

Expressed Emotion and Relapse of Psychopathology

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Abstract

Expressed emotion (EE) is a measure of the family environment that predicts worse clinical outcomes for patients with a range of disorders. This article describes the assessment of EE and the evidence linking EE to clinical relapse in patients with psychopathology. This is followed by consideration of the possible explanatory models that might account for the EE-relapse link and a review of the evidence suggesting that EE may play a causal role in the relapse process. The results of studies describing the effect of EE on patients, as well as cross-cultural aspects of the construct, are highlighted. Finally, the possibility that high levels of EE may stress patients by perturbing activity in neural circuits that underlie psychopathology is considered and new directions for EE research are outlined.

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INTRODUCTION

Rates of relapse are notoriously high for many forms of psychopathology. These relapses are costly and they exact an emotional toll on patients and their families (Almond et al. 2004).

EE: expressed emotion

The early identification of patients who are at high risk for relapse after remission from an episode of illness is clearly important for both theoretical and practical reasons. Moreover, greater understanding of the factors involved in the relapse process not only holds the potential to inform us about the nature of vulnerability, but also provides information that is essential for the development of new clinical interventions.

Given the strong biological basis of many forms of psychopathology, it may at first seem surprising that one of the most consistent predictors of psychiatric relapse across a broad range of disorders is a measure of the family environment that is called expressed emotion (EE). It is important to keep in mind, however, that psychosocial variables are capable of affecting not only the structure and the functioning of the brain, but also the occurrence or the timing of gene expression (Fish et al. 2004, Kandel 1998, Weaver et al. 2006). Biological, psychological, and social variables have reciprocal influences. A growing body of evidence suggests that these factors interact to affect the onset or clinical course of mental disorders (see Caspi et al. 2003, Tienari et al. 2004).

Before we begin our discussion, one point warrants emphasis. Although this article describes a family variable that has been reliably linked to psychiatric relapse, there is no evidence that families cause disorders such as schizophrenia. Indeed, in a longitudinal study, Tienari and his colleagues (2004) have demonstrated that family difficulties, including high levels of criticism, do not predict the development of schizophrenia in adopted children who have no genetic risk for the disorder. However, when children who are at high genetic risk for the disorder (by virtue of a having a mother with schizophrenia) are adopted into dysfunctional families, they are much more likely to develop schizophrenia later than if they were raised in a more healthy family environment. This suggests that people's genotypes may make them more or less sensitive to certain aspects of their

environments (see Caspi et al. 2003). What is particularly exciting about Tienari's work, however, is that when children with a genetic risk for schizophrenia were raised in a well-functioning family, the probability that they would later develop schizophrenia was the same as it was for children who had no genetic risk. This speaks to the protective role healthy families can play, even in the face of high genetic risk.

EXPRESSED EMOTION

Origins and Measurement

The EE construct was developed in the 1960s by George Brown, a British sociologist. In an early study, Brown and his colleagues noted that male patients with schizophrenia did better clinically if they left the hospital to live, not with wives or parents, but with siblings or in lodgings (Brown et al. 1958). This led Brown to consider the possibility that something about family relationships might be important with respect to relapse in schizophrenia. Over the next several years, Brown, working with Michael Rutter, addressed the problem of how to measure the "range of feelings and emotions to be found in ordinary families" (Brown 1985, Brown & Rutter 1966, Rutter & Brown 1966). Of note here is that it was the more commonplace aspects of family relationships that were thought to be important, rather than relationships that were unusual or deeply disturbed. The result was the development of the EE construct (Brown et al. 1972).

Expressed emotion is assessed through a semistructured interview called the Camberwell Family Interview (CFI; see Leff & Vaughn 1985). The interview is named after the Camberwell area of London, which is where the research team was located and where many of the patients and families in the early studies lived. The CFI is conducted with a patient's family member in the absence of the patient. It typically takes 1–2 hours, and it is always audiotaped for later coding. Designed to facilitate a conversation with the

EXPRESSED EMOTION

Expressed emotion, which is assessed through an interview with a key family member (parent, spouse, etc.), is a measure of how much criticism, hostility, or emotional overinvolvement the relative expresses when speaking about a family member with psychopathology. Although it is measured in an individual, it is thought to reflect disturbances in the organization, emotional climate, and transactional patterns of the entire family system.

relative, the CFI contains questions about the development of the patient's psychiatric difficulties as well as questions about specific symptoms. The CFI also focuses on how the relative deals with difficult situations involving the patient and how the relative gets along with the patient more generally. Ratings of EE are derived not only from what the family member says but also from the voice tone that the relative uses when speaking about the patient.

The key elements of EE are criticism, hostility, and emotional overinvolvement (EOI). Critical remarks reflect obvious dislike or disapproval of some aspect of the patient's behavior (e.g., "He's always sleeping. It's very annoying."). Critical remarks can be rated on the basis of their content or because of a particularly negative voice tone that is used to describe a situation involving the patient. Hostile remarks, like criticism, also reflect dislike or disapproval. However, in the case of hostility there is a more generalized critical attitude and dislike of the patient as a person (e.g., "He's very lazy—he won't do anything unless you make him."). Rejection of the patient is also evidence of hostility. Finally, EOI reflects a dramatic, exaggerated, or overprotective attitude on the part of the relative toward the patient. This is reflected in an intrusive style when dealing with the patient or in the relative's extreme emotional distress during the interview (e.g., "I won't leave him alone if I can avoid it. I worry constantly.").

CFI: Camberwell Family Interview

EOI: emotional overinvolvement

EOI is more commonly noted in parents than it is in spouses (Goldstein et al. 2002).

After approximately two weeks of training, coders are able to rate the elements of EE quite reliably. Training is important, however. When psychiatrists familiar with the EE construct were asked to guess the EE status (high versus low) of their patients' relatives (with whom they were familiar), they performed no better than chance (King et al. 1994).

