Familial Expressed Emotion: Outcome and Course of Israeli Patients With Schizophrenia

by Sofi Marom, Hanan Munitz, Peter B. Jones, Abraham Weizman, and Haggai Hermesh

Abstract

We investigated the validity of expressed emotion (EE) in Israel. The study sample consisted of 108 patients with schizophrenia and 15 with schizoaffective disorder, and their key relatives. EE was rated with the Five Minute Speech Sample (FMSS). Patient households were categorized by EE and its two components: criticism and emotional overinvolvement. Patients were rated with the Brief Psychiatric Rating Scale (BPRS) at admission, at discharge, and 6 months after discharge. Readmissions were determined over a 9-month period. High EE and particularly high criticism were significantly associated with poorer outcome (higher rate of and earlier readmissions, and higher BPRS score at followup) and worse illness course (higher annual number of prior psychiatric hospital admissions). Odds ratios between high EE and high criticism and readmission were 2.6 and 3.5, respectively. The strongest predictor of earlier readmission was the interaction of high criticism × poor compliance with medication. The results converge to further confirm the notion that familial EE is a valid crosscultural predictor of the clinical course of schizophrenia. Moreover, EE has predictive power in very chronic samples. Criticism appears to be the crucial EE component linked with short-term outcome. Treatment aimed at reducing high criticism is warranted. The FMSS appears to have predictive validity.

Keywords: Expressed emotion (EE), schizophrenia, family relatives, relapse, hospitalizations.


Research over the past 4 decades into the role of social and situational factors in mental illness has focused on the concept of EE. Although initially conceived as a predictor of relapse in schizophrenia, it now appears to be more of a general risk factor across a range of psychopathological conditions (Butzlaff and Hooley 1998).

Use of the EE index in prospective studies of schizophrenia has shown that patients with schizophrenia living in home environments characterized by high levels of EE were significantly more likely to relapse than those residing in low-EE households (Parker and Hadzi-Pavlovic 1990; Kavanagh 1992; Bebbington and Kuipers 1994; Butzlaff and Hooley 1998). The crucial components of the EE construct were considered to be criticism and emotional overinvolvement (EOI) (Leff and Vaughn 1985).

Although the majority of studies treated EE as a unitary construct, some attempted to determine the differential predictive power of these two components (Barrelet et al. 1990; Stirling et al. 1993; Chambless and Stekete 1999; King and Dixon 1999). In adult populations, high EE was associated with high levels of criticism rather than with high EOI (Vaughn and Leff 1976a; Vaughn et al. 1984; MacMillan et al. 1986), and criticism made the greater contribution to relapse (Hogarty et al. 1986; MacMillan et al. 1986; Barrelet et al. 1990; Vaughan et al. 1992b; Lopez et al. 1999). However, the question of whether EE is a single construct remains unresolved.

The clinical relevance of familial EE to illness course has been established empirically across a wide variety of cultural settings, and the geographic location did not affect the predictive power of EE (Bebbington and Kuipers 1994). Analyses of crosscultural data showed significant differences in levels of family display of criticism with respect to schizophrenia (Jenkins and Karno 1992) and considerably less quantitative variability for measures of EOI.

The majority of EE research has been conducted in Western countries, and only recently has the concept been examined in populations in Eastern Asia (Otsuka et al. 1994; Ito and Oshima 1995; Uehara et al. 1997; Mino et al. 1998). There are still no studies from the Middle East, except one from Egypt conducted on patients with depression (Okasha et al. 1994).
This is the first study to explore the EE index in a Jewish Israeli setting. The aim of the study was to examine global familial EE and each of the two EE components with respect to several prospective and retrospective variables of outcome and course of disease. In this manner, we sought to overcome some of the major limitations of earlier studies, namely (1) definition of relapse was based on either symptom exacerbation or readmission to a psychiatric hospital (Barrelet et al. 1990; Bertrand and al. 1992; Mozny and Votydpkova 1992; Vaughan and al. 1992b); (2) failure to demonstrate a consistent relationship between EE and specific type or severity of symptomatology; (3) emphasis on only outcome, with little consideration of history of mental illness (Vaughan et al. 1984; Karno et al. 1987; Leff et al. 1987; Gutierrez et al. 1988), which might be either the cause or the effect of familial EE; and (4) inconclusive findings with respect to the effects of compliance with medication on the predictive power of EE (Moline et al. 1985; Nuechterlein et al. 1986; Vaughan et al. 1992a).

With respect to the prospectively analyzed variables, we hypothesized that compared with low familial EE, high familial EE would be associated with higher readmission rate following discharge, shorter time to readmission, and higher symptom score. We also examined relationships among compliance with medication, level of EE, and readmission. With respect to historical factors, we hypothesized that high familial EE would be associated with a higher annual number of prior psychiatric hospitalizations, a longer annual cumulative length of stay in psychiatric hospitals, a longer duration of illness, and an earlier age at onset.

