Expressed Emotion and Sociocultural Moderation in the Course of Schizophrenia

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Abstract

This study examines whether the sociocultural context moderates the relationship between families' expressed emotion and clinical outcomes in schizophrenia. In a sample of 60 Mexican-American caregivers and their ill relatives, we first assessed whether expressed emotion (EE), and its indices (criticism, EOI and warmth), relate to relapse. Secondly, we extended the analysis of EE and its indices to a longitudinal assessment of symptomatology. Last, we tested whether bidimensional acculturation moderates 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 the patient's 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 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 expressed emotion 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) that 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, 2007; Weisman de Mamani, Kymalainen, Rosales, & Armesto, 2007). Research on expressed emotion across different national and ethnic groups suggests 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 particularly been found in Eastern cultural contexts (Japanese; 37% [Tanaka, Mino & Inoue, 1994], East India; 23% [Leff et al., 1987]) with rural settings showing particularly low levels (0-8% in India; Wig et al., 1987; Leff et al., 1990). The highest estimates have been found in European origin cultural contexts (Euro-Canadian; 61% [King & Dixon, 1999], Euro-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 expressed emotion 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, it defines culture as categories rather than processes. Last, the focus on 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 of criticism and relapse (e.g., Brown, Birley & Wing, 1972, and Vaughn et al., 1984), this interpretation is largely based on the fact that family members with a high number of critical comments comprise the largest proportion of high EE households. Family members identified as high EE due to hostility and emotional overinvolvement are usually much smaller in number.

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 Euro-Americans. Breitborde and colleagues (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 while 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 while 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 of 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 observed with the studies beginning in England (e.g., Brown, Birley & Wing, 1972) and then extending to the United States (Vaughn et al., 1986) 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 without too much involvement. Although there are three studies examining the association between specific EE indices and relapse of 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), are 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 is to carry out another study of Mexican-Americans to assess whether the previously observed pattern of specific EE indices and relapse can be replicated.

Acculturation and Enculturation as Moderators of Family Processes

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

Berry (1997) defines 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 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 host culture represent separate dimensions and 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 (1997) and others who conceptualize acculturation as being comprised of two independent dimensions and therefore adopt the bidimensional model to examine further the role of culture, expressed emotion, and 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 Euro-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 Euro-Americans, we expect that acculturation and enculturation will

moderate the relationship of EE predictors (global EE, criticism, EOI and warmth) and relapse. For example, given that criticism is related to the course of illness for Euro-Americans but not for Mexican-Americans, we expect that criticism will 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 Euro-Americans then we hypothesize that warmth will be associated with relapse with decreasing U.S. acculturation and increasing Mexican enculturation.

Increased Specificity of Outcomes: Longitudinal Symptomatology vs. 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 to a categorical approach, a symptom-based approach over multiple time points may provide a more fine-grained analysis of the relationship of family factors and clinical functioning within the same time period (e.g., 1 year).

To date, few longitudinal symptom-based studies of expressed emotion have been carried out. In one study, Wuerker and colleagues (2002) employed growth-curve modeling and found no relationship between EE and patient symptomatology at one and two-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 that may have reduced their ability to detect relationships. Additionally, Wuerker et al. (2002) measured EE using the Five Minute Speech Sample (FMSS), which underestimates the presence of high EE (Weisman de Mamani et al., 2007) and has limited predictive validity (Hooley, 2007). Altogether, 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. Among 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 is to replicate and extend past expressed emotion research and to further understand the influence of culture on outcomes in schizophrenia. To replicate past findings regarding the relationship of specific EE components and outcome among Mexican-Americans, we first tested whether global EE, criticism, and EOI are associated with a greater likelihood of relapse and whether warmth is 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 based on the patients' levels of acculturation and enculturation. We expected that the relationship between "negative" family factors (global EE, criticism, and EOI) 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 of warmth and relapse would be less negatively related as U.S. acculturation increased and more negatively related 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 expressed emotion and its indices with symptomatology over 12 months. Our specific hypotheses were the same as 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 reflected worsening symptoms.

Methods

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 to be able to provide informed consent. Patient participants met DSM-IV criteria for schizophrenia or schizoaffective disorder based on 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 which 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 ($SD = 11.15$) and 67% of patients were males ($n = 40$). More patients were born in the U.S. (55%; $n = 33$) than in Mexico. The mean age of the caregivers was 55 ($SD = 16.76$) and 82% ($n = 47$) of the caregivers were female. Caregivers preferred speaking Spanish (63%, $n = 38$) more than English and for 37 caregivers for whom birthplace data were available, 70% ($n = 26$) were born in Mexico and the rest in the U.S. The caregivers in this study included 33 mothers, 7 sisters, 6 wives/girlfriend, 6 fathers, 3 husbands, 3 daughters, 1 brother, and 1 son. Although no data on income was 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 are from low socioeconomic backgrounds.