Relatives are classified as high in EE if they make an above-threshold number of critical remarks, or show any evidence of hostility, or score high (3 or more) on a 0–5 scale of EOI. However, the most important component of EE is criticism—an observation made by Brown et al. 1972 and repeatedly confirmed by researchers in subsequent studies. For family members of patients with schizophrenia, making six or more critical remarks warrants a high EE classification. For relatives of patients with unipolar depression, however, a lower cutting score (two or three critical remarks) is used. It is also important to note that, in addition to rating criticism, hostility, and EOI, coders also note how much warmth the relative expresses when talking about the patient and how many positive comments he or she makes about the patient. Warmth is rated on a 0–5 scale; for positive comments a frequency count is used. However, neither of these ratings is considered in the overall (high versus low) EE assessment. This is because, in the first prospective study of the association between EE and relapse, very low warmth tended to be associated with high rates of criticism, and very high warmth was associated with high levels of EOI (see Brown et al. 1972). Unfortunately, this has led to a general neglect of the role of warmth in families (see Lopez et al. 2004 for an exception).

On first inspection, the procedures that are used to determine a high- versus low-EE classification may appear somewhat arbitrary. However, the reason that EE is a composite variable based on ratings of criticism, hostility, and EOI is because these scales predicted an increased likelihood of relapse in Brown's

seminal study (Brown et al. 1972). Brown did explore the consequences of using different cutting scores for criticism. However, the best separation (based on statistical criteria) between relapsing and nonrelapsing patients came when a cutoff of seven critical comments was used. Vaughn & Leff (1976) subsequently replicated Brown et al.'s results using the original cutting score for criticism, but further refined the classification and reduced the cutoff to six critical remarks, again based on statistical considerations. Because this cutting score has been associated with positive findings in many other studies (see Butzlaff & Hooley 1998), there has been little effort on the part of EE researchers to conduct the kinds of statistical modeling studies that might provide data supporting other approaches.

An inherent assumption in the traditional approach to EE classification is that something is qualitatively different about families who score above or below the specified critical comment threshold. Although many studies have provided empirical support for this assumption, dichotomizing EE (as opposed to using critical comment frequency as a continuous variable) does create problems. First, it gives the impression that low-EE families are experiencing few difficulties and are therefore not in need of any help. As a result, such families are typically not offered family-based treatments or provided with support, even though they may benefit from them (Linszen et al. 1996). Second, adopting a dichotomous classification of EE restricts the range of the variable in statistical analyses. It is therefore perhaps surprising that EE predicts relapse as well as it does. Although the predictive power of (dichotomous) EE and critical comment frequency has not been subjected to any systematic empirical scrutiny, correlations scattered throughout the EE literature do suggest that EE might actually be better as a threshold construct than criticism is as a continuous variable. For example, in a study of relapse in alcohol-abusing patients, O'Farrell et al. (1998) reported that the correlation between critical

comments and relapse was 0.31. However, the correlation between EE and relapse was 0.36. Similarly, in Hooley et al.'s (1986) study of relapse in patients with unipolar depression, the correlation between criticism and relapse was not as large as the correlation between EE and relapse ($r = 0.40$ and $r = 0.52$, respectively).

Alternative Measures of EE

The CFI is the gold standard measure for the assessment of EE (Hooley & Parker 2006). The vast majority of the work that has been conducted to validate the EE construct has employed the CFI, and this instrument is undoubtedly the assessment measure of choice. However, the extended period of training (two or more weeks) that is required to learn to rate EE combined with the long duration of the CFI (1–2 hours) and time taken to code the interview (2–3 hours) has led some researchers to seek quicker forms of assessment. Although there is still no fully acceptable alternative, a few instruments warrant mention.

One of the most frequently used alternative measures of EE is the Five Minute Speech Sample (FMSS; Magaña et al. 1986). As its name suggests, the FMSS simply requires the relative to talk about the patient for five uninterrupted minutes. This measure is widely used by researchers studying childhood psychopathology (e.g., Asarnow et al. 1993, Hirshfeldt et al. 1997, Peris & Baker 2000). It has also been employed, with mixed success, in studies involving adult patients with schizophrenia and bipolar disorder (Jarbin et al. 2000, Marom et al. 2002, Tompson et al. 1995, Uehara et al. 1997, Yan et al. 2004). Although coding the FMSS still requires a period of training, one advantage it has over the CFI is that it takes only 5 minutes to administer and about 20 minutes to code. These benefits must be weighed, however, against the tendency of the FMSS to under-identify high-EE relatives (see Hooley & Parker 2006 for a review).

For schizophrenia researchers, two questionnaire measures, the Level of Expressed

RELAPSE

Relapse is a measure of outcome that reflects a clinically significant return of symptoms based on an independent assessment with a structured clinical interview. Relapse is not based on rehospitalization, although many patients who do relapse will be admitted to the hospital. This is because rehospitalization can be influenced by other factors, including how willing the family is to manage the patient at home.

Emotion Scale (LEE; Cole & Kazarian 1988) and the Family Attitude Scale (FAS; Kavanagh et al. 1997) have some demonstrated validity. For other disorders (e.g., mood disorders, anxiety disorders, and substance abuse), the very short (one question) Perceived Criticism measure (see Hooley & Teasdale 1989) appears to be capable of predicting patients at high risk for poor clinical outcomes. Nonetheless, two recent reviews have concluded that the CFI remains the measure of choice for the assessment of EE (Hooley & Parker 2006, Van Humbeeck et al. 2002).

EXPRESSED EMOTION AND RELAPSE

Schizophrenia

Efforts to understand the clinical outcomes of patient with schizophrenia provided the original impetus for the development of the EE construct. In light of this, it is perhaps not surprising that the vast majority of work on EE has concerned patients with this disorder. Numerous studies, conducted with patients from all over the world, have repeatedly demonstrated that EE (assessed using the CFI) is a reliable predictor of relapse for schizophrenia. When patients with schizophrenia return home from the hospital to live in family environments that are high in EE, they have a risk of relapse that is more than double that of patients living in low-EE homes. A meta-analysis conducted by Butzlaff &

FMSS: Five-Minute Speech Sample

PTSD:

posttraumatic stress disorder

Hooley (1998) examined 27 prospective outcome studies and resulted in a weighted mean effect size of $r = 0.31$ for the association between EE and relapse in schizophrenia. Moreover, although EE is a risk factor for relapse even for patients who have recently developed the disorder, patients who have more chronic and long-standing illnesses are at even greater risk of relapse when they live in high-EE home environments.