Method

Subjects. The initial study group consisted of 114 consecutive newly admitted patients hospitalized in an acute locked ward at Geha Mental Health Center between March 1993 and September 1994. Inclusion criteria were as follows: (1) diagnosis of schizophrenia or schizoaffective disorder according to DSM-III-R criteria at admission (APA 1987); (2) psychotic state, defined as a score of 4 or more on one or more of the BPRS (Overall and Gorham 1962) items: conceptual disorganization (#4), suspiciousness (#11), hallucinatory behavior (#12), and unusual thought content (#15); (3) age 20–65 years; (4) living with a first-degree relative for at least 1 year prior to the index admission or living alone but spending at least 35 hours per week with a close relative; (5) main language Hebrew; and (6) absence of significant chronic physical disease. Six patients were eventually excluded from the study, three because they were transferred during the index hospitalization to a chronic care hospital, and three because they were still hospitalized at termination of the study. An additional 11 of the remaining 108 patients did not appear for followup visits after discharge for various reasons (moved to another city \( n = 2 \), were unable to come \( n = 5 \), refused further contact with the hospital staff \( n = 4 \)). Thus, the final analyses of readmissions and the retrospective variables included 108 patients, and the followup analyses of severity of symptomatology included 97 patients.

The demographic data of the whole sample of patients and of the low-EE and high-EE groups are shown in table 1. The illness data are shown in table 2. Ninety-three patients (86.1%) had a diagnosis of schizophrenia, and 15 (13.9%) had a diagnosis of schizoaffective disorder. Scores for the two psychotic BPRS clusters (Overall et al. 1967)—namely, thinking disturbance and hostile suspiciousness—were 8.6 (standard deviation [SD] = 3.9) and 7.9 (SD = 3.2), respectively. Half the patients were classified as compliant with medication and half as noncompliant.

A total of 151 key relatives were interviewed to assess familial EE: for 60.2 percent of the patients, a single relative was interviewed \( (n = 65 \) relatives), and for the remainder, two relatives were interviewed \( (n = 86 \) relatives). No significant difference was found between number of relatives interviewed in high- and low-EE groups \( (\chi^2 = 0.79, df = 1, p = 0.37) \). Relatives were predominantly parents (66.7%); a minority were spouses. For the patients for whom two relatives were interviewed, households were classified as high EE when either one relative or both satisfied the criteria for individual high-EE status. For patients with only a single relative, the EE status of the interviewee was taken as the EE status of the household. These criteria are in accordance with the accumulated EE literature (Kavanagh 1992).

The study was approved by the Geha Mental Health Center Review Board and Ethics Committee. Both patients and their relatives gave written informed consent to participate after receiving a complete description of the study.

Procedure. A prospective, longitudinal design was used. Within 2 days of admission, the patients underwent a psychiatric interview, according to the guidelines of the Structured Clinical Interview for DSM-III-R (Spitzer et al. 1989), by two senior psychiatrists (H.M. and H.H.) to establish the diagnosis according to DSM-III-R criteria. A consensus between the two senior psychiatrists was required for diagnosis, and it was reconfirmed close to discharge. The BPRS was administered by the treating therapist within 2 days of admission, at discharge, and 6 months after discharge, when patients are routinely referred to community outpatient clinics for continued...
Table 1. Demographic data of 108 consecutively admitted psychotic schizophrenia and schizoaffective disorder patients at index admission

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total sample, n (%)</th>
<th>Low EE (n = 56), n (%)</th>
<th>High EE (n = 52), n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>61 (56.5)</td>
<td>31 (55.4)</td>
<td>30 (57.7)</td>
</tr>
<tr>
<td>Female</td>
<td>47 (43.5)</td>
<td>25 (44.6)</td>
<td>22 (42.3)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>61 (56.5)</td>
<td>34 (60.7)</td>
<td>27 (51.9)</td>
</tr>
<tr>
<td>Married</td>
<td>29 (26.9)</td>
<td>16 (28.6)</td>
<td>13 (25.0)</td>
</tr>
<tr>
<td>Divorced</td>
<td>18 (16.6)</td>
<td>6 (10.7)</td>
<td>12 (23.1)</td>
</tr>
<tr>
<td>Household</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two parents</td>
<td>43 (39.8)</td>
<td>25 (44.6)</td>
<td>18 (34.6)</td>
</tr>
<tr>
<td>One parent</td>
<td>22 (20.4)</td>
<td>13 (23.2)</td>
<td>9 (17.3)</td>
</tr>
<tr>
<td>Spouse</td>
<td>28 (25.9)</td>
<td>14 (25.0)</td>
<td>14 (26.9)</td>
</tr>
<tr>
<td>Alone</td>
<td>15 (13.9)</td>
<td>4 (7.1)</td>
<td>11 (21.1)</td>
</tr>
<tr>
<td>SES2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>21 (19.4)</td>
<td>11 (19.6)</td>
<td>10 (19.2)</td>
</tr>
<tr>
<td>Middle</td>
<td>58 (53.7)</td>
<td>35 (62.5)</td>
<td>23 (44.2)</td>
</tr>
<tr>
<td>Low</td>
<td>29 (26.9)</td>
<td>10 (17.9)</td>
<td>19 (36.6)</td>
</tr>
<tr>
<td>Country of origin3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>54 (50.5)</td>
<td>35 (62.5)</td>
<td>19 (37.3)</td>
</tr>
<tr>
<td>Asia/Africa</td>
<td>53 (49.5)</td>
<td>21 (37.5)</td>
<td>32 (62.7)</td>
</tr>
<tr>
<td>Observance4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonobservant</td>
<td>95 (88.0)</td>
<td>48 (85.7)</td>
<td>47 (90.4)</td>
</tr>
<tr>
<td>Observant</td>
<td>13 (12.0)</td>
<td>8 (14.3)</td>
<td>5 (9.6)</td>
</tr>
</tbody>
</table>