Measures

Camberwell Family Interview (CFI)—We used the abbreviated Camberwell Family Interview (CFI, Vaughn & Leff, 1976), a semi-structured 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 three months. The interview is audio-taped and later scored on the dimensions of critical comments, emotional overinvolvement (EOI), warmth, positive remarks and hostility. For this study, the predictors of interest are overall EE ratings, criticism, EOI and warmth. Hostility was not analyzed independently due to the high correlation with criticism ($r = 0.44$, $p < .001$) 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 is

coded as a dichotomous variable; caregivers are designated as high 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 (Lopez et al., 2009).

Three post-BA 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 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, oftentimes 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 their 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 ($\alpha = .94$; $\alpha = .87$; Marín & Gamba, 1996) as well as in our sample ($\alpha = .96$; $\alpha = .96$). For our purposes, we will refer to the non-Hispanic dimension as "U.S. acculturation" and to the Hispanic dimension as "Mexican enculturation." Although research suggests 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 12-month 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 post-doctoral 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 1-7 with one being not present and seven being highly present and impairing. Generally ratings of 1-3 are considered mild symptoms, ratings of 4-5 are considered moderate symptoms, and ratings of 6-7 are considered 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 Ph.D. psychologist and 3 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 6 times over a one 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 maximizes 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 one-year period, we only considered symptom data within one year after baseline in order to make more direct comparisons to the relapse analyses that focused on the span of one 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 one 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 is rarely carried out in this literature. Lastly, 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 paper is to assess the relationship of EE with different clinical outcomes and to test for sociocultural moderation. We carry out a curvilinear analysis to examine the specific nature of associations between EE indices and outcomes in a separate report (Breitborde, Lopez, Aguilera, and Kopelowicz, under review).

Longitudinal symptomatology—Using hierarchical linear modeling (HLM), 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. Secondly, 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 since it is derived from ratings of criticism and EOI, and, as a result, would be highly correlated with these variables. Lastly, 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 HLM 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).

HLM 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 include EE predictors, acculturation dimensions and the interactions of the 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 HLM 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 ANOVA. Longitudinal multilevel analyses were conducted using HLM6 (Raudenbush, Bryk, Cheong & Congdon, 2004).

The models tested were the following:

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[1] and Symptomatology (Repeated for each variable)

Level 1

$$SYMPTOMS_{ij}=\beta_{0j}+\beta_{1j}(DAYS_{ij})+r_{ij}$$

Level 2

$$\beta_{0j}=\gamma_{00}+\gamma_{01}(VARIABLE_J - \overline{VARIABLE})+\gamma_{02}(ACCULTURATION_J - \overline{ACCULTURATION_\bullet})$$
$$+\gamma_{03}(VARIABLE*ACCUL_J - \overline{VARIABLE*ACCUL_\bullet})+\gamma_{04}(MEDADHERE_J - MEDADHERE_\bullet)+u_{0j}$$

$$\beta_{1j}=\gamma_{10}+\gamma_{11}(VARIABLE_J - \overline{VARIABLE_\bullet})+\gamma_{12}(ACCULTURATION_J - \overline{ACCULTURATION_\bullet})$$
$$+\gamma_{13}(VARIABLE*ACCUL_J - \overline{VARIABLE*ACCUL_\bullet})+\gamma_{14}(MEDADHERE_J - \overline{MEDADHERE_\bullet})+u_{1j}$$

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. Secondly, 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

[1]Analyses of acculturation tested separate models for U.S. acculturation and Mexican enculturation.