Mood Disorders

At least seven studies have used the CFI to examine the association between family levels of EE and relapse in patients with major mood disorders such as unipolar and bipolar depression. All but one (Hayhurst et al. 1997) have shown a positive association between EE and relapse. The meta-analysis study of Butzlaff & Hooley (1998) reported a weighted mean effect size of $r = 0.39$ for the association between EE and relapse in depression using a cutting score of two critical comments to define high EE and an effect size of 0.45 when a cutting score of three critical comments was used. Including the data from Hayhurst et al. (1997) reduces this latter effect size to 0.39, which is still highly significant (see Hooley & Gotlib 2000).

It is worth noting that, although the majority of relatives of patients with schizophrenia are parents, most of the relatives of patients with depression tend to be spouses. The fact that EE still predicts relapse when nonbiological relatives are involved and when the diagnosis is not schizophrenia is important. Goldstein et al. (1992) have previously suggested that high EE could be a behavioral manifestation of the schizophrenia genotype that is measured in the biological relatives of patients. If this were the case, it could explain why high levels of EE in family members are associated with greater risk of relapse in patients. However, this genetic model of EE is seriously challenged by data linking EE with relapse in depression and by the finding that high levels of EE in nonbiological rela-

tives (e.g., spouses) are predictive of patient relapse.

Anxiety Disorders

Not all studies that have explored the association between EE and clinical outcome have used relapse as a dependent measure. In studies of patients with anxiety disorders, researchers have examined the role of EE in the prediction of outcome after treatment with behavior therapy.

Tarrier et al. (1999) used the CFI to assess EE in the relatives (mostly spouses) of patients with posttraumatic stress disorder (PTSD). Consistent with the findings for schizophrenia and depression described above, both criticism and hostility were predictive of patients doing less well at post-test after being treated with imaginal exposure. In contrast, Peter & Hand (1988) reported that patients with agoraphobia who lived with spouses who were rated as critical on the CFI had *better* clinical outcomes 1–2 years after a behavioral (exposure) intervention than did patients whose spouses were low on criticism. This rather counterintuitive finding was later replicated in outpatients suffering from either agoraphobia or obsessive-compulsive disorder who were treated with exposure therapy (Chambless & Steketee 1999). Although criticism was associated with a more positive clinical outcome, patients did not do well when they lived in family environments that were high on hostility (see Chambless & Steketee 1999). Finally, for patients receiving cognitive behavior therapy for social phobia, EE was unrelated to treatment outcome, although there was a trend toward patients with relatives who were rated as high in EOI to do worse (Fogler et al. 2007).

These findings are interesting because they suggest that the impact of criticism may be different for patients with different types of psychopathology. Although patients with schizophrenia, mood disorders, and PTSD tend to fare more poorly in the face of high criticism, this does not seem to be the case for patients with agoraphobia

and obsessive-compulsive disorder. Both Chambless & Steketee (1999) and Peter & Hand (1988) have suggested that perhaps critical spouses pressure anxious patients to confront anxiety-provoking stimuli more than would otherwise be the case. By not tolerating avoidance, these critical spouses may actually be helping patients engage in exposure on a routine basis, hence facilitating improvement after treatment. This may not happen for PTSD patients with critical spouses because of the imaginal (versus in vivo) nature of the exposure. It may also not happen when patients are receiving therapy that has a more cognitive focus, as was the case in the study of Fogler et al. (2007).

Eating Disorders

In addition to schizophrenia and anxiety and mood disorders, research into the predictive validity of EE has also included patients with eating disorders or disordered eating patterns. Fischmann-Havstad & Marston (1984) reported that married women who had lost at least 15 pounds over the previous year were more likely to relapse and gain weight again if they lived with spouses who were high in EE (based on three or more critical comments). Higher levels of parental criticism also predicted worse clinical functioning of patients with anorexia nervosa after six months of therapy (LeGrange et al. 1992) and predicted less-favorable outcomes in bulimia nervosa patients at the end of a six-year follow-up (Hedlund et al. 2003). Patients with anorexia nervosa and bulimia nervosa were more likely to drop out of outpatient family treatment prematurely if their parents were high rather than low in EE (Szmukler et al. 1985). An association between EE and reduced treatment compliance was also reported by Flanagan & Wagner (1991) for severely obese patients.

The studies described above vary with respect to the nature of the patients' problems and the type of outcome measure used. However, taken together, the findings suggest

that family levels of EE are good predictors of treatment compliance, early treatment outcome, and long-term clinical outcomes for patients with eating disorders or weight problems.

Substance Use Disorders

The first extension of the EE construct to the course of alcoholism was conducted by Fichter et al. (1997). Using a cutting score of four or more critical comments to determine high EE, these researchers noted an association between high levels of EE and more relapses at a six-month follow-up. The number of critical comments made by the family member (most typically a spouse) was also related to a shorter time until relapse occurred. O'Farrell et al. (1998) subsequently reported that male patients who received behavioral marital therapy designed to promote abstinence fared much worse over the course of a one-year follow-up when they lived with a high- versus a low-EE spouse. More specifically, men with high-EE spouses (i.e., those who made more than the median number of six critical comments) were more likely to relapse, had a shorter time to relapse, and spent more days drinking in the 12-month follow-up than did men with low-EE spouses. Finally, in the only study of dually diagnosed patients to date, Pourmand et al. (2005) reported that for patients with both psychosis and substance abuse, EE was the strongest univariate predictor of relapse of all the variables examined.

Personality Disorders

EE is most typically studied in the context of Axis I disorders. However, one study has reported on the association between EE and clinical outcome in patients with an Axis II disorder. Hooley & Hoffman (1999) measured EE in the family members of hospitalized patients who were diagnosed with borderline personality disorder. Patients received follow-up for one-year after they had been discharged from the hospital, and EE was used to predict

the clinical outcome of patients during this time. Contrary to prediction, neither criticism nor hostility was associated with how patients did clinically over the follow-up period. Patients whose relatives were critical of them did just as well as patients who had families who made few criticisms. Moreover, patients whose families were rated as high in EOI actually did better than did patients whose families showed low levels of EOI. This was a surprising finding because, for mood disorders and schizophrenia, EOI is typically associated with relapse.

Findings such as these highlight the importance of considering patient factors in understanding the EE-relapse relationship. Although all high-EE relatives are people who express high levels of criticism, hostility, or marked emotional overinvolvement, the ways in which these attitudes and behaviors are perceived and experienced by patients vary. For patients with schizophrenia or mood disorders, high levels of criticism and high levels of EOI are associated with relapse. When the diagnosis is borderline personality disorder, however, criticism is unrelated to relapse and EOI is an indicator of a better longer-term outcome. Understanding how different types of psychopathology moderate the impact and the meaning of critical or overinvolved behaviors on the part of relatives is clearly an important topic for future research.

