

## Expressed Emotion and Sociocultural Moderation in the Course of Schizophrenia

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This study examined whether the sociocultural context moderates the relationship between families' expressed emotion (EE) and clinical outcomes in schizophrenia. In a sample of 60 Mexican American caregivers and their ill relatives, we first assessed whether EE and its indices (criticism, emotional overinvolvement [EOI], and warmth) related to relapse. Second, we extended the analysis of EE and its indices to a longitudinal assessment of symptomatology. Last, we tested whether bidimensional acculturation moderated the relationship between EE (and its indices) and both relapse and symptom trajectory over time. Results indicated that EOI was associated with increased relapse and that criticism was associated with increased symptomatology. Additionally, as patients' Mexican enculturation (Spanish language and media involvement) decreased, EE was increasingly related to relapse. For symptomatology, as patients' U.S. acculturation (English language and media involvement) increased, EE was associated with increased symptoms longitudinally. Our results replicate and extend past research on how culture might shape the way family factors relate to the course of schizophrenia.

*Keywords:* schizophrenia, expressed emotion, acculturation, enculturation, Mexican Americans

Schizophrenia is a serious mental illness that burdens afflicted individuals, their families, and society (e.g., Murray & López, 1996). Although biological factors are crucial to understanding schizophrenia, social factors also play a pivotal role in determining outcomes. After hospitalization, patients who return to family environments marked by high levels of criticism, emotional overinvolvement (EOI), or hostility (referred to as high expressed emotion [EE]) are more likely to relapse than those who return to households characterized by low EE. The association between families' level of EE and relapse is robust, with a mean weighted effect size of  $r = .31$  across 27 studies

carried out over three decades across multiple countries (Butzlaff & Hooley, 1998). One proposed mechanism is that EE produces stress (Hooley & Gotlib, 2000), which triggers autonomic arousal, which in turn exacerbates symptoms and leads to relapse (Tarrier & Turpin, 1992).

What is deemed stressful may depend on the sociocultural context (Kymalainen & Weisman de Mamani, 2008; Weisman de Mamani, Kymalainen, Rosales, & Armesto, 2007). Research on EE across different national and ethnic groups has suggested that the sociocultural context may influence the family's emotional climate and levels of EE (Bhugra & McKenzie, 2003). For example, low estimates of EE have been found particularly in Eastern cultural contexts (Japanese: 37%; Tanaka, Mino, & Inoue, 1995; East India: 23%; Leff et al., 1987), with rural settings showing particularly low levels (0%–8% in India; Leff et al., 1990; Wig et al., 1987). The highest estimates have been found in European origin cultural contexts (European Canadian: 61%; King & Dixon, 1999; European American: 67%; Vaughn, Snyder, Jones, Freeman, & Falloon, 1984; and British: 45%; Vaughn & Leff, 1976). Mexican American families have shown rates of high EE at 41% (Karno et al., 1987).

Although variability in the level of EE across sociocultural contexts has been identified, there are limitations to existing culturally focused research. First, a focus on global EE may limit the identification of sociocultural influences on specific family processes. Second, the study of nationality and ethnicity is an important first step to identify the role of culture in the EE–clinical course relationship; however, the existing research has defined culture as categories rather than processes. Last, the focus on

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relapse as the main outcome measure may restrict our understanding of how family factors and culture influence the course of illness.

### The Specificity of Expressed Emotion and Clinical Outcome

The number of critical comments by family members is thought to be the most important predictor of relapse (Kavanagh, 1992). Although early studies examined the relationship between criticism and relapse (e.g., Brown, Birley, & Wing, 1972; Vaughn et al., 1984), this interpretation was largely based on the fact that family members with a high number of critical comments compose the largest proportion of high EE households. The number of family members identified as high in EE due to hostility and EOI is usually much smaller.

More recently, cross-cultural investigations have begun to examine the relationship between specific EE indices and the likelihood of relapse. For example, both Kopelowicz et al. (2002) and López et al. (2004) found that criticism was not related to relapse for Mexican Americans but was related to relapse for European Americans. Breitborde, López, Wickens, Jenkins, and Karno (2007) found that EOI and warmth were predictive of relapse for Mexican Americans. Furthermore, a curvilinear analysis revealed specifically how EOI and warmth were related to relapse. High EOI (a score of 4 on a 0–5 scale) predicted higher than average rates of relapse, whereas moderate EOI (a score of 2) was associated with lower than average rates of relapse. With regard to warmth, high warmth (a score of 4 on a 0–5 scale) predicted lower than average rates of relapse, whereas the relapse rates associated with lower rates of warmth were no different from the average rates of relapse. The focus on specific EE indices begins to suggest how culture may shape the relationship between family factors and course of illness. For these primarily immigrant Mexican American samples, a high degree of EOI is what appears to be most stressful, but at the same time, a moderate level of EOI and a high degree of warmth may be protective against relapse.

These findings suggest a different family dynamic than typically has been observed in studies beginning in England (e.g., Brown et al., 1972) and then extending to the United States (Vaughn et al., 1984) and other countries (e.g., King, 2000). Instead of an emphasis on family negativity (as suggested by the prominence of criticism), it appears that overly close family ties and exaggerated emotional reactions (i.e., high EOI) characterize the family environment most associated with higher rates of relapse for Mexican Americans with schizophrenia. One possible explanation is that emotional closeness may be present at higher rates among Mexican origin families, making this relational style more susceptible to becoming extreme in the face of a serious mental illness.

Identifying ethnic and national differences in how specific EE indices are associated with relapse has important implications for informing the adaptation of evidence-based family interventions (e.g., McFarlane, 2002). Currently, reduction of family negativity, particularly criticism, is the main focus of most family interventions. This contrasts with the observed family dynamic of balancing caring with not too much involvement. Although there have been three studies examining the association between specific EE indices and relapse in Mexican Americans (Breitborde et al., 2007; Kopelowicz et al., 2002; López, et al., 2004), the findings using the

Camberwell Family Interview, the gold standard in measuring EE (Vaughn & Leff, 1976), have been based on data from only one study (Karno et al., 1987). Before efforts are undertaken to adapt existing family interventions, particularly for Mexican Americans, it is important to replicate these findings. Much like two independent findings are needed to establish the evidence base to an intervention (Chambless & Ollendick, 2001), at least two studies should support the need for a specific adaptation. One of our goals with the current study was to carry out another study of Mexican Americans to assess whether the previously observed pattern of specific EE indices and relapse could be replicated.