Note.—EE = expressed emotion; SES = socioeconomic status.

1 None of the comparisons was significant following Bonferroni correction (critical α = 0.008).
2 SES classified according to Hollingshead and Redlich (1958): high = I and II, middle = III, low = IV and V.
3 Data missing for one patient.
4 All patients were Jewish.

Table 2. Illness data of 108 consecutively admitted psychotic schizophrenia and schizoaffective disorder patients at index admission

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of patients</td>
<td>35.4 (10.8)</td>
<td>20–64</td>
</tr>
<tr>
<td>Age of key relatives</td>
<td>55.6 (13.0)</td>
<td>25–82</td>
</tr>
<tr>
<td>Age at onset</td>
<td>23.5 (9.1)</td>
<td>12–55</td>
</tr>
<tr>
<td>BPRS at admission</td>
<td>45.9 (8.1)</td>
<td>28–70</td>
</tr>
<tr>
<td>Duration of illness (yrs)</td>
<td>11.9 (8.0)</td>
<td>&lt;1–31</td>
</tr>
<tr>
<td>No. of previous hospitalizations1</td>
<td>7.5 (7.3)</td>
<td>1–29</td>
</tr>
<tr>
<td>Length of previous hospital stay (mos)</td>
<td>17.2 (18.6)</td>
<td>8 days–8.6 yrs</td>
</tr>
</tbody>
</table>

Note.—BPRS = Brief Psychiatric Rating Scale; SD = standard deviation.

1 The index admission was included. The index admission was the only admission for 15 patients (13.9%).
treatment. Doing BPRS assessment at 6 months after discharge kept the dropout rate low and ensured that the vast majority of BPRS third assessments would be conducted by the same rater for each of the patients. Within 4 days of admission, the relatives underwent an individual structured interview, conducted by the treating therapists, to collect background and medical data, and they completed the FMSS (Magana et al. 1986), administered and rated by the chief researcher (S.M.), to determine familial EE. This timing of administration of the FMSS was in accordance with the majority of studies on EE (Kavanagh 1992).

Patients were followed for 9 months after discharge, as in the majority of EE studies (Kavanagh 1992). The need for readmission during this period was determined by senior psychiatrists in the emergency room who were blinded to the patients' EE status. Following Geha hospital policy, only patients with a clear exacerbation of psychotic symptoms and in urgent need of care were readmitted.

Hospital policy is that patients continue treatment with the same therapist throughout hospitalization and followup. The treating therapists were blinded to their patients' EE status. All patients received routine treatment during hospitalization, which included pharmacotherapy with typical antipsychotic agents, supportive psychotherapy, and routine outpatient care during followup.

**Assessment of EE.** Administration, coding, and rating were conducted according to the Manual for Coding Expressed Emotion from the Five Minute Speech Sample (Magana 1990). The interrater reliability of the FMSS was established by two independent raters (S.M. and another qualified rater) on a sample of the first 20 relatives. Kappa values (Cohen 1960) were $k = 0.86$ for global EE, $k = 0.86$ for EE-criticism, and $k = 0.76$ for EE-EOI.

**Prospective and Retrospective Measures.** Outcome was measured by three variables: readmission to a psychiatric hospital, time from discharge to readmission, and total BPRS score at 6-month followup compared with discharge. The severity of illness prior to the index EE was assessed by four variables: number of prior psychiatric hospitalizations, cumulative hospital stay, duration of illness, and age at onset/first admission. The first two variables were adjusted for chronological age by dividing the total number of hospitalizations/cumulative length of stay at hospitals by the patient's chronological age. The BPRS was used as a global measure of psychosis. Age at onset was defined as the age of the patient when clear psychotic symptoms appeared for the first time by anamnesis and medical records. Our preliminary findings showed a very high correlation between age at onset and age at first psychiatric admission ($n = 108, r = 0.91, p = 0.001$), so only the latter was used in the analysis. No significant difference was found between age at onset of males and females ($n = 108, t = 0.04, df = 106, p = 0.96$).