EVIDENCE OF CAUSALITY

Methodological Issues

In the prototypical EE and relapse study, symptoms are assessed during follow-up using structured clinical interviews. This allows relapse to be determined on the basis of increases in symptom severity. From a methodological perspective, it is important that rehospitalization not be used as a measure of relapse because this could be confounded with EE. For example, if high-EE relatives are less tolerant of symptoms, they may make efforts to have the patient readmitted to the hospital

when, under the same clinical circumstances, low-EE relatives might allow the patient to remain at home.

Even with this methodological issue addressed, however, the presence of a reliable correlation between EE in relatives and unfavorable clinical outcomes in patients does not permit us to conclude that EE plays a causal role in the relapse process. Although it is possible that high levels of EE cause vulnerable patients to relapse, it is also plausible to suggest that some of the illness characteristics of relapse-prone patients might engender criticism in family members. If this were the case, EE could be associated with relapse and yet play no causal role.

Even in the very early research studies, investigators were attentive to this possibility. Brown et al. (1972) observed that patients with more severe behavioral or work impairments were more likely to relapse than were patients who had fewer problems in these areas. Patients with more behavioral or occupational difficulties were also more likely to have high-EE relatives. However, even when these factors were statistically controlled, EE remained a significant predictor of patients' clinical outcomes. Subsequent studies that have controlled for potentially important patient variables have further confirmed the independent contribution that is made to relapse by EE (e.g., Nuechterlein et al. 1992).

Intervention Studies Involving EE

Although the question of directionality is not fully resolved, the hypothesis that EE may play a causal role in the relapse process is consistent with the findings of treatment studies. Rates of relapse in patients (who are already taking medications) are greatly reduced when families also receive interventions that are designed to reduce aspects of high-EE behavior (e.g., Hogarty et al. 1991, Leff et al. 1982). Typically, such interventions involve providing relatives with education about the illness as well as improving communication skills and problem solving.

When families receive interventions of this kind, 6- to 12-month relapse rates for patients with schizophrenia are around 12.5% (range 0%–33%) compared with relapse rates averaging 42% (range 17%–61%) for patients whose families do not receive such interventions (Miklowitz & Tompson 2003). There is also evidence that family-based interventions improve clinical outcomes for patients with bipolar disorder (Miklowitz et al. 2003) and anorexia nervosa (Eisler et al. 2000). Family interventions can also be successful when conducted with several families at once rather than in a single-family format (e.g., McFarlane et al. 1995, Schooler et al. 1997).

The success of family-based interventions in reducing patients' relapse rates supports the idea that EE may play a causal role in the relapse process. However, care must be taken to avoid an overly simplistic and unidirectional view of EE (see Hooley et al. 1995 for a review). Family-based interventions may benefit families in many ways, and changes in EE are not always necessary for patients to show clinical improvement (see Miklowitz 2004). That EE is a bidirectional construct is now widely accepted (see Hooley et al. 1995, Hooley & Gotlib 2000). Far from being a construct that blames families, EE is perhaps best regarded as "a measure of a set of *patient-relative relationship problems* that are important for the relapse process" (Hooley et al. 2006b). As Miklowitz (2004) has noted, "EE may reflect disturbances in the organization, emotional climate, and transactional patterns of the entire family system, even if it is only measured in a single caregiver."

WHY DO HIGH-EE ATTITUDES DEVELOP?

The measure of EE that researchers obtain from a single relative almost certainly reflects the product of the interaction between the relative and the patient. Conceptualizing EE in this way thus requires a consideration of the characteristics of relatives that might make

them more likely to become critical, hostile, or emotionally overinvolved when they have to cope with a psychiatrically impaired family member. In a similar vein, it also calls for a consideration of the characteristics of patients that might present challenges to relatives and thus engender the development of high-EE attitudes in those who are inclined to respond in this way. This type of formulation allows us to move beyond simple trait-versus-state notions of the EE construct and acknowledges the mutual influences of relatives' characteristics and patient factors in the development of this relational variable.

Patient Factors that Contribute to High-EE Attitudes

It might be expected that relatives would be more critical of patients who are more severely ill or who have more symptoms of psychopathology. However, this is generally not the case (Brown et al. 1972, Cutting et al. 2006, Heikkilä et al. 2002, Hooley et al. 1986, Miklowitz et al. 1988, Nuechterlein et al. 1992, Vaughn & Leff 1976). Levels of psychopathology in patients who have low-EE relatives are quite comparable to levels of psychopathology in patients who have high-EE relatives. EE in relatives is also unrelated to the gender of the patient (Davis et al. 1996). Stated simply, EE does not appear to be a simple reaction to specific characteristics of patients. The fact that two relatives of the same patient can sometimes have different levels of EE is further evidence of this (Weisman et al. 2000).

However, although there is notable absence of consistent findings across studies, some isolated reports do link EE to characteristics of patients. Of course, care needs to be taken to avoid relying on relatives' reports here, because these could be correlated with EE for other reasons (the more overwhelmed and upset relatives are, the more they may report problems). Even so, higher levels of criticism have sometimes been linked to patients showing more aggressive or

delinquent behavior (Brown et al. 1972) or being less engaged in productive activities such as work (Bentsen et al. 1998, Brown et al. 1972). There are also reports of patients in high-EE families having worse social functioning (Barrowclough & Tarrier 1990) or showing greater irritability (Karno et al. 1987) as well as manifesting other impairments or difficulties (see Hooley et al. 1995 for a more thorough review). Running counter to this general trend of patients in high-EE families having more problems are the reports of better premorbid adjustment (Linszen et al. 1997) and the higher levels of cognitive functioning in patients from high- versus low-EE homes (Bentsen et al. 1998).

When the EE literature is considered overall, there do not appear to be any reliable and specific clinical differences that discriminate between patients from high- and low-EE families. Instead, what may be important is that patients are experiencing symptoms and showing a decline in their functioning. Families are therefore trying to cope with patients whose behavior, for a variety of reasons, may be more difficult and challenging to manage than it was before. Circumstances such as these demand accommodations from close relatives. The willingness and ability of relatives to make such accommodations may underlie the development of high-EE attitudes.