### Acculturation and Enculturation as Moderators of Family Processes

Another goal of the current study was to further specify the role of sociocultural factors in moderating predictors of outcomes in schizophrenia. Although observing ethnic and national differences in past studies has suggested the possibility that culture plays a role, more direct measures of culture would strengthen cultural explanations. One way to further advance the understanding of culture and EE would be to examine whether acculturation moderates family predictors of schizophrenia outcomes.

Berry (1997) defined *acculturation* as the psychological, behavioral, and attitudinal changes that occur through cultural exchange and contact with different social groups. The process of acculturative change has been conceptualized as a unidimensional process and as a bidimensional process. The unidimensional model proposes that as individuals take on the cultural practices of the host culture, they are continuously losing the practices and values of their culture of origin (i.e., becoming more acculturated). This approach views acculturation as a continuum anchored by two poles—immersion into the culture of origin and immersion into the host culture. The bidimensional model proposes that immersion into the culture of origin and the host culture represent separate dimensions; it assumes that integration into one's culture of origin and integration into the host culture can be independent processes (Cabassa, 2003). We concur with Berry and others who have conceptualized acculturation as being composed of two independent dimensions, and therefore we adopted the bidimensional model to further examine the roles of culture and EE in clinical outcome.

To help distinguish between these two dimensions we use the term *U.S. acculturation* to refer to the process of adopting the English language and European American cultural norms, whereas we use the term *Mexican enculturation* to refer to the process of preserving Spanish language use and Mexican cultural norms. Given the past cross-ethnic findings of Mexican Americans and European Americans, we expected that acculturation and enculturation would moderate the relationship between EE predictors (global EE, criticism, EOI, and warmth) and relapse. For example, given that criticism is related to the course of illness for European Americans but not for Mexican Americans, we expected that criticism would be more associated with relapse with increasing U.S. acculturation and decreasing Mexican enculturation. In contrast, given that warmth is related to course of illness for Mexican Americans and not for European Americans, we hypothesized that warmth would be associated with relapse with decreasing U.S. acculturation and increasing Mexican enculturation.

### Increased Specificity of Outcomes: Longitudinal Symptomatology Versus Relapse

In addition to a closer examination of culture, further scrutiny of outcome measures may also be helpful. Most EE studies have conceptualized outcomes as categories of relapse defined by either hospitalization, the exacerbation of symptoms, or both within a given time period. In contrast with a categorical approach, a symptom-based approach over multiple time points may provide a more fine-grained analysis of the relationship between family factors and clinical functioning within the same time period (e.g., 1 year).

To date, few longitudinal symptom-based studies of EE have been carried out. In one study, Wuerker, Long, Haas, and Bellack (2002) employed growth-curve modeling and found no relationship between EE and patient symptomatology at 1- and 2-year follow-ups. Additionally, King (2000) used a cross-lagged panel analysis and found no significant association between EE and psychotic symptomatology over time. Both studies had the limitation of using only three time points, which may have reduced their ability to detect relationships. Additionally, Wuerker et al. measured EE using the Five Minute Speech Sample, which underestimates the presence of high EE (Weisman de Mamani et al., 2007) and has limited predictive validity (Hooley, 2007). All together, past attempts to assess the relationship between EE and later symptomatology have yielded largely negative findings.

The longitudinal symptom-based approach to studying EE and the course of illness has one major advantage over the study of relapse. It considers a wide range of illness courses that are not included in binary outcomes that focus on the worst stage of illness. The alternative trajectories that can be detected by the assessment of longitudinal symptomatology include (a) patients who improve over time, (b) those who display exacerbations of symptoms that fall below relapse thresholds, and (c) patients with multiple relapses beyond the initial relapse. The ability to identify multiple illness courses may serve to improve the sensitivity of EE measures as they relate to the course of schizophrenia.

### Overview and Hypotheses

The overall objective of this study was to replicate and extend past EE research and to further understand the influence of culture on outcomes in schizophrenia. To replicate past findings regarding the relationship between specific EE components and outcome among Mexican Americans, we first tested whether global EE, criticism, and EOI were associated with a greater likelihood of relapse and whether warmth was associated with a lower likelihood of relapse. To examine the role of acculturation and enculturation, we tested whether the value of each predictor (EE, criticism, EOI, and warmth) varied on the basis of the patients' levels of acculturation and enculturation. We expected that the relationship between "negative" family factors (global EE, criticism, and EOI) and relapse would be greater as U.S. acculturation increased and that the respective associations would decrease as Mexican enculturation decreased. Conversely, we expected that the association between warmth and relapse would also be moderated such that the association between warmth and relapse would be less negative as U.S. acculturation increased and more negative as Mexican enculturation increased. Given that medication adherence

is a strong predictor of outcomes among people with schizophrenia (Zygmunt, Olfson, Boyer, & Mechanic, 2002), we adjusted for adherence in our analyses to assess for relationships above and beyond the influence of medication.

To extend past research with regard to outcomes, we also assessed the relationship of EE and its indices with symptomatology over 1 year. Our specific hypotheses were similar to those for our analysis of relapse, except that our outcome of interest was the slope of symptoms over the period of a year, such that a steeper positive slope of symptomatology would reflect worsening symptoms.

## Method

### Participants

For this study, 60 Mexican Americans with schizophrenia or schizoaffective disorder and a caregiver (i.e., parent, spouse, child, etc.) were recruited from two outpatient mental health centers in the Los Angeles, CA area. Potential participants were identified by mental health professionals and gave their permission to be subsequently contacted by the investigators. Patients were either contacted in person following their visit with a clinician or were contacted by phone. All eligible participants (patients and relatives) were required to be of Mexican descent, be between 18 and 65 years of age, display no evidence of organic impairment or mental retardation, and be able to provide informed consent. Patient participants met *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 2000) criteria for schizophrenia or schizoaffective disorder on the basis of the Structured Clinical Interview for the *DSM-IV* (First, Spitzer, Gibbon, & Williams, 2002). Additionally, patient participants had to be living with or had to have significant contact with a caregiver. The research team communicated with 178 patient and caregiver dyads, of whom 34% participated in the study. Reasons for not having participated included patient and/or caregiver refusal, severe initial symptomatology, not meeting study criteria, and inability to contact one or both members of the dyad.

