low EE groups on the clinical outcome measures. This was done by comparing the EE groups on the change scores from Assessment 1 to 3 which represented the change over treatment. Assessment 1 was used to compute the change score since it was the baseline measure taken just prior to the CFI whereas Assessment 2 would have been made sometime after the CFI. However, comparisons were made between the two pre-treatment assessments and there were no significant changes in this group of patients between Assessments 1 and 2. Statistical analyses indicates that there was a significant difference between high and low EE groups on the main outcome measure the CAPS total score ($t(29) = 2{\cdot}14$, $P = 0{\cdot}041$). Comparison of the secondary measures using Bonferroni modification for multiple comparisons indicated the following comparisons were significant at the $P < 0{\cdot}05$ level: IES Intrusions ($t(28) = 2{\cdot}68$); BDI ($t(28) = 3{\cdot}35$); BAI ($t(28) = 3{\cdot}13$). The outcome measures for different EE groups are displayed in Table 1.

The influence of the EE scales on treatment outcome

To investigate the possible influences of a range of variables on treatment outcome analyses were carried out to investigate the contribution of predictor variables to the change in the main outcome variable, the CAPS total severity score. A number of variables representing demographic

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Table 1. *Means and standard deviations (in parentheses) of assessment measures at baseline (A1 and A2) and post-treatment (A3) assessments and the change scores over treatment (A1–A3) for PTSD patients with high and low EE key relatives*

	High EE ($N = 16$)				Low EE ($N = 15$)			
	A1	A2	A3	Change scores	A1	A2	A3	Change scores
CAPS total	67·6 (17·3)	71·9 (13·1)	52·7 (19·2)	14·9 (26·6)	71·3 (14·4)	74·9 (14·6)	41·9 (18·6)	29·5 (16·3)
Penn	45·4 (11·1)	44·9 (9·0)	35·4 (9·2)	9·8 (13·7)	49·3 (11·1)	46·5 (13·8)	29·6 (11·6)	19·7 (17·4)
IES-I	26·5 (7·9)	24·2 (9·1)	18·2 (7·4)	8·0 (8·8)	29·3 (5·6)	27·3 (7·2)	13·3 (9·2)	15·9 (9·2)
IES-A	27·7 (7·7)	26·5 (7·8)	21·3 (8·6)	6·1 (10·7)	29·1 (4·8)	25·2 (6·9)	14·7 (9·9)	14·3 (12·5)
BDI	23·4 (8·9)	22·4 (8·5)	19·3 (8·6)	4·1 (11·0)	30·9 (10·2)	29·7 (12·3)	15·2 (10·1)	15·7 (13·2)
BAI	22·6 (9·4)	22·9 (12·5)	20·8 (11·0)	1·9 (13·0)	31·9 (12·4)	29·1 (12·3)	16·1 (9·5)	15·7 (13·9)
GHQ (28)	15·5 (6·7)	17·3 (7·5)	11·5 (8·3)	4·3 (12·2)	16·1 (8·2)	17·3 (8·6)	6·7 (8·3)	9·3 (9·6)