Characteristics of High-EE Relatives

High- and low-EE relatives differ from each other in ways that may have considerable implications for how they try to manage psychopathology in a close family member. For example, Hooley (1998) has reported that high-EE relatives tend to have a more internal locus of control for their own behavior than do low-EE relatives. In other words, they tend to take an active role in managing their own life problems and difficulties. Low-EE relatives, in contrast, are more fatalistic. Moreover, on self-report measures of personality, high-EE relatives tend to score in ways that suggest they are more conscientious

(King et al. 2003) as well as less tolerant and less flexible in their approach to life than are low-EE relatives (Hooley & Hiller 2000). This lack of tolerance may also be self-directed, and could explain Docherty et al.'s (1998) finding of higher levels of self-criticism in high- versus low-EE relatives.

Other researchers note that high-EE relatives report feeling more burdened in the caretaking role than do their low-EE counterparts and experience more distress (Barrowclough & Parle 1997, Scazufca & Kuipers 1996, Tarrier et al. 2002). However, the possible overlap between high-EE behavior and the voicing of subjective distress is important to keep in mind here. Tarrier et al. (2002) failed to find significant associations between EE and levels of salivary cortisol (an objective measure of stress) in the relatives of patients with Alzheimer's disease. Moreover, although high EE was associated with relatives reporting that patients had more symptoms, no patient differences were found across levels of EE when independent clinicians rated symptoms (Tarrier et al. 2002). Taken together, these findings suggest that high levels of EE may serve to identify relatives who are suffering more and experiencing more difficulty in the caretaking role. This may be because, unlike low-EE relatives, they have personalities that make them less able to accept the status quo and because they are inclined to adopt a more hands-on as opposed to a more relaxed coping style.

It warrants mention that high-EE relatives do not have more individual psychopathology than low-EE relatives do. Although it is plausible to suggest that high-EE relatives are more negative in their attitudes toward patients because they have higher levels of depression, no empirical support for this hypothesis has been found. Goldstein et al. (2002) conducted clinical interviews with relatives and examined the association between EE and the presence of current or past DSM-IV psychopathology. There was no evidence of any link. This suggests that personality rather than psychopathology is most

important. As Leff & Vaughn presciently noted many years ago:

A critical response depended less on the degree of the patients' disturbance than on the relative's own personality. If a relative was easy going, he or she tended to adopt a non-critical stance. If a relative was typically tense or moody when stressed, the strain of coping with someone psychiatrically ill could result in feelings of anger. (Leff & Vaughn 1985, p. 67)

Attributions and EE

If high-EE relatives are less tolerant, less flexible, and more confident in their ability to take action to manage problematic situations, what are the implications of this for the patients with whom they live? Hooley (1985) was the first to suggest that high levels of EE (particularly criticism) might be linked to a desire on the part of relatives to get the patient to behave differently and that this might be linked to controlling behavior on the part of the relative. This idea was later developed into a model of EE based on attributions (see Hooley 1987).

Central to the attribution model of EE is the idea that high- and low-EE relatives differ in their underlying beliefs about why patients might be experiencing problems or difficulties and what should be done about it. Even when they accept that the patient has a severe mental illness, high-EE relatives tend to be more likely to believe that more could be done to exert some control (however minimal) over a problematic situation to improve things. Accordingly, they have higher expectations for patients, make more attributions of control in situations involving the patient, and become more frustrated and controlling in their own behavior when patients fail to behave in the ways that relatives think would be helpful.

Empirical tests of this model of EE suggest that it has considerable validity (see Barrowclough & Hooley 2003 for a review). Several investigators have examined the spon-

taneous speech of the relatives of patients with schizophrenia and coded it for its attribution content. When they were discussing problem situations involving the patient, high-EE relatives of patients with schizophrenia were more likely than low-EE relatives to make attributions to factors they believed were controllable by patients (Barrowclough et al. 1994, 2005; Brewin et al. 1991; Weisman et al. 1993). Similar findings have also been reported for the high-EE relatives of unipolar and bipolar depressed patients (Hooley & Licht 1997, Wendel et al. 2000). Using a self-report measure, Hinrichsen and colleagues (Hinrichsen et al. 2004) have also shown that blaming attributions are associated with high levels of EE in the family members of depressed older adults.

BEHAVIOR OF HIGH- AND LOW-EE RELATIVES

A major assumption in the early research on EE was that the critical attitudes expressed by relatives during the course of a private interview were reflective of their behavior when they interacted with patients. Studies have now demonstrated the concurrent validity of EE for schizophrenia (Hahlweg et al. 1989, Miklowitz et al. 1995), unipolar depression (Hooley 1986), bipolar disorder (Miklowitz et al. 1995), and anxiety disorders (Chambless et al. 2006).

In the typical study, patients and their family members are videotaped during a face-to-face interaction and independent raters subsequently code their behaviors. Using this design, researchers have demonstrated that high-EE relatives are more critical during face-to-face interactions with patients than are low-EE relatives (Hahlweg et al. 1989, Hooley 1986, Miklowitz et al. 1995). They also tend to disagree with patients more readily and they show lower levels of accepting behavior (Hooley 1986). Moreover, not just the relatives are negative. Interactions involving high-EE relatives are characterized by more reciprocal negativity and less positive

reciprocity than those involving low-EE relatives (Hahlweg et al. 1989, Hooley 1990, Simoneau et al. 1998). This means that regardless of whether the patient or the relative initiates a negative behavior, a negative interaction sequence is much more likely to be prolonged if a high-EE family member is involved. When interactions involve low-EE family members, however, negative interaction sequences are less likely to start and, once begun, are quickly terminated.

CHANGES IN EE OVER TIME

If EE is a relational construct that signifies problems in the patient-relative relationship, we might expect that EE levels would change over time if the nature of the relationship between the patient and the relative also changes. On the other hand, if certain aspects of temperament or personality underlie the development of high-EE attitudes, we might also expect some stability in EE across time. Stated differently, we might predict that EE would be both a stable and a dynamic construct with some state-like and trait-like properties (Hooley & Gotlib 2000).