The mean patient age was 39 years ( $SD = 11.15$ ); 67% of patients were men ( $n = 40$ ), and 33% of patients were women ( $n = 20$ ). More patients were born in the United States (55%;  $n = 33$ ) than in Mexico (45%;  $n = 27$ ). The mean age of the caregivers was 55 years ( $SD = 16.76$ ); 82% ( $n = 47$ ) of the caregivers were female, and 18% were male ( $n = 13$ ). Caregivers preferred speaking Spanish (63%,  $n = 38$ ) more than English (37%,  $n = 22$ ), and of the 37 caregivers for whom birthplace data were available, 70% ( $n = 26$ ) were born in Mexico, and the rest (30%,  $n = 11$ ) were born in the United States. The caregivers in this study included 33 mothers, 7 sisters, 6 wives/girlfriends, 6 fathers, 3 husbands, 3 daughters, 1 brother, and 1 son. Although no data on income were collected from participants, their use of public community mental health centers and their generally low educational attainment (patients:  $M = 10.38$  years,  $SD = 3.54$ ; caregivers:  $M = 7.96$  years,  $SD = 4.42$ ) suggest that they were from low socioeconomic backgrounds.

## Measures

**Camberwell Family Interview (CFI).** We used the abbreviated Camberwell Family Interview (CFI; Vaughn & Leff, 1976), a semistructured interview of a caregiver, to assess for EE and its indices. The CFI elicits attitudes and emotional reactions of the caregiver toward the ill relative in the context of how the illness developed and in the daily life of the ill relative during the last 3 months. The interview is audio-taped and later scored on the dimensions of critical comments, EOI, warmth, positive remarks, and hostility. For this study, the predictors of interest were overall EE ratings, criticism, EOI, and warmth. Hostility was not analyzed independently due to its high correlation with criticism ( $r = .44$ ,  $p < .001$ ) and the already high number of analyses. The number of critical comments and instances of critical tone during the interview ranged from 0 to 14. EOI and warmth are global measures with a range of 0 (*none*) to 5 (*high*). EE was coded as a dichotomous variable; caregivers were designated as high in EE if they expressed six or more critical comments, were rated 4–5 on EOI, and/or had a hostility rating (indicating generalized criticism or rejection). We did not adapt the measurement of EE indices to this specific cultural context because modification makes comparisons to other studies difficult and because the literature is unclear on how adjustments should be made (López et al., 2009).

Three postbachelor's level interviewers and one doctoral student conducted interviews. A team of seven coders rated the CFI interviews. All of the interviewers and all but one of the coders were bilingual and bicultural. Raters were trained on previously scored CFI interviews from past studies (Karno et al., 1987; Vaughn et al., 1984) and from the current study. Intraclass correlation coefficients (ICCs) of each coder's ratings with previous ratings revealed a range of adequate to excellent reliability for each of the EE indices: criticism (.73–.97), EOI (.69–.95), warmth (.73–.94), and hostility (.74–1.0). All coding was reviewed during weekly team meetings. Coders presented the evidence for each rating at these meetings. In more than 50% of the cases, more than one rater coded the interview. In cases of discrepancies between two coders, a consensus was reached in the team meeting, often-times by listening to portions of the taped interview to support a given rating.

**Acculturation and enculturation.** Acculturation and enculturation were measured using the Bidimensional Acculturation Scale (BAS; Marín & Gamba, 1996), which is specifically designed for Latino populations. Participants are asked to indicate on a 1 (*almost never*) to 4 (*almost always*) rating scale their language use (six items), linguistic proficiency (12 items), and electronic media preferences (six items). The responses are divided into two domains (non-Hispanic and Hispanic). The non-Hispanic and Hispanic domains have shown high reliability in previous testing ( $\alpha = .94$  and  $\alpha = .87$ , respectively; Marín & Gamba, 1996) as well as in our sample ( $\alpha = .96$  and  $\alpha = .96$ , respectively). For our purposes, we refer to the non-Hispanic dimension as *U.S. acculturation* and to the Hispanic dimension as *Mexican enculturation*. Although research has suggested that the study of acculturation should include analyses regarding individuals' level of biculturalism (Cabassa, 2003), our sample size prohibited such analyses.

**Medication adherence.** Each psychiatrist visit during the 1-year study period was assessed for medication information and

rated on a scale of 0 (*never took medication*) to 4 (*always took medication*). When information was not reported or was not clear, no rating was given. Additionally, caregivers' references to medication adherence were transcribed from two CFI interviews, one conducted at baseline and the other at the end of the study. Two raters (a postdoctoral fellow and a doctoral student with a master's degree) reviewed both sources and derived a global measure of medication adherence (0–4) during the course of the study. Interrater reliability between the two raters was very good ( $ICC = .87$ ,  $p < .001$ ). These methods have been used in assessing medication adherence in other studies (e.g., Velligan et al., 2006), and the combination of approaches serves to reduce the drawbacks of each individual method alone.