study, time in the study and relapse were not significantly related, even when categorizing the 5 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 one-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-hour 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 EE. Of those identified as high EE, 50% ($n = 13$) met criteria because of high EOI, 19%, ($n = 5$) met criteria based on critical comments, 12% ($n = 3$) met criteria based on hostility, and 19% ($n = 5$) met criteria because of elevated ratings on multiple indices. As displayed in Table 1, the mean number of critical comments was relatively low compared to 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 to other studies (e.g. Vaughn & Leff, 1976) but similar to other Mexican-American samples (Lopez 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 1 indicates that the EE indices relate to one another in the expected manner. There was a significant negative association ($r = -.37$, $p < .01$) between numbers of critical comments and ratings of warmth, and warmth and EOI are significantly positively related ($r = .29$, $p < .05$). Regarding relapse, EOI is the only EE measure related to relapse ($r = .32$, $p < .05$). The global index of EE, as well as criticism and warmth were 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 ($\beta = 0.76$, $p < .05$) and medication adherence ($\beta = -1.88$, $p < .01$) independently predicted relapse while 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 predicts relapse differentially based on level of Mexican enculturation. Post hoc probing of the interaction revealed that the effect is driven by increased relapse levels when Mexican enculturation is low ($\beta = 3.95$, $p < .01$) compared to 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 have a steeper positive slope of symptoms when compared to 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 2).

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 (*coef* = -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 research in important ways. First, we found that EOI predicts schizophrenic relapse for Mexican-Americans, which replicates the findings of Breitborde and collegues (2007). EOI appears to be the most reliable EE index for predicting relapse in this ethnic group. Of the two CFI-based studies of expressed emotion that measured EOI with independent samples of Mexican-Americans, both have found a significant association of 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 to other groups, such as Euro-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 particularly vulnerable to becoming exaggerated under the caregiver stress and in turn toxic for the patient contributing to relapse.

We also found that criticism was not related to relapse, which like the EOI finding is consistent with two prior studies with 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 finds 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 appears 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 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 Euro-American and British samples. The current findings suggest that consistent with the seminal studies of expressed emotion (e.g., Brown, Birley & Wing, 1972 and 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 expressed emotion 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 is moderated by Mexican enculturation. Specifically, EE is associated with relapse to a greater extent for those who are at the lower levels of Mexican enculturation compared to those who are more enculturated (i.e. speak more Spanish). In a complementary fashion, the association between global EE and longitudinal symptomatology is 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 expressed emotion as stress and Breitborde, López, and Nuechterlein's (2009) conceptualization of expressed emotion as threats to personal agency. High EE as defined by both emotional overinvolvement 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 than interpersonal connectedness as suggested by the findings that the association of EE and relapse is greatest for patients with lower levels of Mexican enculturation and that the association of 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 consistent 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' (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 since patients greatly depend on their families. Additionally, family conflict may increase between ill relatives and caregivers as patients acculturate to the U.S and become lower in Mexican enculturation compared to 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 is 0 to 14. This is a more limited range than that of the Euro-American sample in the Vaughn et al. (1984) study (0 to 24 critical comments). Thus, in addition to sociocultural process 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 are 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 be reflective in part of their abilities to identify and use appropriate services. The study of expressed emotion 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 (b) that acculturation/enculturation moderate the association between EE and course of illness argue for adaptation. 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 usual care (Telles et al., 1995). At the very least, more attention should be directed at families' emotional overinvolvement 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 emotional overinvolvement. 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 emotional overinvolvement in order to focus on aspects of relational functioning that are providing the most stress to patients and caregivers (Kymalainen & Weisman de Mamani, 2007). 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 based on 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 paper focused on a 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, 1994). 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 and course of schizophrenia. In contrast to the general expressed emotion literature, we find that emotional overinvolvement is the dominant risk factor for relapse for our sample of Mexican-Americans. We also observed that assessing the 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 moderate the relationship between expressed emotion and clinical outcomes; EE relates to poorer outcomes when individuals identify 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.