Both the demographic and the retrospective clinical data were obtained from the structured interviews conducted at admission and the patient's psychiatric hospitalization file at the Central Registry of the Israel Ministry of Health, which lists the number and duration of all psychiatric hospitalizations in the country. In addition, compliance with medication during the 2 years prior to admission, determined by patient hospital file and anamnesis, was rated by the treating therapist as high (patient usually followed therapist's instructions) or low (patient had not been taking the prescribed medication at least half of the time or usually did not take medication).Patients' socioeconomic status and country of origin were determined by fathers' respective indexes.

**Statistical Analysis.** Low-EE and high-EE groups were compared by chi-square tests for categorical variables and by unpaired, 2-tailed $t$ tests and univariate analyses of variance (ANOVAs) for the prospective and retrospective continuous variables. The major study question of the 9-month risk of readmission according to EE was examined by chi-square tests and odds ratio (OR). The comparison of time to readmission by EE and by the interaction criticism $\times$ compliance with medication was examined by survival analyses (Kaplan-Meier) (Lee 1992). The examination of time to readmission taking the demographic and clinical variables into account was examined by Cox regression analysis. The relationship between the two EE levels and the three BPRS scores was examined by two-way ANOVA with repeated measures and analysis of covariance (ANCOVA) as needed. Mann-Whitney tests were conducted to analyze retrospective variables with a nonnormal distribution.

**Results**

Classification by familial EE yielded two groups: low EE, 56 households (51.9%); high EE, 52 households (48.1%). Classification by the two EE components yielded four subgroups: low criticism–low EOI, 56 households (51.9%); high criticism–low EOI, 31 households (28.7%); low criticism–high EOI, 13 households (12.0%); high criticism–high EOI, 8 households (7.4%). Slightly more than one-third of the households were classified as high criticism, and about one-fifth as high EOI.

Categorization as low or high EE proved to be unrelated both to the majority of the demographic variables (table 1) and to compliance with medication. Patients from low-EE households were significantly younger than patients from high-EE households ($32.9 \text{ [SD } 9.4\text{]}$ vs. 


A 2 × 3 ANOVA (readmission and time) demonstrated a significant interaction difference in BPRS scores between readmitted and non-readmitted patients \((n = 97, F = 35.9, df = 2.190, p < 0.001)\). The difference was apparent in the simple main-effects analysis at the followup assessment, when patients who were readmitted had a significantly higher BPRS score \((\text{mean} = 44.3, \text{SD} = 8.3)\) than those who were not \((\text{mean} = 29.8, \text{SD} = 7.3)\) \((F = 80.57, df = 1.95, p < 0.001)\). Thus, the readmitted patients exhibited, on 6-month followup, more severe symptomatology, suggesting that mental deterioration had contributed to the earlier readmission.

**Time to readmission.** Comparison of the patients by EE status yielded significant differences between the survival curves by log rank and Breslow tests \((p = 0.01\) for both). Comparison by the criticism component only (figure 1) showed that the proportion of patients from low-criticism households who were not readmitted was significantly higher than the proportion of non-readmitted

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**Figure 1.** Survival curves for readmission in 108 ambulatory schizophrenia and schizoaffective disorder patients from high-criticism and low-criticism households followed for 9 months after discharge from index admission

\[\chi^2 = 5.36, df = 1, p < 0.05; \text{OR} = 2.6, 95\% \text{ CI} [1.1-6.0]; \phi = 0.22\].

More than twice as many patients from high-criticism households \((n = 20, 51.3\%)\) were readmitted than from low-criticism households \((n = 16, 23.2\%)\) \((\chi^2 = 8.85, df = 1, p < 0.01; \text{OR} = 3.5, 95\% \text{ CI} [1.5-8.1]; \phi = 0.29\). No significant difference was noted for EO1 \((\chi^2 = 0.00, df = 1)\).

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**Prospective Followup Data**

**Readmission.** During the 9 months following discharge, 36 of the 108 patients (33.3%) were readmitted. Almost twice as many patients from high-EE households \((n = 23, 44.2\%)\) were readmitted than from low-EE households \((n = 13, 23.2\%)\) \((\chi^2 = 5.36, df = 1, p < 0.05; \text{OR} = 2.6, 95\% \text{ CI} [1.1-6.0]; \phi = 0.22\). More than twice as many patients from high-criticism households \((n = 20, 51.3\%)\) were readmitted than from low-criticism households \((n = 16, 23.2\%)\) \((\chi^2 = 8.85, df = 1, p < 0.01; \text{OR} = 3.5, 95\% \text{ CI} [1.5-8.1]; \phi = 0.29\). No significant difference was noted for EO1 \((\chi^2 = 0.00, df = 1)\).
patients from high-criticism households. There was no significant difference in the survival curves based on EOI by either log rank (p = 0.97) or Breslow test (p = 0.94).