**Symptomatology.** Symptom data were obtained from monthly patient interviews by a team of clinical raters who administered the Expanded Brief Psychiatric Rating Scale (BPRS; Ventura et al., 1993). Symptoms are rated on a scale of 1 (*not present*) to 7 (*highly present and impairing*). Generally ratings of 1–3 are considered indicative of mild symptoms, ratings of 4–5 of moderate symptoms, and ratings of 6–7 of severe and impairing symptoms. We focused on the positive psychotic symptoms, which include hallucinations, unusual thought content, and conceptual disorganization. A team of four clinical raters (one doctoral level psychologist and three doctoral students with master's degrees) carried out the BPRS interviews and ratings. All raters received structured training, and their ratings of training tapes were reliable with previously coded BPRS interviews ( $ICCs > .80$ ). The raters were not knowledgeable of the patient's caregiver's EE ratings. Participants were evaluated an average of six times over a 1-year period ( $SD = 2.53$ ), with a range of one to nine assessments. Although most participants did not have ratings for every month, growth-curve modeling analyses account for missing data and maximize use of available symptom data for each participant. Additionally, for each data point, the number of days since the initial baseline interview was determined, allowing the data of each participant to be based on real time since the initial assessment. Although some participants did have symptom data beyond the 1-year period, we considered only symptom data within 1 year after baseline in order to make more direct comparisons to the relapse analyses that focused on the span of 1 year. Limiting the data to a single year, the mean number of days from first to last assessment was 276 ( $SD = 124.72$ ), with a range of 0 (only baseline) to 365.

**Relapse.** Relapse was based on hospitalization and/or symptom exacerbation and was determined by using multiple sources of information. First, patient charts were reviewed for evidence of hospitalization during the 1-year time period since baseline. Second, computerized medical records for Los Angeles County were assessed for evidence of hospitalization within the same time period. Third, the monthly BPRS ratings were reviewed, and participants were placed in one of three outcome categories: non-relapse, relapse, and severe and persisting symptoms (see Nuechterlein et al., 2006). Using the combination of hospitalization and symptom data, individuals who remained in remission were coded as 0, individuals who relapsed were coded as 1, and individuals with severe and persisting symptoms at the beginning of the study were removed from the relapse analysis.

## Procedure

Baseline interviews were conducted upon entry into the study for both patients and relatives. A variety of measures were included in those interviews, but only CFI interview ratings, acculturation, and symptom data were used for this study. After the baseline interview, patients were phoned monthly to answer another set of questionnaires including the assessment of clinical symptomatology (BPRS).

## Analyses

**Relapse.** Correlational analyses were conducted to assess the interrelations of EE predictors, relapse, and medication adherence. Pearson's correlations were used in the case of two continuous variables, point biserial correlations were used in the case of one dichotomous and one continuous variable, and a phi correlation was used in the case of two dichotomous variables. Separate logistic regression models assessed the unique effects of each predictor variable (EE, criticism, EOI, and warmth) as they related to relapse while adjusting for medication adherence. The first model assessed the relationship of EE with relapse while adjusting for medication adherence. The next model assessed the unique relationship of each EE index (i.e., criticism, EOI, and warmth) while adjusting for medication adherence. Assessing the unique contribution of each EE index while accounting for the influences of other indices has rarely been carried out in this literature. Last, to examine whether acculturation moderates relapse, we tested models that assessed the interactions of each predictor with each acculturation dimension (i.e., U.S. and Mexican) while adjusting for medication adherence. EE indices and acculturation variables were centered to reduce multicollinearity as a result of the high correlation between predictors and interaction terms. To assess both dimensions of acculturation, we conducted parallel analyses using both U.S. acculturation and Mexican enculturation in separate models. Although a previous study highlighted the curvilinear relationship between the EE index of EOI and warmth (Breitborde et al., 2007), an examination of curvilinear relationships is outside the purview of this study; our focus in this article was to assess the relationship of EE with different clinical outcomes and to test for sociocultural moderation. We carried out a curvilinear analysis to examine the specific nature of associations between EE indices and outcomes in a separate report (Breitborde, López, Aguilera, and Kopelowicz, 2010).

**Longitudinal symptomatology.** Using multilevel modeling (MLM), we tested separate models of longitudinal symptom slope. First, to test the relationship of each predictor with symptom trajectory, variables were first individually entered into separate models that assessed the total effect of each variable on symptom slope. Second, we tested a model of the unique effect of each EE index (criticism, EOI, and warmth) while also adjusting for medication adherence. Global EE was not included in this model because it is derived from ratings of criticism and EOI, and, as a result, would be highly correlated with these variables. Last, separate models were run for each EE predictor (global EE, criticism, EOI, and warmth) and the interaction with each acculturation dimension (U.S. acculturation and Mexican enculturation) while adjusting for medication adherence. All variables were grand mean centered. We analyzed longitudinal symptom data using growth-

curve modeling with MLM to model individual change over time and determine if there are differences in rate (i.e., slope) when covaried with independent variables of interest (Bryk & Raudenbush, 2002).

MLM involves modeling at two levels. At Level 1, the symptom ratings were regressed onto a time variable (0 being the first time point and continuing on until the last data point collected). At Level 2, the correlates of change can be tested, which in this study included EE predictors, acculturation dimensions, and the interactions of each predictor variable with each acculturation dimension. Medication adherence was also inserted at Level 2 in order to adjust for its influence. The relationships between variables at Level 2 can be tested with regard to changes over time at Level 1. At Level 2, the Level 1 parameter estimates of slope are treated as criterion scores, and each is regressed on the independent variables. The results are weighted combinations of Level 1 and Level 2 estimates (Bryk & Raudenbush, 2002). A major advantage of MLM is its accommodation of missing data structures by maximizing the predictive ability of all the data, which is omitted with other longitudinal methods such as repeated-measures analysis of variance. Longitudinal multilevel analyses were conducted using HLM6 (Raudenbush, Bryk, Cheong, & Congdon, 2004). The models tested are shown in Table 1.

## Results

### Overview

Two distinct sets of analyses were carried out with the different outcome variables. First, for the relapse analyses, individuals who started with severe and exacerbated symptoms (see Nuechterlein et al., 2006, for specification) and continued that way throughout the study ( $n = 5$ ) were removed, leaving a total of 55 patients. Second, we assessed the outcome of symptom slope trajectory over time including all participants ( $N = 60$ ) in that analysis because it allows for the assessment of change in symptomatology regardless of where the patient begins at baseline. Although some participants dropped out before the end of the study, time in the study and relapse were not significantly related, even when categorizing the five patients with initially severe symptoms as "relapsed" ( $r = -.08, p = .55$ ).