The available evidence on the temporal stability of EE is highly consistent with this formulation. EE levels have been shown to decrease after relatives receive family-based interventions (Hogarty et al. 1991, Leff et al. 1982). Moreover, even in the absence of any formal intervention, there can be spontaneous change (Brown et al. 1972, Tarrrier et al. 1988a). When EE assessments are repeated 9–12 months after patients have left the hospital (and presumably entered a period of symptomatic improvement), somewhere between 25% and 50% of relatives who were previously classified as high in EE are rated as being low in EE. Changes in the opposite direction (i.e., from low to high EE) also occur, although these are much less frequent.

The fact that EE levels decline when patients are less symptomatic provides support for the idea that relatives' critical attitudes are, at least in part, a response to aspects or

correlates of the patients' illnesses. However, there is also some evidence suggesting that the tendency to be critical about patients may have some stability. Hooley and colleagues assessed EE in relatives around the time that patients were admitted to the hospital and again three months after the patient returned home (see Hooley et al. 1995). The mean number of critical remarks that relatives made about patients dropped considerably between the two assessments (11.3 versus 4.3). Nonetheless, there was a high correlation ($r = 0.74$) between how many criticisms relatives made initially and how many they made at the follow-up assessment. This suggests that, although relatives become less critical of patients when patients are doing better, relatives also show stability in terms of how critical they are inclined to be. Put another way, the most critical relatives at the first assessment are still the most critical relatives at the second assessment, even though the number of critical remarks they make overall has declined sharply.

Taken together, the empirical evidence suggests that EE levels can change over time, with relatives tending to be more critical during periods of greater stress and becoming less critical as patients show clinical improvement. In addition to these short-term fluctuations, however, there is also some evidence that families may become more critical over time as a consequence of increased exposure to psychopathology. Using cross-sectional data, Hooley & Richters (1995) compared the number of critical comments made by the relatives of schizophrenia patients who had recently become ill with the number of critical comments made by relatives of patients who had been ill for much longer periods of time. Relatives who had been coping with the illness for less than a year made an average of 4.2 critical comments. In contrast, those who had been coping with the illness for three to five years made an average number of 15 critical remarks during the EE interview.

Although longitudinal studies are clearly needed to examine the issue in a more methodologically rigorous manner, these

preliminary findings suggest that there is a developmental component to expressed emotion. Over time, and in the face of chronic exposure to psychopathology, there may well be a tendency for the family climate to deteriorate. This speaks to the importance of early intervention with the families of patients with major mental illnesses.

THEORETICAL SYNTHESIS AND SUMMARY

EE is a complex construct. It is measured in an individual relative of a person with psychopathology. However, EE is a relational variable that reflects important aspects of the patient-relative interaction. EE does not cause psychopathology *de novo*. However, for people who have a vulnerability to psychopathology, high EE is a well-replicated risk factor for relapse.

EE can also change over time. EE levels show a tendency to decrease over the shorter term (i.e., across illness and recovery periods) but also to increase gradually over the longer term, perhaps as function of continued exposure to psychopathology. This indicates that EE has a reactive component. However, there is also evidence that EE has some trait-like aspects as well.

How can we best understand and organize these rather diverse observations? The most accepted theoretical model to date is the diathesis-stress attribution model of EE (Hooley 1987, Hooley & Gotlib 2000). This holds that certain characteristics of relatives (e.g., internal locus of control, a more inflexible personality style) render them more vulnerable to responding to patients' behavioral difficulties or functional impairments in a manner that is designed to create change. This may be because the personality traits that underlie high-EE attitudes make relatives less willing to tolerate or otherwise accommodate to behaviors they perceive as undesirable. Accordingly, when patients exhibit behaviors that these relatives do not like, they

make efforts to get the patient to behave differently.

It is very important to keep in mind that high-EE relatives are not bad or difficult people. In fact, in most of the industrialized world, high-EE attitudes are more normative than are low-EE attitudes (Hooley et al. 1995). Moreover, the impression one gets from conversations with high-EE relatives is that the vast majority of them are highly motivated to help the patient. They are also very involved with the patient's care (van Os et al. 2001). In contrast to low-EE relatives, however, high-EE family members seem to have distinct and definite ideas about what needs to be done to improve the current situation. This may be linked to their more internal locus of control and the more active and problem-solving approach they take when dealing with life's difficulties. The desire to change bad situations and the beliefs that there are things that patients can and should do to effect positive change in their circumstances are thought to be at the heart of why relatives develop critical attitudes.

Although the majority of relatives are initially low in EE, EE levels tend to rise gradually over time. This may be because, over time, the well-intentioned efforts of high-EE relatives to get patients to function better do not lead to the kind of successful outcomes for which they are striving. As a result, it is natural for relatives to become more frustrated, critical, and blaming. The fact that the majority of relatives end up being high in EE over time speaks volumes about the difficulties inherent in trying to cope with psychopathology in a loved one.

CROSS-CULTURAL ASPECTS

The construct of EE has been studied in countries all over the world, including the United Kingdom, the United States, Australia, Denmark, Poland, India, Egypt, Israel, China, Japan, and Iran. EE has also been examined in a number of ethnic minority groups. Space does not permit a full review of the

findings from cross-cultural research on EE (see Bhugra & McKenzie 2003 or Hashemi & Cochrane 1999 for reviews). However, a few general comments warrant mention.

As Jenkins & Karno (1992) have observed, culture defines the kinds of behaviors that warrant criticism. In light of this, it is hardly surprising that levels of criticism vary across cultures. Levels of EE are lower in India than they are the United Kingdom and the United States, for example (Leff et al. 1987). Moreover, the majority of relatives of Latino patients with schizophrenia are classified as low rather than high in EE (Weisman et al. 2003). In contrast, Hashemi & Cochrane (1999) reported that 80% of the relatives of British Pakistani patients with schizophrenia were rated as being high EE compared with 45% of white and 30% of British Sikh families. A major difference was how relatives in these different ethnic groups scored on the EE component of emotional overinvolvement. Whereas the modal score for the white and Sikh families was 1 (EOI is rated on a 0–5 scale), the modal score for the Pakistani families was 4. These findings highlight the role of culture in the expression of critical or emotionally overinvolved attitudes. They also speak to the importance of understanding cultural factors before beginning interventions with the families of patients from different ethnic groups.