Cox regression analyses using forward stepwise procedures (likelihood ratio) were conducted to determine whether the EE status continued to be associated with time to readmission if the sociodemographic and clinical characteristics were taken into account. The analyses were conducted for EE criticism, which had proved to be the significant EE component associated with time to readmission. Criticism and compliance with medication each predicted outcome (χ² = 10.48, p = 0.001; χ² = 7.93, p = 0.005, respectively), as did annual length of stay at the hospital, although to a lesser extent (χ² = 3.9, p = 0.05). However, the interaction criticism × compliance with medication contributed more than each variable alone (χ² = 11.36, p = 0.0008).

On examination of each of the combinations of level of criticism and compliance status by survival analysis (Kaplan-Meier) (figure 2), highly significant differences were observed between the survival curves (log rank p = 0.0008, Breslow p = 0.0007). We then examined whether the interaction EE × compliance with medication was similarly significant in predicting relapse. Cox regression forward stepwise (likelihood ratio) analyses of all variables with this interaction showed that the variables that predicted time to relapse were EE alone, compliance with medication alone, the interaction EE × compliance with medication, and to a lesser extent, annual length of hospital stay. However, at the final step of this model, the most significant predictors were compliance with medication and annual length of hospital stay.

Symptomatology. A 2 × 3 ANOVA with repeated measures (time) yielded a significant difference among the three BPRS assessments for the low- and high-EE groups (F = 92.7, df = 2,190, p < 0.001). Although high-EE patients scored higher than low-EE patients at the third assessment (mean = 36.9, SD = 9.7, and mean = 33.3, SD = 10.7, respectively), there was no interaction of group × time (F = 0.82, df = 2,190, p = 0.44). To deter-

Figure 2. Survival curves for readmission in 107 schizophrenia and schizoaffective disorder ambulatory patients followed for 9 months after discharge from index admission, grouped by level of familial criticism and degree of compliance with medication.

Note.—HCOMP = high compliance; HCR = high criticism; LCOMP = low compliance; LCR = low criticism.

† Significant difference between the groups (log rank p = 0.0008, Breslow p = 0.0007).
mine if the severity of symptomatology over time depended on either of the EE components alone or on their interaction, a $2 \times 2 \times 3$ ANOVA (criticism $\times$ EOI $\times$ time) with repeated measures was conducted. There was a significant difference between patients from low-criticism and high-criticism households across the three measurements ($F = 5.28, df = 1, 93, p < 0.05$) and a significant interaction of criticism $\times$ time ($F = 3.25, df = 2, 186, p < 0.05$) (figure 3). On followup, the patients from high-criticism households exhibited a significantly worse symptomatology (BPRS score 38.7 [SD = 9.9] vs. 33.0 [SD = 10.1], respectively). By contrast, comparison of the BPRS scores between patients from low-EOI and high-EOI environments yielded no significant difference ($F = 0.77, df = 1, 93, p = 0.38$) and no significant interactions of EOI $\times$ time ($F = 0.07, df = 2, 186, p = 0.93$) or of criticism $\times$ EOI ($F = 0.79, df = 2, 186, p = 0.46$).

Retrospective Data. We found that living in a high-criticism household was significantly associated with more frequent prior annual hospitalizations (table 3). EE, criticism, and EOI were not related to age at onset of disorder or duration of disorder.

Discussion

High-EE and Low-EE Households: Comparison With Previous Studies. In the present study, the proportion of high-EE households was 48.1 percent, similar to proportions found in the majority of studies conducted in Western countries (Kavanagh 1992; Bebbington and Kuipers 1994), taking into account the lower base rate (about 20%) of high-EE ratings for the FMSS compared with the Camberwell Family Interview (CFI) (Magana et al. 1986; Nuechterlein et al. 1986; Leff et al. 1987; Tarrier et al. 1988; Leeb et al. 1991). This being the first study to explore the EE index in Israel, we have no data for comparison among the Israeli population.

Analysis by EE components showed a higher prevalence of high-criticism households (36.1%) than high-EOI households (19.4%). These rates fall within the reported ranges, but again, data on the FMSS remain scarce, and its use here may have underestimated the true prevalence.

Readmission. During the 9-month followup period, 33.3 percent of the patients were readmitted. This figure closely agrees with the 36.3 percent relapse rate found on

Figure 3. Total BPRS scores of 97 schizophrenia and schizoaffective disorder patients from low-criticism ($n = 63$) and high-criticism households ($n = 34$) at index admission, discharge, and 6-month followup $^{1,2}$

![Image of Figure 3](chart.png)

Note.—BPRS = Brief Psychiatric Rating Scale.

$^1$ Group effect by analysis of variance with repeated measures ($F = 5.28, df = 1, 93, p < 0.05$).