Acknowledgments

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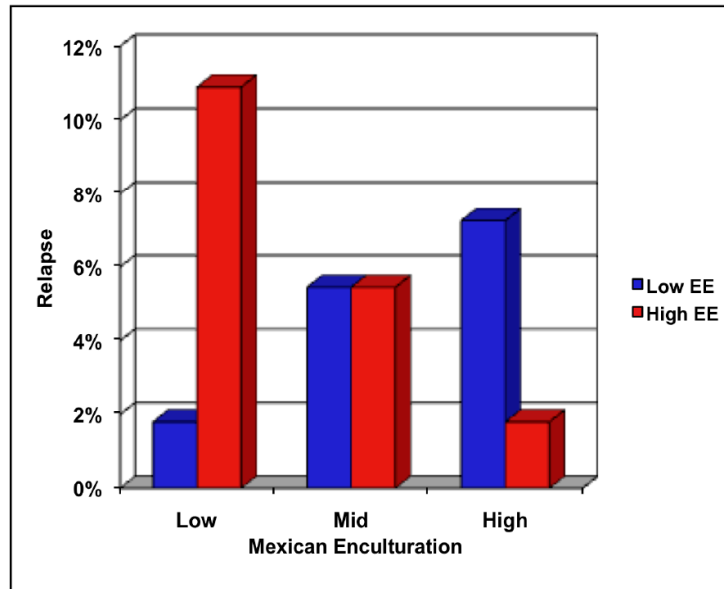
Figure 1.
High EE is related with the highest rates of relapse among those low in Mexican enculturation.
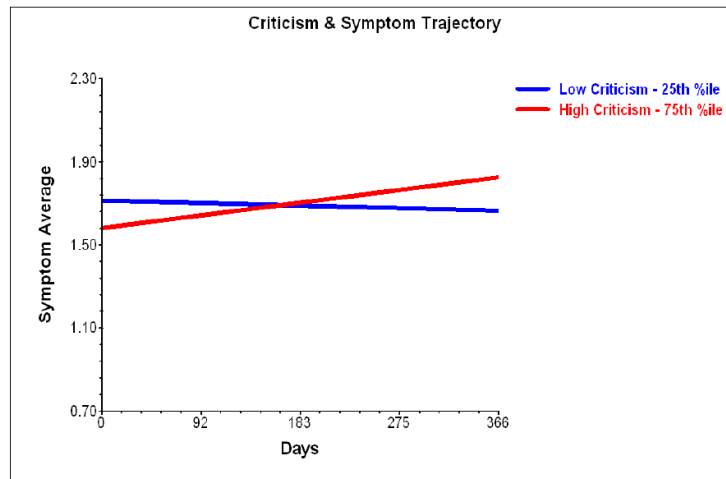
Figure 2.
High levels of criticism are predictive of a positive symptom slope indicating increasingly worsening symptoms over time based on baseline criticism ratings.
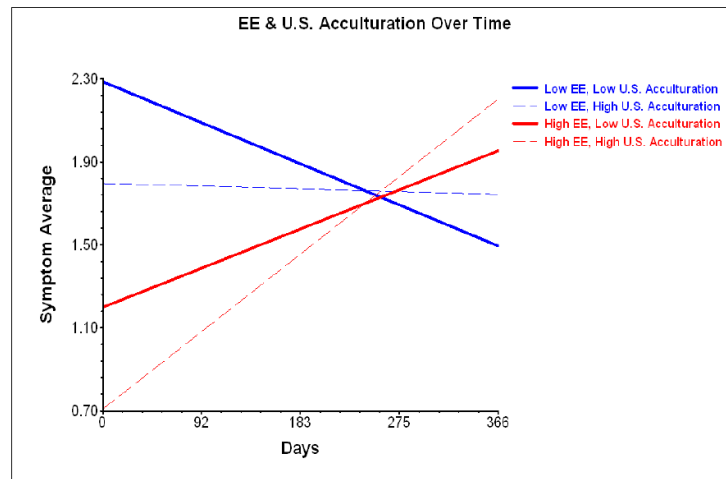
Figure 3.
U.S. acculturation is a moderator such that High EE predicts the steepest positively slope of symptoms for those high in U.S. acculturation, whereas for those low in U.S. acculturation, high EE predicts a positive but less steep symptom trajectory.

Table 1

Correlations of predictors and relapse (N = 60, except for Relapse)

Variable Name	M	SD	2	3	4	5	6	7	8
1. Relapse (*N* = 55) §	0.33	0.47	.17	.05	.32*	.07	-.14	.28*	-.52*
2. EE #	0.43	0.50	----	.58**	.70**	-.30	.06	-.07	-.14
3. Criticism #	3.27	3.04		----	.14	-.37**	-.18	.13	-.12
4. EOI #	2.72	1.19			----	.29*	-.04	-.10	-.05
5. Warmth #	2.88	1.28				----	.04	-.05	.15
6. Mexican Enculturation §	2.63	0.94					----	-.62**	.01
7. U.S. Acculturation §	2.80	0.95						----	-.11
8. Medication Adherence §	3.32	0.79							----

*
p < .05;

**
p < .01,

§Patient,

#Caregiver

Table 2

EE Indices Effects on Longitudinal Symptomatology Adjusting for Medication Adherence

Fixed Effect	Coefficient	S.E.	T-ratio	d.f.	p-value
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
Med 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
Med Adherence	-0.0008	0.0004	-2.29	55	*.03*