Culture also appears to moderate the EE-relapse relationship. Although EE has been shown to predict more negative clinical outcomes in samples of schizophrenia patients in places such as Japan (Tanaka et al. 1995), India (Leff et al. 1987), Egypt (Kamal 1995), and Iran (Mottaghipour et al. 2001), the components of EE differ with regard to their predictive validity. In Indian families, for example, the presence of hostility is most associated with relapse (Leff et al. 1987). In Japan, patients who are living in high-EOI homes may be at the greatest risk (see Tanaka et al. 1995). In Egypt, there seems to be no association between EOI and relapse (Kamal 1995). There is also some evidence that patients in Egypt

are able to tolerate higher levels of criticism than is typical of patients in Western samples (see Hashemi & Cochrane 1999).

Overall, the available data suggest that the prevalence of high-EE attitudes varies across cultures. Given this, it is not surprising that different cutting scores are often used to define high or low EE in cross-cultural studies. In some ethnic groups, high levels of criticism or emotional overinvolvement may be more culturally accepted than in other minority groups (see Bhugra & McKenzie 2003, Rosenfarb et al. 2004). Nonetheless, there appears to be some general support for the conclusion that the EE-relapse association replicates across cultures. The meaning of EE, however, is likely to be influenced by a broad array of cultural factors (Jenkins & Karno 1992). Understanding the cross-cultural aspects of the construct is now an active research area (Nomura et al. 2005, Yang et al. 2004).

WHY DOES EE PREDICT RELAPSE?

Mechanisms of Action

Prevailing models of the EE-relapse association conceptualize EE as a form of stress for patients. In his early study, Brown speculated that high levels of EE might provide too much stress for patients vulnerable to schizophrenia (Brown et al. 1972). Subsequent discussions of this issue have stayed close to such a formulation (Nuechterlein & Dawson 1984).

The idea that high-EE environments are stressful for patients is supported by the findings from several empirical studies. Depressed patients who are married to high EE spouses report more problems in their relationship than do patients with low-EE spouses (Hooley & Teasdale 1989). In a related vein, Cutting et al. (2006) found that patients with schizophrenia reported feeling more stressed by their interactions with high-EE parents, siblings, spouses, or romantic partners than patients with low-EE relatives or partners did. Kuipers et al. (2006) noted that patients

reported feeling more anxious if they had caretakers who were rated as more critical. Patients with schizophrenia also recalled more negative and fewer positive memories of high-EE relatives of than-low EE relatives (Cutting & Docherty 2000).

These empirical observations mesh well with the general perception patients report that high-EE relatives are less tolerant, more intrusive, and have higher expectations than do low-EE relatives (Kazarian et al. 1990). What is interesting is that high-EE relatives also describe themselves as being more behaviorally controlling in their interactions with patients than do low-EE relatives (Hooley & Campbell 2002). The fact that relatives' controlling behaviors also predict relapse in patients with schizophrenia (see Hooley & Campbell 2002) lends further support to the idea that something in the interaction styles of high-EE relatives that may provide too much stress for vulnerable patients.

Care must be taken to avoid overgeneralizations, however. Hooley & Campbell (2002) did not find that controlling behaviors on the part of high-EE relatives predicted relapse in patients with depression. This again highlights the importance of considering characteristics of the patients' underlying psychopathology in any discussion of the mechanisms through which EE is linked to relapse (see Hooley & Gotlib 2000).

Psychophysiological Studies and Patient Arousal

A major assumption with regard to the mechanism of action of EE in schizophrenia is that autonomic hyperarousal mediates the effects of psychosocial stress on a person vulnerable to the disorder and eventually produces relapse (see Tarrier & Turpin 1992). In their efforts to test this hypothesis, researchers have used psychophysiological techniques to measure arousal in patients with schizophrenia during interactions with their high- or low-EE relatives.

In general, the empirical findings are consistent with the idea that interactions with high-EE relatives are more stressful for patients than are interactions with low-EE relatives. Tarrier et al. (1979) measured skin conductance and blood pressure in remitted schizophrenia patients who were tested in their own homes. Psychophysiological data were collected for 15 minutes while patients were in the company of the experimenter and then for 15 minutes after high- or low-EE relatives entered the room. There were no differences between the patients prior to the entry of the relatives. However, after the entry of high-EE relatives, patients showed an increase in diastolic blood pressure; in contrast, after the entry of their low-EE relatives, patients showed a decrease in electrodermal arousal (measured as reduced spontaneous fluctuations in skin conductance). Later testing in a laboratory setting revealed no overall differences between patients with high and low EE relatives for such variables as heart rate, EEG, or electrodermal activity.

Similar results have also been obtained when this kind of experimental design is used with acutely ill patients (Sturgeon et al. 1981, Tarrier et al. 1988b). Although patients in the acute phase of illness generally have higher levels of electrodermal arousal than do patients in remission, the entry of low-EE relatives seems to facilitate habituation to the novel testing situation in both ill and remitted patients. In contrast, the presence of a high-EE relative is associated with continued arousal.

These differences in electrodermal reactivity to high- and low-EE relatives were nicely demonstrated in a single case design involving a 29-year-old male patient who was suffering from schizophrenia (Tarrier & Barrowclough 1984). Skin conductance measurements were taken when the patient was in the presence of a neutral experimenter, alone with his low-EE father, and alone with his high-EE mother. The patient showed a similar number of spontaneous skin conductance

fMRI: functional magnetic resonance imaging

DLPFC: dorsolateral prefrontal cortex

fluctuations when he was talking with the experimenter and when he was with his low-EE father. When in the company of his high-EE mother, however, the patient showed significantly more electrodermal arousal than at any other time.

The data are therefore consistent with the idea that something about the presence of high-EE relatives may be stressful or arousing for patients. The presence of low-EE relatives, on the other hand, may be calming and facilitate habituation to a novel situation. There is also some evidence that patients with schizophrenia and bipolar disorder show increased cardiovascular activity immediately after their relatives direct critical, intrusive, or guilt-inducing comments toward them (Altorfer et al. 1998). Moreover, electrodermal reactivity to the presence of a high-EE relative has been shown to be predictive of later relapse (Sturgeon et al. 1984). Although we are still far from a good understanding of the mechanisms through which EE is linked to relapse, the idea that EE is a form of psychosocial stress that has biological consequences for vulnerable patients is consistent with the available data.