$^2$ Interaction of group $\times$ time by analysis of variance with repeated measures ($F = 3.25, df = 2, 186, p < 0.05$).

$p = 0.009$; high vs. low criticism (post hoc $t = -2.7, df = 95$).
Table 3. Retrospective indexes of illness in 107 schizophrenia and schizoaffective disorder patients at index admission, grouped by global EE, EE-criticism, and EE-EOI

<table>
<thead>
<tr>
<th></th>
<th>Duration of illness (yrs), mean (SD)</th>
<th>Age at onset (yrs), mean (SD)</th>
<th>Annual no. of previous hospitalizations, mean (SD)</th>
<th>Annual (days) length of hospital stay, mean (SD)</th>
<th>( \rho )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low EE ((n=55))</td>
<td>10.6 (8.1)</td>
<td>22.4 (6.3)</td>
<td>0.16 (0.14)</td>
<td>12.6 (14.6)</td>
<td>-1.71</td>
</tr>
<tr>
<td>High EE ((n=52))</td>
<td>13.2 (7.7)</td>
<td>24.9 (11.3)</td>
<td>0.26 (0.23)</td>
<td>17.8 (17.4)</td>
<td>0.09</td>
</tr>
<tr>
<td>Analysis</td>
<td>( t(106) = -1.71 )</td>
<td>( t(106) = -1.48 )</td>
<td>( U = 1,110 )</td>
<td>( U = 1,134 )</td>
<td>0.03</td>
</tr>
<tr>
<td>( \rho )</td>
<td>0.09</td>
<td>0.14</td>
<td>0.03</td>
<td>0.06</td>
<td>0.01</td>
</tr>
<tr>
<td>Low CR ((n=68))</td>
<td>11.1 (8.5)</td>
<td>22.6 (6.5)</td>
<td>0.16 (0.13)</td>
<td>12.3 (13.9)</td>
<td>-1.48</td>
</tr>
<tr>
<td>High CR ((n=39))</td>
<td>13.1 (6.9)</td>
<td>25.2 (12.3)</td>
<td>0.30 (0.24)</td>
<td>20.1 (18.6)</td>
<td>0.22</td>
</tr>
<tr>
<td>Analysis</td>
<td>( t(106) = -1.24 )</td>
<td>( t(106) = -1.47 )</td>
<td>( U = 870.5 )</td>
<td>( U = 933.5 )</td>
<td>0.002</td>
</tr>
<tr>
<td>( \rho )</td>
<td>0.22</td>
<td>0.14</td>
<td>0.002</td>
<td>0.01</td>
<td>0.1</td>
</tr>
<tr>
<td>Low EOI ((n=86))</td>
<td>11.6 (8.0)</td>
<td>24.0 (9.6)</td>
<td>0.19 (0.16)</td>
<td>13.3 (13.9)</td>
<td>-1.37</td>
</tr>
<tr>
<td>High EOI ((n=21))</td>
<td>13.1 (8.0)</td>
<td>21.9 (6.7)</td>
<td>0.28 (0.28)</td>
<td>22.5 (22.1)</td>
<td>0.22</td>
</tr>
<tr>
<td>Analysis</td>
<td>( t(106) = -0.79 )</td>
<td>( t(106) = 0.88 )</td>
<td>( U = 781.0 )</td>
<td>( U = 723.5 )</td>
<td>0.30</td>
</tr>
<tr>
<td>( \rho )</td>
<td>0.43</td>
<td>0.38</td>
<td>0.30</td>
<td>0.16</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Note.—CR = criticism; EE = expressed emotion; EOI = emotional overinvolvement; SD = standard deviation; \( t \) = Student's \( t \) test; \( U \) = Mann-Whitney \( U \) test.

*1* Nonsignificant, following Bonferroni correction (critical \( \alpha \) = 0.004).

*2* Significant, following Bonferroni correction (critical \( \alpha \) = 0.004).

aggregate analysis by Bebbington and Kuipers (1994) on a total sample of 1,346 subjects.

The OR between EE, EE-criticism, and readmission indicated that the chances of being readmitted to a psychiatric hospital within 9 months of discharge were 2.6 times higher for a patient from a high-EE household than for one from a low-EE household, and 3.5 times higher for a patient from a high-criticism household than for one from a low-criticism household. Again, these figures are very similar to those reported by Bebbington and Kuipers (1994) for EE, namely, 50 percent and 21 percent for high EE and low EE, respectively, and even closer for EE-criticism. These results support our first prospective hypothesis that patients from high-EE households are readmitted significantly more often than patients from low-EE households, with patients from high-criticism households having the highest rates. Relapse was not associated with EE-EOI.

Several researchers have expressed reservations regarding the use of readmission as an outcome measure (Vaughn et al. 1984; Parker et al. 1988); however, our results support its utility as a valid outcome measure of relapse. This is relevant in Israel, where public health policy dictates that patients be readmitted because of an exacerbation in clinical symptoms but not because of social reasons. Similar results were obtained in other countries that follow the same policy, such as Italy (Bertrand et al. 1992) and Australia (Parker et al. 1989). The tentative causal relationship of readmission and symptom severity was supported by the higher BPRS score of the readmitted patients at the 6-month assessment, regardless of their EE categorization.

