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Nicholas J.K. Breitborde · Steven R. López · Christina Chang · Alex Kopelowicz · Roberto Zarate

Emotional over-involvement can be deleterious for caregivers' health

Mexican Americans caring for a relative with schizophrenia

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Abstract The study of emotional over-involvement (EOI) has focused primarily on its relationship with patients' course of illness. We know little about the predictors and possible consequences of EOI for caregivers. Based on past research, we tested the hypotheses that EOI is associated with worse physical and psychological health among caregivers and examined whether caregiver burden and social support may mediate this relationship. *Method* In a sample of 37 Mexican American caregivers and their ill relatives recruited from two outpatient clinics, we examined the relationships between EOI, caregiver burden, caregivers' level of social support, and caregivers' health. Additionally, we examined whether caregiver burden and social support may mediate the relationship between EOI and caregivers' health. Cross-sectional analysis indicates that at baseline EOI was not associated with caregiver burden or social support, but was related to worse current health. Longitudinal analysis, however, indicates that EOI at baseline was associated with greater burden, less instrumental support, and worse health among caregivers at follow-up. Moreover, objective burden and instrumental support mediated the relationship between EOI and several health outcomes. Conse-

quently, EOI may be a marker of poor current health status and predicts worse future health among Mexican-American caregiving relatives of individuals with schizophrenia. Moreover, changes in burden and social support associated with EOI appear to mediate the relationship between EOI and several health outcomes among caregivers. These findings suggest that it might be important for family interventions to not only address the functioning of individuals with schizophrenia but also their caregiving relatives.

Key words expressed emotion – schizophrenia – caregiver health – caregiver burden – social support

Introduction

It is clear from past research that family factors influence the course of schizophrenia. The strongest support for this claim comes from studies of expressed emotion (EE) [5]. To date, a plethora of studies have demonstrated that individuals with schizophrenia who are exposed to familial environments characterized by high levels of criticism, emotional over-involvement, and/or hostility (high EE) are more likely to suffer a relapse than individuals who are exposed to familial environments in which the presence of these variables is low (low EE) [6].

Although, the association between EE and relapse exists among individuals from a variety of ethnic and cultural backgrounds, the *nature* of this association appears to vary across different ethnic and cultural populations [14]. For example, although the dichotomous EE variable (high EE vs. low EE) predicts relapse among Mexican-Americans with schizophrenia [16, 20], there is an important caveat with regard to the relationship. Specifically, whereas the EE index of criticism has traditionally been thought to play the predominant role in the association between the

N.J.K. Breitborde (✉)
Dept. of Psychiatry, STEP Program
Yale University
34 Park St, Room B38
New Haven (CT) 06519, USA

S.R. López
Dept. of Psychology
University of Southern California
Los Angeles (CA), USA

C. Chang · A. Kopelowicz · R. Zarate
Dept. of Psychology
University of California
Los Angeles (CA), USA

dichotomous EE variable (high EE vs. low EE) and relapse [17], this is not the case for Mexican-Americans. Rather, criticism is not related to the course of illness for Mexican-Americans [20, 22], and the EE index of emotional over-involvement (EOI) appears to account for the association between the dichotomous EE variable and relapse [4]. The central role of EOI in the EE-relapse association for Mexican-Americans is especially noteworthy given past research highlighting the importance and health benefits of close family ties among Mexican-Americans [22, 36], and suggests a potential tension between the benefits of close family ties and the toxicity of EOI in the recovery process in schizophrenia. Consequently, clarifying the factors associated with EOI among Mexican-Americans may serve to broaden our knowledge of how expressed emotion is related to the course of illness and inform the development and implementation of effective family treatment programs for Mexican-Americans with schizophrenia.

It is important to note, though, that studies of EOI (and EE in general) among individuals caring for a relative with schizophrenia suffer from a key limitation. Specifically, they fail to consider that EOI may also have a deleterious effect on the caregiver. Past studies of both Mexican-American and non-Mexican-American caregivers have indicated a clear link between EOI and increased burden [15, 19] and reduced social support [3, 15]—two risk factors for negative health outcomes among familial caregivers [11, 12, 44], see also [8, 40]. Consequently, if high EOI is associated with high burden and low social support, one would expect that caregivers high in EOI would be at an increased risk for negative health consequences themselves. In total, these findings raise the possibility that EOI may be a risk factor for poor health among caregivers and that burden and/or social support may mediate the relationship between EOI and caregivers' health. This hypothetical multiple mediator relationship is depicted in Fig. 1.