### Descriptive Results

**Relapse.** In total, 33% ( $n = 18$ ) of the 55 participants relapsed in the 1-year period after baseline. Of those who relapsed, nine were categorized solely on the basis of hospitalization(s), three met criteria due to exacerbated symptomatology after a period of remission, and four others met criteria for both hospitalization and exacerbated symptomatology. Finally, two other participants met criteria for relapse because they were placed on involuntary 72-hr holds, as they were judged to be a danger to themselves or others, although they were discharged the same day they were admitted.

**Predictors.** Considering all 60 participants, 43% ( $n = 26$ ) of the caregivers were coded as being high in EE. Of those identified as high in EE, 50% ( $n = 13$ ) met criteria because of high EOI, 19% ( $n = 5$ ) met criteria on the basis of critical comments, 12% ( $n = 3$ ) met criteria on the basis of hostility, and 19% ( $n = 5$ ) met

Table 1  
Longitudinal Multilevel Analysis Models

Model	Equation
Individual variable's total effect (repeated for each variable)	
Level 1	$SYMPTOMS_{ij} = \beta_{0j} + \beta_{1j}(DAYS_{ij}) + r_{ij}$
Level 2	$\beta_{0j} = \gamma_{00} + \gamma_{01}(VARIABLE_J - \overline{VARIABLE_{\bullet}}) + u_{0j}$ $\beta_{1j} = \gamma_{10} + \gamma_{11}(VARIABLE_J - \overline{VARIABLE_{\bullet}}) + u_{1j}$
EE indices and symptomatology	
Level 1	$SYMPTOMS_{ij} = \beta_{0j} + \beta_{1j}(DAYS_{ij}) + r_{ij}$
Level 2	$\beta_{0j} = \gamma_{00} + \gamma_{01}(CRITICISM_J - \overline{CRITICISM_{\bullet}}) + \gamma_{02}(EOI_J - \overline{EOI_{\bullet}}) + \gamma_{03}(WARMTH_J - \overline{WARMTH_{\bullet}}) + \gamma_{04}(MEDADHERE_J - \overline{MEDADHERE_{\bullet}}) + u_{0j}$ $\beta_{1j} = \gamma_{10} + \gamma_{11}(CRITICISM_J - \overline{CRITICISM_{\bullet}}) + \gamma_{12}(EOI_J - \overline{EOI_{\bullet}}) + \gamma_{13}(WARMTH_J - \overline{WARMTH_{\bullet}}) + \gamma_{14}(MEDADHERE_J - \overline{MEDADHERE_{\bullet}}) + u_{1j}$
EE, acculturation, and symptomatology (repeated for each variable)	
Level 1	$SYMPTOMS_{ij} = \beta_{0j} + \beta_{1j}(DAYS_{ij}) + r_{ij}$
Level 2	$\beta_{0j} = \gamma_{00} + \gamma_{01}(VARIABLE_J - \overline{VARIABLE_{\bullet}}) + \gamma_{02}(ACCULTURATION_J - \overline{ACCULTURATION_{\bullet}}) + \gamma_{03}(VARIABLE * ACCUL_J - \overline{VARIABLE * ACCUL_{\bullet}}) + \gamma_{04}(MEDADHERE_J - \overline{MEDADHERE_{\bullet}}) + u_{0j}$ $\beta_{1j} = \gamma_{10} + \gamma_{11}(VARIABLE_J - \overline{VARIABLE_{\bullet}}) + \gamma_{12}(ACCULTURATION_J - \overline{ACCULTURATION_{\bullet}}) + \gamma_{13}(VARIABLE * ACCUL_J - \overline{VARIABLE * ACCUL_{\bullet}}) + \gamma_{14}(MEDADHERE_J - \overline{MEDADHERE_{\bullet}}) + u_{1j}$

Note. Analyses of acculturation tested separate models for U.S. acculturation and Mexican enculturation. EE = expressed emotion; EOI = emotional overinvolvement.

criteria because of elevated ratings on multiple indices. As displayed in Table 2, the mean number of critical comments was relatively low compared with other studies but similar to other Mexican American samples ( $M = 3.27, SD = 3.04$ ). The mean EOI rating ( $M = 2.72, SD = 1.19$ ) and the mean warmth rating ( $M = 2.88, SD = 1.28$ ) were relatively high compared with other studies (e.g., Vaughn & Leff, 1976) but similar to other Mexican American samples (López et al., 2009). Regarding acculturation, on a scale of 1–4 patients were relatively high in both U.S. acculturation ( $M = 2.80, SD = 0.95$ ) and Mexican enculturation ( $M = 2.63, SD = 0.94$ ). Medication adherence was high ( $M = 3.32, SD = 0.79$ ), with the sample as a whole taking medication most of the time.

**Correlations.** An examination of the correlations in Table 2 indicates that the EE indices related to one another in the expected manner. There was a significant negative association ( $r = -.37, p < .01$ ) between number of critical comments and ratings of

warmth, and warmth and EOI were significantly positively related ( $r = .29, p < .05$ ). Regarding relapse, EOI was the only EE measure related to relapse ( $r = .32, p < .05$ ). The global index of EE, as well as criticism and warmth, was not associated with relapse. The other significant correlates of relapse were the U.S. dimension of acculturation ( $r = .28, p < .05$ ) and medication adherence ( $r = -.52, p < .05$ ), which was included as an adjustment variable.

**Relapse**

**Global EE and specific indices.** First, we assessed the independent main effects of each EE index and medication adherence with relapse as the outcome variable. Global EE was not significantly related to relapse when adjusting for medication adherence ( $\beta = 0.50, p = .46$ ). Regarding the EE indices, while adjusting for each EE index and medication adherence, we found that EOI ( $\beta =$

Table 2  
Correlations of Predictors and Relapse ( $N = 60$ , Except for Relapse)

Variable	M	SD	1	2	3	4	5	6	7	8
1. Relapse ( $N = 55$ ) <sup>a</sup>	0.33	0.47	—	.17	.05	.32*	.07	-.14	.28*	-.52*
2. EE <sup>b</sup>	0.43	0.50		—	.58**	.70**	-.30	.06	-.07	-.14
3. Criticism <sup>b</sup>	3.27	3.04			—	.14	-.37**	-.18	.13	-.12
4. EOI <sup>b</sup>	2.72	1.19				—	.29*	-.04	-.10	-.05
5. Warmth <sup>b</sup>	2.88	1.28					—	.04	-.05	.15
6. Mexican enculturation <sup>a</sup>	2.63	0.94						—	-.62**	.01
7. U.S. acculturation <sup>a</sup>	2.80	0.95							—	-.11
8. Medication adherence <sup>a</sup>	3.32	0.79								—

Note. EE = expressed emotion; EOI = emotional overinvolvement.