and characteristics of the patient, illness variables, characteristics of trauma; details of therapy, and characteristics of key relative, which could have contributed to the dependent variable were selected. Because of the relatively low subject numbers associated variables were blocked in groups of four or five. These variables were: age; age finished full time education; gender, current and past employment status; psychiatric history; marital status; nature of household; number of children; compensation claim; level of baseline impairment; duration of symptoms; time since trauma; type of therapy; duration of therapy; number of therapy sessions attended; number of missed therapy sessions; assessed level of motivation for treatment; type of trauma; and, level of threat during trauma. Of these variables only the nature of the household, the number of missed therapy session and type of trauma were significantly correlated with the dependent variable at the 5% level. However, in a stepwise regression none of these variables significantly contributed to the variance of the dependent variable. Similarly, characteristics of the key relative, gender, age and number of face-to-face contact hours did not contribute significantly. Analyses were then carried out to examine whether EE and the separate scales were significant contributors to the dependent variable. The frequency of critical comments, hostility, and EE were significantly correlated with the dependent variable, the number of positive comments approached significance and EOI and warmth were not significantly correlated. In a stepwise regression the model was significant ($F(1, 29) = 8{\cdot}26$, $P = 0{\cdot}0075$) and hostility was the only variable entered (multiple $R = 0{\cdot}471$, adjusted $R^2 = 0{\cdot}195$) indicating that hostility alone contributed to 19·5% of the treatment outcome. Because the number of hostile respondents was relatively low and because hostility is strongly associated with criticism in the EE literature a multi-stage regression analysis was performed in with critical comments being forced into the equation followed by hostility. The model showed a significant effect for critical comments ($F(1, 29) = 8{\cdot}16$, $P = 0{\cdot}0078$; multiple $R = 0{\cdot}469$, adjusted $R^2 = 0{\cdot}193$) with hostility failing to add significantly to the model. Because the scales were skewed this analysis was repeated with a natural logarithmic transformation of the variable critical comments. This model was also significant for critical comments ($F(1, 29) = 8{\cdot}36$, $P = 0{\cdot}0072$; multiple $R = 0{\cdot}473$, adjusted $R^2 = 0{\cdot}197$) with hostility being forced as the second variable the level of significance of the model decreased ($F(2, 28) = 4{\cdot}96$, $P = 0{\cdot}014$) although the amount of variance in the dependent variable that was explained slightly increased (multiple $R = 0{\cdot}512$; adjusted $R^2 = 0{\cdot}21$). The correlation between the transformed variable of critical

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comments and hostility was high ($r = 0{\cdot}703$, $P = 0{\cdot}000$). Critical comments when entered alone in a stepwise regression as a dichotomous variable (i.e. high EE, $\geqslant 6$ comments *v.* low EE, $\leqslant 5$ comments) was a weaker predictor of outcome ($R^2 = 0{\cdot}107$) than when entered as a continuous variable.

The CAPS measure is an interview-based measure so to verify whether similar results would be found on a self-report measure a similar stepwise regression was performed entering the EE scales as predictor variables and the change scores in the Penn Inventory as the dependent variable. The model was significant ($F(1, 29) = 6{\cdot}91$, $P = 0{\cdot}014$) with critical comments as the only significant variable entered (multiple $R = 0{\cdot}45$, adjusted $R^2 = 0{\cdot}174$).

It can be concluded that criticism and hostility are significant predictors of treatment outcome in terms of change in PTSD symptoms as measured by interview and self-report. These variables are highly correlated and each explains just under 20% of the variance of the outcome measure however when added together into the regression model the two variables together do not add anything extra to the predictive power of the model. A theoretical position and the fact that critical comments when transformed explain marginally the greatest variance would suggest that critical comments are the strongest predictor of outcome. Furthermore, there are no other variables that significantly explain treatment outcome.

DISCUSSION

The results were as predicted. On a range of assessments that measure PTSD and other symptoms patients living, or having close contact, with a low EE relative showed significantly greater improvement over treatment than patients with a high EE relative. The only variables that were significant predictors of the comprehensive measure of PTSD symptomatology were those of the hostility and criticism. Thus, the quality of the relationship between the patient and their relative appears to have a significant effect on the patient's response to treatment. Clearly, this study has its limitations, the sample size is small, the number of relatives displaying hostility is low and it is possible that this subsample is not representative. However, these limitations must be balanced against some methodological strengths. Such as, the prospective design and the outcome assessments being carried out by assessors unaware of the EE ratings, the sample size being comparable to some of those reported in the schizophrenia literature (Kavanagh, 1992), the failure to find significant differences between other patients in the study who did not have accessible relatives when compared to this subsample and the fact that this finding is consistent with literature describing the robust finding that EE is associated with outcome in a range of other psychiatric and psychological disorders.

The important dimensions of EE appear to be scales of hostility and criticism. This is not surprising since in the EE literature criticism and hostility are thought to be very strongly related and the essential constituents of the high EE response. Hostility rarely occurs in isolation and without high levels of criticism and could be considered as being a more toxic manifestation of extreme criticism. Emotional over-involvement is the third scale that will result in a categorization of high EE if present to a marked degree, but it is probably functionally different from criticism and hostility (Barrowclough *et al.* 1994) and considered benign by some (Hogarty *et al.* 1986). The results suggest that it is the negative quality of the relationship with the relative that is important in reducing the effects of treatment rather than the positive aspects of enhancing treatment.