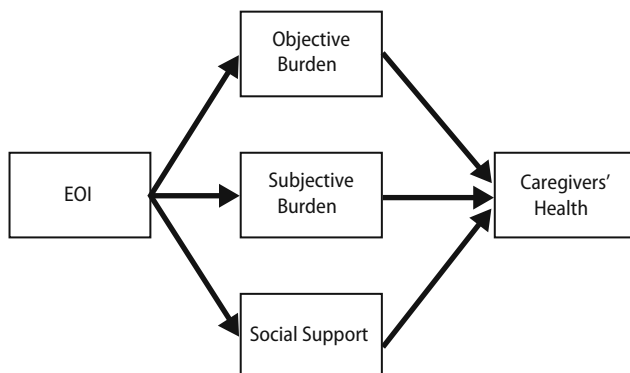


Fig. 1 Hypothetical relationship of objective burden, subjective burden, and social support as mediators of the association between EOI and caregivers' health

■ Study goals

The goal of this longitudinal study is to replicate and extend previous findings with regard to the relationship between EOI, caregiver burden, social support, and caregivers' health among Mexican-Americans caring for a relative with schizophrenia. First, drawing on past findings, we expect that EOI will be related to greater levels of caregiver burden and lower social support. Second, we test the hypothesis that EOI will be associated with poorer physical health and emotional well-being. Finally, we explore whether burden and social support may mediate the relationship between EOI and caregivers' health.

Method

■ Participants

For this study, 60 Mexican-American individuals with schizophrenia or schizoaffective disorder and their caregiving relatives were recruited from two outpatient mental health clinics in southern California to participate in a longitudinal study of family factors and schizophrenia. The vast majority of individuals receiving services at these two mental health clinics were eligible to receive publicly-funded health insurance due to their low-income status. As such, our sample was comprised largely of individuals from low-income families. For this study, we report data from the 37 families that completed both the baseline and follow-up assessment (62% completion rate). Eligible individuals (both caregivers and their ill relatives) needed to be (a) of Mexican origin (based on self-identification) and (b) have no evidence of mental retardation or organic impairment. Additionally, eligible ill individuals (a) needed to meet DSM-IV criteria for schizophrenia or a schizophrenia-spectrum disorder based on the Structured Clinical Interview for the DSM-IV [10], (b) be between the ages of 18–65, and (c) be able to provide informed consent.

The key relatives in this study included 20 mothers, 5 fathers, 4 sisters, 1 brother, 3 wives, 2 husbands, 1 daughter, and 1 son. The mean age for key relatives was 56.03 (SD = 16.85). The ill individuals in this study included 23 men and 14 women with an average age of 38.41 (SD = 11.81). Among the ill individuals, 30 were diagnosed with schizophrenia, and 7 were diagnosed with schizoaffective disorder.

■ Procedure

Upon admission to the study, caregivers were assessed in the four domains of perceived social support, caregiver burden, health status, and EOI. Caregivers' perceived social support, caregiver burden, health status, and EOI were re-assessed on average 12.7 months later (SD = 2.84; Range: 8.9–22.7).

■ Measures

Caregivers' emotional over-involvement

EOI at baseline and follow-up was assessed through the abbreviated Camberwell family interview (CFI) [41]). The CFI is a 1–2 h semi-structured interview administered to a caregiving relative that is used to assess the five indices of EE: critical comments, EOI, hostility, positive remarks, and warmth. Ratings of EOI are based on

reports of self-sacrificing, devoted, or extremely overprotective behavior elicited by the interview as well as key relatives' behavior during the administration of the interview such as displays of emotional distress, statements of how the illness has affected the caregiver's life, and dramatization of minor events. Based on these criteria, caregivers receive an EOI rating from 0 to 5, with 0 indicating no EOI and 5 indicating extreme EOI. All coders completed a training program and reached adequate to excellent levels of reliability on this index before coding data for this study (intraclass correlations 0.69–0.95).