<sup>a</sup> Patient. <sup>b</sup> Caregiver.  
\*  $p < .05$ . \*\*  $p < .01$ .

0.76,  $p < .05$ ) and medication adherence ( $\beta = -1.88$ ,  $p < .01$ ) independently predicted relapse, whereas criticism and warmth did not predict relapse. Higher EOI was related with a higher likelihood of relapse.

**Cultural moderation of EE.** A relapse prediction model that assessed the interaction between EE and Mexican enculturation, controlling for medication adherence, yielded a significant interaction between EE and Mexican enculturation ( $\beta = -2.47$ ,  $p < .05$ ). This indicates that EE significantly predicted relapse differentially on the basis of level of Mexican enculturation. Post hoc probing of the interaction revealed that the effect was driven by increased relapse levels when Mexican enculturation was low ( $\beta = 3.95$ ,  $p < .01$ ) compared with medium ( $\beta = 0.57$ ,  $p = .52$ ) and high enculturation ( $\beta = -2.82$ ,  $p = .06$ ; see Figure 1). The interactions of the specific EE indices and Mexican enculturation were not significant. In addition, the interactions of global EE and its indices with U.S. acculturation were not significant.

### Longitudinal Symptomatology

**Global EE and specific indices.** In the longitudinal symptom analysis, the relationship between global EE and symptom trajectory was not significant ( $p = .055$ ), but the trend indicated that high EE may be associated with a steeper positive symptom trajectory compared with low EE ratings at baseline. With regard to the specific indices, criticism was the only EE index that independently and significantly predicted the trajectory of symptomatology over the span of 1 year. The results in Figure 2 show that patients living with families in the 75th percentile of critical comments had a steeper positive slope of symptoms when compared with patients living with families in the 25th percentile of critical comments. It is important to note that criticism's relationship with symptom trajectory remained significant when adjusting for other indices of EE (i.e., EOI and warmth) as well as medication adherence (see Table 3).

**Cultural moderation of EE.** A model that assessed the interaction of EE and U.S. acculturation while controlling for medication adherence showed that higher levels of EE were related to a steeper positive symptom slope as U.S. acculturation increased

(coefficient =  $-0.0012$ ,  $p < .05$ ), reflecting the hypothesized relationship (see Figure 3). No other moderation effects of U.S. acculturation and Mexican enculturation were found for EE and its indices as they relate to symptom slope.

### Discussion

Our findings contribute to past culture and expressed emotion (EE) research in important ways. First, we found that emotional overinvolvement (EOI) predicted schizophrenic relapse for Mexican Americans, which replicates the findings of Breithorpe et al. (2007). EOI appears to be the most reliable EE index for predicting relapse in this ethnic group. Of the two CFI-based studies of EE that measured EOI with independent samples of Mexican Americans, both have found a significant association between EOI and relapse. Thus, what may be particularly stressful for these patients, and what may lead to relapse, is some aspect of the caregiver's self-sacrifice, overinvolvement, and exaggerated emotional response. The fact that the mean EOI rating was relatively high ( $M = 2.72$ ,  $SD = 1.19$ ) compared with that of other groups, such as European Americans (López et al., 2009), suggests that this family emotional stance may be particularly salient for this largely immigrant group of Mexican American caregivers. The salience of this emotional stance in this group may make it vulnerable to becoming exaggerated under caregiver stress and in turn contributing to relapse.

We also found that criticism was not related to relapse, which like the EOI finding is consistent with two prior studies of Mexican Americans (Kopelowicz et al., 2002; López et al., 2004). At first glance this appears to present a clear deviation from most EE research that has found criticism to be the primary predictor of poor clinical outcomes. However, our assessment of symptomatology over multiple time points reveals that criticism was related to a positive symptom slope. In other words, a higher level of caregivers' criticism at baseline was associated with more positive symptoms. Thus, criticism appeared to be stressful for this sample, but not stressful enough to increase the likelihood of relapse. It is also possible that criticism leads to relapse regardless of cultural background but that low criticism in this sample requires a higher degree of power to detect significant effects.

Our findings point out the value of assessing symptom functioning over time. We were able to uncover criticism's role in the course of illness, which would have been overlooked had longitudinal symptoms not been examined. One major innovation of our study is the identification of significant relationships between EE variables and symptoms over multiple time points. Although relapse is an important variable to consider for its clinical and practical implications (e.g., hospitalization costs), further research would do well in considering longitudinal symptomatology to increase the understanding of factors that contribute to worsening and even improving outcomes at all levels of symptomatology.

Together, our findings regarding the specific EE indices paint a slightly different picture of the role of the sociocultural context than that suggested by past research. Prior studies have suggested that the sociocultural context determined *which* of the EE indices was related to the course of illness: warmth and EOI for primarily immigrant Mexican Americans and criticism and EOI for European American and British samples. The current findings suggest that, consistent with the seminal studies of EE (e.g., Brown et al.,

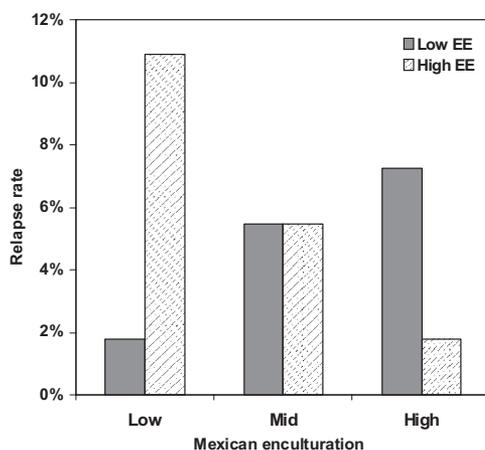


Figure 1. High expressed emotion (EE) was related to the highest rates of relapse among those low in Mexican enculturation.