High EE was associated not only with higher incidence of readmission but also with shorter time to readmission. Furthermore, criticism status highly predicted time to readmission, whereas EOI did not. If familial EE and the patient’s symptomatology interact to trigger relapse, we may assume that high criticism can lead to earlier readmission. Comparison of these data with results of earlier studies is difficult because, although most studies followed patients up to 9 months after discharge (Kavanagh 1992), they did not address the issue of time to relapse as a function of EE status. Our results highlight the efficacy of survival analysis in EE research.

Examination of the predictive validity of EE with respect to time to readmission, taking the demographic and clinical variables into account, showed that high EE alone and high criticism alone, as well as low compliance with medication, were strongly related to relapse. However, the interaction criticism \( \times \) compliance with medication was the most potent variable for predicting time to readmission. EE \( \times \) compliance with medication was less powerful. These results provide additional evidence that the criticism component of EE is the most powerful predictor of relapse.
The EE-relapse relationship cannot be explained as a derivative arising from a greater compliance with medication among patients from low-EE households, because the compliance levels (high/low) were evenly distributed among the patients in the two EE groups. Our findings clearly demonstrate that compliance with medication is an important preventive factor in relapse, but alone, it might not protect patients sufficiently from the impact of a stressful familial environment. Accordingly, Nuechterlein et al. (1986) demonstrated that when compliance with medication was held constant, high EE was associated with higher rates of relapse. Although several authors have suggested that continuous medication has a limiting effect on predictions based on EE (Vaughn et al. 1984; Vaughan et al. 1992a), our findings suggest that patients from high-EE households are at greater risk of relapse even if they take medication regularly. Likewise, Bebbington and Kuipers (1994) reported that compliance with treatment and EE were independently related to relapse. Our study adds the factor of the interaction of criticism × compliance with medication in the prediction of relapse. This construct, which reflects the complex relationship between social and pharmacotherapeutic factors in the daily life of schizophrenia patients, may partially resolve the debate surrounding the value of the EE index in medicated versus nonmedicated patients.

Symptomatology. Data on the relationship between EE status and degree of patient symptomatology at admission, at discharge, and at various points during followup are scarce and inconclusive (Milkowitz et al. 1983; Vaughn et al. 1984; Nuechterlein et al. 1986; Gutierrez et al. 1988). Like several other researchers (Milkowitz et al. 1983; Vaughan et al. 1984; Nuechterlein et al. 1986; Goldstein et al. 1989; Vaughn 1989), we found that the psychopathology at admission and discharge was unrelated to EE status. However, we did note a relationship between index EE criticism and degree of later mental deterioration at the ambulatory followup, a finding that broadens the well-established association of EE and relapse. Several studies also reported that symptomatology after discharge was associated with the degree of EE (Hogarty et al. 1988; Otsuka et al. 1994; Huguelet et al. 1995; Woo et al. 1997). However, these data warrant further specification with respect to the timing of the assessment. The more pronounced decline in the ambulatory mental status at followup noted here among patients from high-criticism households suggests that this group’s higher readmission rate does not merely reflect a familial inclination to overuse psychiatric hospitalization, but indeed, a worse mental state. Because high- and low-EE patients did not differ in symptomatology at admission or at discharge, the difference in symptomatology at ambulatory followup could be reasonably attributed to the home environment. These results shed some light on the cause and effect of EE and provide some evidence that it is not mental status at admission or discharge that is the causative factor of high-EE.

To bypass the controversies regarding the definition of relapse and the binary measure of outcome, we designed our study to ensure that all patients would be examined at a fixed time at followup, regardless of symptomatology. By doing so, we found that relapse and time to readmission and severity of symptoms at followup all coincided and were all associated with high-criticism environments. These outcome measures appear to be complementary, thereby providing a more comprehensive picture of the interplay between familial atmosphere, compliance with medication, and psychopathology.

Analysis of Clinical History. The present study showed that the levels of EE-criticism at the time of the index admission were related to the annual number of previous hospitalizations. Only a few of the EE studies to date have explored retrospective variables, and there are almost no comparative data on the association of EE or its components with hospital stay, previous admissions, and age at disease onset. Of the few studies that considered previous history of hospitalizations, some noted a significant relationship with EE (Bertrand et al. 1992; Vaughan et al. 1992b; Honig et al. 1997; Shimodera et al. 1999), but others did not (Milkowitz et al. 1983; Nuechterlein et al. 1986). As to duration of schizophrenia, Hooley and Richters (1995) suggested, on the basis of previous studies, that EE levels are positively related to duration of illness; however, the chronicity of the present sample might have blurred possible differences between low- and high-EE patients with regard to duration of illness.