Caregivers' social support

The social support provided to caregivers was assessed through a 6-item questionnaire based on items taken from the Arizona Social Support Interview Schedule [2]. This questionnaire asks caregivers to rate their access to six different domains of social support: (a) emotional support (i.e., the ability to share private feelings with someone); (b) tangible support (i.e., material aid); (c) informational support (i.e., advice); (d) appraisal support (i.e., positive feedback); (e) instrumental support (i.e., physical assistance); and (f) social companionship (i.e., social participation) from 1 (Not At All) to 5 (Always). This measure possessed good internal consistency among the participants at baseline and follow-up (Cronbach's alphas = 0.83; 0.88).

Caregiver burden

Caregiver burden was assessed through the burden assessment scale (BAS) [37]. The BAS is a 19-item questionnaire that assesses the subjective and objective burden associated with caring for an ill relative. Burden refers to the common challenges and stressors associated with caring for an ill relative and is conceptually different from EOI which is an attitude or stance that caregivers take with regard to their ill relative that may be influenced by these challenges or stressors [14]. Objective burden is a measure of the behavioral challenges associated with caregiving (e.g., reduction in leisure time), whereas subjective burden is a measure of the psychological challenges commonly experienced by caregivers (e.g., feelings of guilt [37]). This measure asks caregivers to rate how much their lives have been affected by common burdensome elements of caring for a relative with schizophrenia on a scale from 1 (Not At All) to 4 (A Lot). Caregivers also have the option to rate an item as not applicable. For the current sample, this measure had adequate internal consistency for subjective burden at baseline and at follow-up (Cronbach's alphas = 0.76; 0.78).

Of note, one question for the objective burden index of the BAS asks caregivers to rate the extent to which they have missed work/school in the past 6 months. Given that many participants in this study were retired or unemployed and rated the question with regard to work/school functioning as not applicable (15 out of 37 at baseline and 18 out of 37 at follow-up), data obtained from this question were not used in the calculation of participants' scores for objective burden. This adjusted measure of objective burden possessed good internal consistency at baseline and follow-up (Cronbach's alphas = 0.88, 0.89).

Caregivers' physical and psychological health

Caregivers' physical and psychological health was assessed through the RAND 36-item health survey 1.0 (RAND-36 [13]). This measure assesses eight different physical and psychological health subscales (i.e., physical functioning, bodily pain, role limitations due to physical health; role limitations due to emotional/personal prob-

lems, general mental health, social functioning, and perceived change in health). The RAND-36 also provides three composite scores: physical health, mental health, and general health. Scores for the eight subscales and three composite scores are converted into T-scores with a $M = 50$ and $SD = 10$ which provide a normed estimate of the participant's health relative to the health of similar age individuals in the United States [13]. Responses are scored so that lower scores on a given index/composite are indicative of worse health. Within the current sample, this measure was found to have excellent internal consistency at both the baseline and follow-up assessment (Cronbach's alphas = 0.94; 0.94).

Statistical analyses

Determination of "statistical significance" was completed through the calculation of p_{rep} [18]. Unlike null-hypothesis significance tests, p_{rep} provides an estimate of the proportion of future replications in which a similar effect would be found. Thus, obtaining a $p_{rep} = 0.50$ would suggest that a similar effect would be found in 50% of future replications. Unlike standard null-hypothesis significance tests which have been repeatedly criticized for providing indirect (at best) evidence with regard to the probability of the hypothesis under investigation [31], the p_{rep} statistic provides more direct, easily-interpretable evidence with regard to one's hypothesis [18]. Moreover, the information provided by the p_{rep} statistic comports with suggestions from multiple scholars who have argued that information with regard to replicability is of greater value to scientists than information obtained through inductive logical strategies such as null-hypothesis significant tests (e.g. [7]). Although there is no strict criteria for "significance" for the p_{rep} statistic, a value greater than or equal to 0.90 provides an equivalent (if not more conservative) standard for identifying "meaningful" relationships as compared to the criteria typically used in null-hypothesis significance tests (i.e., $P < 0.05$ [18]). All statistically significant p_{rep} values will be supplemented with the standard P -value to aid in the interpretation of the results.¹

Results

Prior to the analysis, all variables were inspected for departures from a normal distribution, outliers, and multicollinearity. Examination of skew and kurtosis revealed no statistically significant departures from normality among the variables. Tests of univariate (Grubbs outlier test) and multivariate outliers (Mahalanobis distance) revealed no outliers in the data using a criterion of $P < 0.001$. Finally, the respective variance inflation factors (VIF) for each completed regression equation did not differ substantially from 1.0, suggesting that multicollinearity among the predictor variables was not a problem [29].