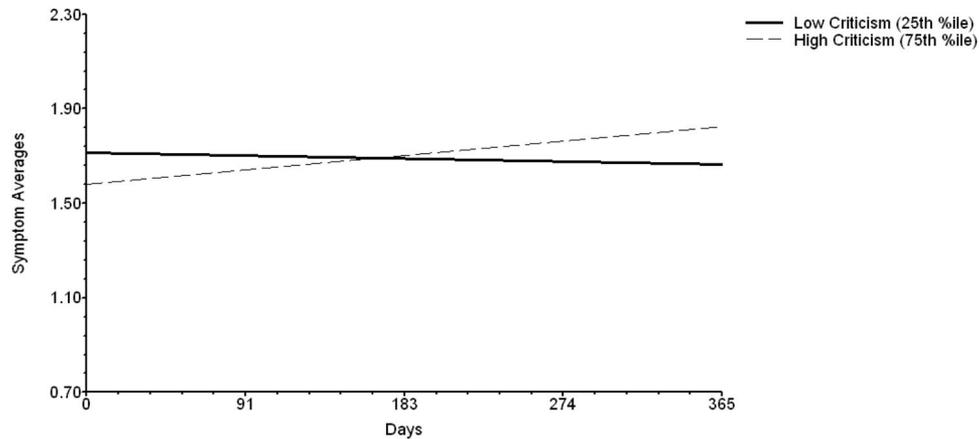


Figure 2. High levels of criticism were predictive of a positive symptom slope, indicating increasingly worsening symptoms over time based on baseline criticism ratings.

1972; Vaughn & Leff, 1976), the key indices of criticism and EOI are associated with the course of illness for persons of both Mexican and European origin. The sociocultural context, however, may influence *how* these indices are related. If one considers Hooley and Gotlib's (2000) conceptualization of EE as stress, then for this Mexican American sample, both EOI and criticism are stressful, but a high degree of EOI may be the most stressful as it relates to increased relapse, whereas criticism leads to increases within the lower range of clinical symptoms.

The acculturation findings shed further light on how the sociocultural context may shape the way family factors are related to the course of schizophrenia. We found that the global EE-relapse relationship was moderated by Mexican enculturation. Specifically, EE was associated with relapse to a greater extent for those who were at lower levels of Mexican enculturation compared with those who were more enculturated (i.e., speak more Spanish). In a complementary fashion, the association between global EE and longitudinal symptomatology was moderated by U.S. acculturation. This indicates that EE is related to a worsening set of symptoms for those ill relatives with higher levels of U.S. acculturation. In sum, EE is most associated with a negative course for

those ill relatives at higher levels of U.S. acculturation or those at lower levels of Mexican enculturation. The EE by acculturation findings are the second important contribution of this study, as they go beyond past cross-ethnic research to identify within-group cultural processes associated with the EE-course relationship.

To interpret the specific sociocultural processes suggested by the acculturation findings, we draw on both Hooley and Gotlib's (2000) conceptualization of EE as stress and Breitborde, López, and Nuechterlein's (2009) conceptualization of EE as threats to personal agency. High EE as defined by both EOI and criticism may be toxic by encroaching on an individual's sense of autonomy and agency, which contributes to autonomic arousal that exacerbates symptomatology and leads to relapse. This relationship appears to be more pronounced in cultural contexts that value autonomy and independence versus interpersonal connectedness, as suggested by the findings that the association between EE and relapse is greatest for patients with lower levels of Mexican enculturation and that the association between EE and longitudinal symptoms is greatest for patients at higher levels of U.S. acculturation. In contrast, patients who are less acculturated and more enculturated may have more interdependent values that are con-

Table 3  
*EE Indices' Effects on Longitudinal Symptomatology Adjusting for Medication Adherence*

Fixed effect	Coefficient	SE	T ratio	df	p
Intercept					
Constant	1.62	0.12	13.77	55	.001**
Criticism	-0.05	0.04	-1.25	55	.22
EOI	0.10	0.11	0.91	55	.37
Warmth	-0.01	0.11	-0.13	55	.90
Medication adherence	-0.14	0.15	-0.88	55	.38
Slope					
Constant	0.0006	0.0003	2.09	55	.04
Criticism	0.0003	0.0001	2.76	55	.01*
EOI	-0.0002	0.0002	-0.66	55	.51
Warmth	0.0004	0.0002	1.72	55	.09
Medication adherence	-0.0008	0.0004	-2.29	55	.03*

Note. EE = expressed emotion; EOI = emotional overinvolvement.  
\*  $p < .05$ . \*\*  $p < .01$ .

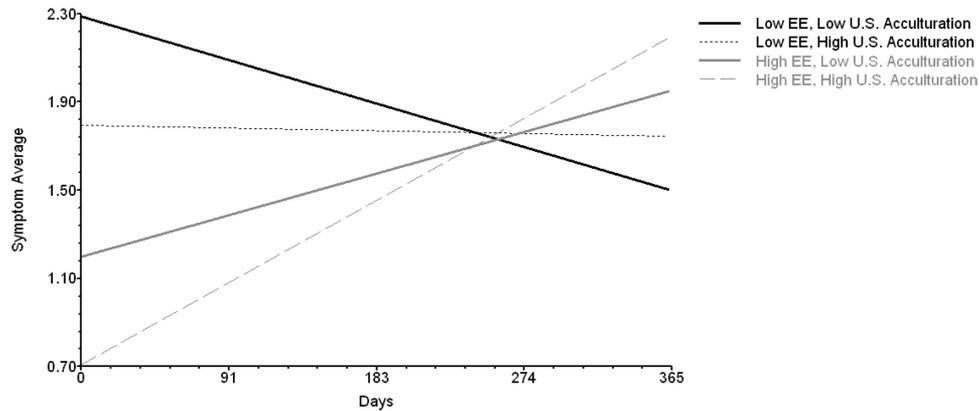


Figure 3. U.S. acculturation was a moderator such that high expressed emotion (EE) predicted the steepest positive slope of symptoms for those high in U.S. acculturation, whereas for those low in U.S. acculturation, high EE predicted a positive but less steep symptom trajectory.

sistent with higher levels of family involvement, making EE less stressful (Weisman de Mamani et al., 2007).