Can this finding of a relationship between EE and past index reflect a vicious cycle? The prevailing and often implicit assumption in the literature is that EE develops independently of patient characteristics. Nevertheless, a developmental conceptualization of EE is supported by some authors (Tarrier 1991; Birchwood 1992; Hooley and Richters 1995), and it points to the possibly central role of the transactional processes that take place between the patient’s characteristics and his or her family’s behavior. These studies, together with the present finding of a worse history of hospitalizations in high-criticism patients, may indicate that EE has a reactive component and suggest a circular process wherein a poor earlier course increases EE, which contributes to a poor subsequent course, and so on. The crucial question of whether sicker patients cause their families to become high in criticism or whether families high in criticism influence the...
patients’ course of illness, or both, requires additional investigation. The relationship is obviously complex and implies that the EE construct is linked to a diversity of patient and family variables.

**EE as a Binary Construct.** Our study highlights the strength of EE-criticism in the prediction of outcome and reveals, in addition, its relationship to history of hospitalizations. Furthermore, the findings suggest, in line with other studies (Barralet et al. 1990; Vaughan et al. 1992a), that criticism is a more powerful predictor of outcome than global EE, and that EOI is unrelated to most of the variables examined. Most of the pertinent studies examined EE as a unitary construct, whereas we examined the separate and the combined effects of each of the EE components, as well as the interaction between them. Our general pattern of results indicates that treating EE as a binary index conceals the importance of EE criticism, which may be essential to the understanding of the role of EE. The low prevalence of high EE throughout studies (e.g., Vaughn and Leff 1976b; Vaughn et al. 1984) together with its low predictive value sharpens the debate over its value over EE criticism alone with respect to outcome.

Our findings suggest that criticism may deserve more detailed consideration in future EE research, while the place of EOI is less clear. Taking into account our finding of the powerful interaction of criticism × compliance with medication in predicting relapse, it appears that the two main foci of psychosocial interventions may need to be the concomitant improvement of patient compliance with medication and the lowering of high criticism of relatives toward patients. However, although in most Western studies criticism prevails to a greater extent than EOI, this pattern is different from the one found in other cultures (e.g., Gutierrez et al. 1988), where different studies, using the CFI, have shown EOI’s predictive value; hence, the predictive value of EOI should not be underestimated in relation to family intervention.

**Strengths and Limitations.** The measures used here to examine the effects of EE were both prospective and retrospective, thereby enabling a broader perspective and integrative conclusions. An important feature of this study is the use of objective, quantitative criteria for relapse and symptomatology. Clearly, there are limitations to defining relapse by only readmission or to evaluating symptom severity by only a change in BPRS at followup. Our binary definition of compliance with medication might be too simplistic or inaccurate, particularly taking into account that it was not measured by an independent researcher. Our patients were followed for 9 months to establish readmission but for only 6 months to assess BPRS. Perhaps the two followup periods should have been identical.

The sample size in our study was significantly larger than in the majority of previous studies of EE. In addition, mean duration of illness was longer, and mean number of prior admissions was larger. The present rate of first admissions (13.9%) was low compared with other EE studies that examined heterogeneous groups of patients. Hooley and Richters (1995) reported that their sample may have contained the highest proportion of chronic patients that has been studied for EE: approximately 64 percent of their patients had been ill for more than 5 years, with a mean duration of illness since initial hospitalization of 9.8 years. Our sample was characterized by an even higher chronicity: 71 percent of the patients were ill for more than 6 years, with a mean duration of illness of 11.9 years. Because severity of symptoms was not an exclusion criterion, our study broadens the existing prognostic value of high EE to difficult-to-treat chronic patients.

Although the CFI (Vaughn and Leff 1976a) might have yielded a higher rate of high EE (Magana et al. 1986) than the FMSS (Magana et al. 1986) did, our probable underdetection did not affect the predictive ability of the EE index, although it might be relevant to local cultural features. If there was a bias secondary to our use of the FMSS, then we would expect a possible underestimation of the associations determined in this study. Finally, research demonstrating the predictive validity of the FMSS is still scarce (e.g., Otsuka et al. 1994; Uehara et al. 1997); this study confirmed its predictive validity.

**Conclusions**

Our findings are consistent with the majority of previous EE studies with respect to the relationship between familial EE and the short-term clinical course of patients with schizophrenia/schizoaffective disorder. In general, this study is a transcultural replication of previous EE studies, and its findings seem to extend the validity of EE to multicultural and immigrant societies. Our findings support the value of EE as a prognostic measure for the clinical course of mental illness. Moreover, we showed that EE has a predictive power also in samples with more chronic disease.

It appears that irrespective of the cultural setting, EE is related to parameters of both outcome and course of illness; that is, there is a continuum of EE-related indexes. High criticism appears to be the crucial EE component and, as such, should be the focus of psychofamilial therapeutic interventions.
References


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