Neuroimaging Approaches

What happens in the brains of healthy people and people vulnerable to psychopathology when they are exposed to criticism? New studies in EE research are now exploring this question using functional magnetic resonance imaging (fMRI). Such approaches are exciting because they provide a bridge between traditional EE research and the growing interest in social cognitive neuroscience.

Using a novel paradigm, Hooley et al. (2005) have collected brain-imaging data from research participants who received brain scans while their mothers were criticizing them. Some of the research participants were healthy controls who had no history of psychopathology. Others were young adults who were fully well but who had previously expe-

rienced one or more episodes of clinical depression. While they were lying in the MRI scanner, all of the subjects heard the voice of their own mothers coming through the headphones. In some trials, mothers made remarks that were critical of their offspring. In other trials, mothers made positive and praising comments. Importantly, each comment was individually tailored to be relevant to the particular subject.

What effect did hearing these affectively challenging stimuli have on the research participants? When they were exposed to criticism from their mothers, the healthy controls showed activation of dorsolateral prefrontal cortex (DLPFC), an area of the brain that is involved in cognitive and emotional processing. What was striking about the recovered depressed participants, however, was that they failed to activate DLPFC when they were exposed to criticism.

These findings are interesting because positron emission tomography and fMRI studies have shown abnormal blood flow in depressed patients in multiple prefrontal regions, including DLPFC (Davidson et al. 2002). Hooley et al.'s (2005) findings provide support for the idea that abnormalities in neural pathways involving the DLPFC are associated with vulnerability to depression and that exposure to criticism can lead to perturbations in these neural circuits, even when formerly depressed people are fully well.

CONCLUSIONS AND FUTURE DIRECTIONS

In his pioneering work on the development of the EE construct, Brown (1985) sought to develop a measure that would reflect the feelings and emotions that were characteristic of normal families who were facing the challenge of coping with mental illness. In this regard, he was successful. High levels of EE are normative in industrialized countries. Moreover, people who have high levels of EE have characteristics, such as an internally based locus

of control, that are widely valued in modern culture and that probably serve them well in many areas of their lives.

The skills needed to cope with psychopathology in a loved one, however, are not always intuitive or obvious. In some cases, less is more. High-EE relatives, in their efforts to help patients function better, may sometimes try too hard. Over time, well-meaning suggestions may evolve into critical comments and controlling behaviors. The result of this very natural process is a family environment that is stressful for relatives and patients alike.

One clear benefit of EE research is that it has been the catalyst for the development of several types of family-based intervention programs (Leff et al. 1982, McFarlane et al. 1995). These have provided benefits for both patients and relatives. In addition to treatment programs for patients with schizophrenia, psychosocial treatment approaches have now been developed for families of patients with mood disorders (e.g., Miklowitz et al. 2003) and are also being implemented for family members of patients with borderline personality disorder (Hoffman et al. 2005).

Not only has EE research been extended to more and more disorders, but it also has been expanded to include assessments of hospital staff members who interact with patients on a regular basis (e.g., Moore et al. 1992). This is important, not least because it destigmatizes high-EE families. Research of this kind makes it clear that even trained professionals are not immune to the development of high-EE attitudes and behaviors. It also makes the EE construct more clinically relevant for patients who do not reside with their families.

The stress associated with high-EE home environments appears to be a major reason why patients with a range of psychopathological conditions are at increased risk of relapse if they are exposed to critical, hostile, or intrusive family members. Yet the mechanisms through which a psychosocial event

like criticism can culminate in a biobehavioral outcome like symptom relapse remain relatively unexplored. By employing challenge paradigms based on the EE construct, researchers are now bringing a decades-old construct into the era of affective neuroscience. Those interested in this psychosocial risk factor are now well positioned to make important contributions to an understanding of the perturbations in neural circuitry that might be implicated in relapse of schizophrenia, depression, and other disorders. Moreover, by exploring the neural correlates of such EE components as criticism and emotional overinvolvement, we may learn much about the links between interpersonal experience and the neurobiology of relapse. We may also learn about the patient factors that moderate the appraisal or processing of affectively charged emotional stimuli leading to more benign or more negative clinical outcomes. Why, for example, does criticism predict relapse in major depression but not in borderline personality disorder, even though the rate of comorbidity between these two disorders is very high? By exploring how healthy people and people with different forms of psychopathology respond to such elements of EE as criticism, emotional overinvolvement, and warmth, researchers may be able to learn much about the neural circuitry that underlies vulnerability to a wide range of psychopathological conditions.

Finally, it warrants mention that EE is a construct that lends itself well to research designs that seek to explore gene x environment interactions. Of interest here is the now-replicated finding that a functional polymorphism in the promoter region of the serotonin transporter (5-HTT) gene renders people more susceptible to depression in the face of stressful life events (Caspi et al. 2003, Wilhelm et al. 2006). Examining the possible consequences of an ongoing stressor such as EE in the context of differential genetic susceptibility to depression is an obvious next step.

SUMMARY POINTS

1. High levels of expressed emotion predict relapse in patients with schizophrenia, mood disorders, eating disorders, posttraumatic stress disorder, and substance abuse disorders. For patients with anxiety disorders receiving exposure treatment, higher levels of criticism may be beneficial, although high levels of hostility are not.
2. High levels of emotional overinvolvement predict better clinical outcome for patients with borderline personality disorder.
3. Expressed emotion (EE) is an independent predictor of relapse even when clinical factors in patients are considered and are statistically controlled.
4. EE is both a reaction to patients' psychopathology as well as a link to characteristics of the relatives themselves. Bidirectional processes are at work in the development of high-EE attitudes. High-EE attitudes also tend to rise over time, probably as a consequence of continued exposure to psychopathology.
5. Interventions that improve family communication and problem solving skills tend to lower EE levels and improve the family environment more generally. Relapse rates in patients are reduced when families receive this kind of help.
6. Interactions between patients and high-EE relatives involve more negative and less positive behavior. This is reciprocal, and it involves the patient as well as the family member.
7. Psychophysiological data show that patients are more aroused when they are interacting with high-EE family members. Patients also report feeling more stressed when they are with high- versus low-EE relatives.
8. New research is using neuroimaging approaches to explore how people who are vulnerable to psychopathology respond to the challenge of being criticized. This research may help us learn more about the neurobiology of relapse. However, the mechanism through which EE and relapse are linked is still unknown.

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