In addition to considering how cultural values of autonomy and interdependence may explain these findings, an alternative mechanism may lie in the social world. For patients with high U.S. acculturation and low Mexican enculturation, family support may be less available than for those patients with low U.S. acculturation and high Mexican enculturation. This is consistent with Jenkins's (1991) observations that family ties are an important part of the sociocultural fabric of Mexicans. One must also consider that immigrant populations are not only new to the United States but tend to be of low socioeconomic status. Given fewer social and capital resources, there may be considerable reliance on available family support, which may provide a higher tolerance for and limit the impact of criticism and overinvolvement because patients greatly depend on their families. Additionally, family conflict may increase between ill relatives and caregivers as patients acculturate to the United States and become lower in Mexican enculturation compared with their caregivers (usually parents), contributing to worsening outcomes (Alegría et al., 2007).

A third factor that may contribute to the differential relationships to illness course is the variability of the range of families' responses across sociocultural contexts. Given restricted ranges, one is less likely to find significant associations. For example, for this sample of Mexican Americans the range of critical comments was 0 to 14. This is a more limited range than that of the European American sample in the Vaughn et al. (1984) study (0 to 24 critical comments). Thus, in addition to sociocultural processes influencing the meaning ascribed to family reactions, those processes may also shape the range of families' emotional stances. For example, a limited range can in turn affect the detection of significant associations between family factors and course of illness.

### Limitations

Two potential problems with our analysis were relatively low power and the large number of analyses. Accordingly, it is important to interpret the findings (both positive and negative) with caution. However, given the low power, it is striking that we found evidence for sociocultural moderation. These findings warrant

further research with larger sample sizes that allow for greater power. Also because similar models were analyzed twice to assess for both U.S. acculturation and Mexican enculturation, we increased the chance of Type I error (i.e., detecting false positive effects). This issue is particularly relevant when considering that moderating effects of EE with relapse and symptom trajectory were observed with distinct dimensions of acculturation. Given their strong negative relationship to each other ( $r = -.62, p < .01$ ), one might expect the moderation effects to be opposite and of similar strength, but it is possible that each dimension is culturally unique and provides unique influences. This issue merits further study for increasing knowledge about the influence of bidimensional acculturation.

It is important to note that the relapse ratings were based largely on hospitalizations. It is possible that the relationship between EOI and relapse could be driven, at least in part, by highly involved family members who are more likely to seek care than those family members lower in EOI (Hooley, 2007). Given that our measure of acculturation relied mostly on language, it may also be related to service accessibility. That is, people who speak English well may be better able to access services than those who do not speak English well. Higher relapse rates among highly U.S. acculturated individuals therefore could in part reflect their abilities to identify and use appropriate services. The study of EE and help seeking, particularly as it relates to hospitalization, would shed some light on their possible interrelation. On a related note, the strength of assessing symptom trajectory is that it is largely independent of the caregiver's proclivity to seek services.

### Implications

The findings have important implications for understanding the course of schizophrenia and for the cultural adaptation of family treatment. On the one hand, the results that EOI and criticism are related to the course of schizophrenia suggest that available behavioral family interventions may be applicable for primarily immigrant Mexican Americans without modification. On the other hand, the findings that (a) EOI is the single EE predictor associated with relapse and that (b) acculturation and enculturation moderate the association between EE and course of illness argue for adap-

tation. These results are consistent with a prior clinical trial that indicated that low acculturated Latino families did worse with traditional behavioral family treatment and its emphasis on a reduction of negativity than with usual care (Telles et al., 1995). At the very least, more attention should be directed at families' EOI than is currently the case in existing behavioral family interventions (Falloon et al., 1985; McFarlane, 2002). Now that there are two independent findings that EOI predicts relapse for primarily immigrant Mexican Americans, a module is needed that strictly addresses EOI. However, we caution against the development of a Mexican American or any other group-specific family treatment that should be applied to families given their ethnicity. The acculturation findings argue against such a fixed notion of cultural adaptation for an ethnic group.

We believe that treatments should recognize and incorporate diverse sociocultural stances regarding negativity and EOI in order to focus on aspects of relational functioning that are providing the most stress to patients and caregivers (Kymalainen & Weisman de Mamani, 2008). This would call for the development of a clinical assessment tool that can identify the emotional climate(s) and sources of conflict that should be targeted on the basis of what is most stressful and damaging to the patient. The prior findings of ethnic differences and the current findings of acculturation alert us to the need for adaptations that can be used flexibly depending on the particular family's emotional and cultural context.

Although our article focused on Mexican Americans specifically, the findings of this study are relevant more broadly, considering cultural diversity in value systems and social contexts across and within ethnic groups worldwide. For example, studies in Japan have also found EOI to be a consistent predictor of relapse, despite the low baseline rates of the index (Tanaka et al., 1995). Further attention to EE indices and to sociocultural context can highlight the variable ways in which individuals respond to psychosocial stressors in diverse contexts. Our findings of cultural variability merit further investigation among other groups and potentially in other mental disorders.

## Conclusion

Our findings advance the understanding of the role of culture and its relationship to families' expressed emotion (EE) and the course of schizophrenia. In contrast with the general EE literature, we found that emotional overinvolvement (EOI) was the dominant risk factor for relapse for our sample of Mexican Americans. We also observed that assessing clinical functioning over time can detect associations of EE and course of illness that were not previously observed with this ethnic group. Finally, we found that acculturation and enculturation moderated the relationship between EE and clinical outcomes; EE related to poorer outcomes when individuals identified with U.S. cultural contexts and less so with Mexican cultural contexts. Together these findings point out that the determinants of clinical outcomes can vary depending on the sociocultural context. Attention to the nuances of culture as they relate to family factors and the course of mental illness can also help inform the cultural adaptation of available treatment regimens.

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