A weakness of EE research has been that it has been largely empirically rather than theoretically driven. Robust theoretical explanations of what processes, psychological or otherwise, are at play have been slow to develop and account either for the specific effects of EE with a particular disorder or why EE appears to be associated with a wide range of psychopathologies. What factors could be operating to cause those patients who have critical or hostile relatives to do less well from treatment? They do not appear to be more severely disturbed or symptomatic so it can be assumed that it is a result of their contact with their relative rather than because they are more severely disordered. There are some pointers from the EE literature mainly based on schizophrenic patients. Assuming that the attribution process and coping

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behaviour of relatives to be broadly similar in PTSD patients' relatives to those of relatives of schizophrenic patients a similar process of beliefs about the causes of problems and consequential behaviour on the part of the relative will result. Such negative interactions will result in elevated levels of autonomic arousal. Although the nature of symptoms and their proximal underlying processes may be very different in schizophrenic and PTSD patients the importance of the arousal system and its activation in maintaining symptoms in PTSD patients is highly probable. Thus, the home environment and the quality of the relationship could impair the habituation of arousal, which may be the expected benefit of psychological treatment. The second way in which EE may be influential is that contact with a critical or hostile relative may reinforce and persistently activate negative schema held by the patient and impair their ability to assimilate the meaning of the trauma that would be occurring as part of therapy. In the previous analysis of the content of critical comments made by relatives of PTSD patients (Tarrier, 1996) some relatives complained of the patient's excessive preoccupation with the trauma and they appeared to be unwilling to allow the patient to talk about their experience or they felt the patient was not doing enough to help themselves. Relatives also criticize the patients for being withdrawn and their general lack of activity and response (Tarrier, 1996), which is consistent with Riggs *et al*.'s (1998) report that relationship distress in PTSD veterans and their partners was correlated with the severity of the PTSD symptoms, particularly emotional numbing.

How relatives come to form particular explanations of problem behaviours is unknown, possibly aspects from their own personal history may influence this. Anecdotally, patients felt that they were not supported or understood by their key relative. There are parallels here with the depression research, in which it has been demonstrated that during interactions high EE relatives are more critical, disagree more frequently and are less accepting of what the patient has to say, whereas patients are less likely to self-disclose to high EE relatives (Hooley, 1986). Thus, patients' beliefs that it is harmful to experience emotions, that they are going mad or have something intrinsically wrong with them or that they should suppress their emotions and pull themselves together may be reinforced by contact with a high EE relative. These influences within the patient's social environment could conspire against the endurance of treatment benefit. Unfortunately, we did not take other measures of emotional distress, which may have elucidated information about relatives' coping responses (cf. Barrowclough & Parle, 1997).

It may be possible that the relatives themselves could be suffering from secondary traumatization as a result of their contact with the traumatized patient and this would explain their irritability and reluctance to be empathic. However, if this was true high levels of EOI would be predicted since distress and personalization would contribute to this rating but neither were exceptionally high EOI ratings found nor was EOI significantly related to poorer treatment response. Thus, there appears little support for this hypothesis from the current data. Thus, a secondary traumatization is unlikely to explain the high EE response in these relatives.

In schizophrenia research the EE studies have had a major impact on the treatment of schizophrenia through the development and evaluation of family interventions, which have been repeatedly found to significantly reduce relapse rates (Mari & Striener, 1994). If the finding of EE influencing outcome in PTSD is robust then a comprehensive treatment approach will need to accommodate the potential effects of the relative on the patient and intervene at a family level. In support of this Glynn *et al*. (1995) have reported on the modification of behavioural family management, an intervention developed in the treatment of schizophrenia, in which the difficulties experienced by veterans with combat-related PTSD and their families are addressed through family education, communication training and family problem-solving training. The measure of EE is basically a research instrument but the CFI can supply a wealth of clinical information. This information can be used as a basis for an individualized assessment to pin-point a families' problems, including depressed mood in carers, and to formulate intervention strategies to directly and specifically address them. Family interventions based on EE, as a treatment strategy with PTSD patients could well be

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productive, especially if such interventions improve engagement and attendance at therapy.

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