Given that the time between the baseline and follow-up assessment varied among the participants, the number of months between the baseline and follow-up assessment was entered as a covariate in all of the longitudinal analyses. Additionally, all independent variables and covariates were centered prior to the completion of the regression analyses to reduce multicollinearity.

¹To remain consistent with the theoretical underpinnings of p_{rep} , all P -values presented are one-sided.

Table 1 Means, standard deviations, and correlations between burden, social support, and EOI at baseline

	<i>M</i>	<i>SD</i>	1	2	3	4
1. EOI	2.65	1.25	–	0.23	0.05	–0.14
2. Objective burden	17.49	7.04	–	–	0.69*	–0.26 [†]
3. Subjective burden	18.68	5.63	–	–	–	–0.11
4. Social support	20.30	6.19	–	–	–	–

* $p_{\text{rep}} \geq 0.90$, $P < 0.001$; [†] $p_{\text{rep}} \geq 0.85$, $P = 0.06$

■ EOI, burden, and social support

Cross-sectional analyses

The means, standard deviations, and correlations between EOI, objective burden, subjective burden, and total social support at baseline are listed in Table 1. EOI was not associated with objective burden or subjective burden. Additionally, EOI was not associated with social support at baseline. However, subsequent analyses of the subtypes of social support assessed at baseline revealed that the relationships between EOI and emotional support ($r = 0.24$; $p_{\text{rep}} = 0.85$; $P = 0.07$) and between EOI and appraisal support ($r = -0.27$; $p_{\text{rep}} = 0.87$; $P = 0.06$) approached criteria for statistical significance. The relationships between the remaining subtypes of social support and EOI did not reach criteria for statistical significance (all $p_{\text{rep}} \leq 0.70$). There was a statistically significant correlation between subjective and objective burden with key relatives who reported greater subjective burden also reporting greater objective burden. Social support was not associated with subjective burden. However, the relationship between objective burden and social support approached criteria for statistical significance with higher levels of objective burden being associated with lower levels of social support among key relatives.

Longitudinal analyses

The relationships between EOI and objective burden, subjective burden, and social support, respectively, were examined using three separate regression equations. After controlling for key relatives' objective burden at baseline, EOI at baseline was a statistically significant predictor of objective burden at follow-up with higher EOI at baseline associated with greater objective burden at follow-up ($B = 1.56$; $\beta = 0.27$; $p_{\text{rep}} = 0.91$; $P = 0.03$). Likewise, the relationship between EOI at baseline and subjective burden at follow-up approached criteria for statistical significance after controlling for key relatives' subjective burden at baseline ($B = 1.06$; $\beta = 0.23$; $p_{\text{rep}} = 0.85$; $P = 0.07$). EOI at baseline was not associated with key relative's total social support at follow-up after controlling for their total social support at baseline ($B = -0.31$;

$\beta = -0.06$; $p_{\text{rep}} = 0.60$). However, when examining the specific subtypes of social support, EOI at baseline was a statistically significant predictor of key relatives' instrumental support at follow-up after controlling for their instrumental support at baseline ($B = -0.28$; $\beta = -0.32$; $p_{\text{rep}} = 0.91$; $P = 0.03$) with higher levels of EOI at baseline associated with lower levels of instrumental support at follow-up. EOI at baseline was not associated with any other subtype of social support at follow-up (all $p_{\text{rep}} \leq 0.68$).

■ EOI and caregivers' health

Cross-sectional analyses

Means and standard deviations for the baseline values of the eight subscales and three composite scores of the RAND-36 are listed in Table 2 along with the correlation between these variables and key relatives' baseline EOI scores. Evaluations of the RAND-36 suggest that the minimal clinically important difference is in the range of 3–5 points [38]. Using the more conservative definition of a clinically significant difference on the RAND-36 (i.e., 5 points), key relatives' scores for each subscale and composite measure were lower than the population average (50) except for the Emotional Well-Being, Social Functioning, and Pain

Table 2 Means, standard deviations and correlations between EOI and the subscales of the RAND-36 health survey at baseline

	<i>M</i>	<i>SD</i>	Correlation with EOI
PF	44.78	11.85	–0.24
RLP	41.11	13.51	–0.31*
RLE	39.49	14.48	–0.40*
EF	49.97	10.35	–0.22
EWB	46.32	12.57	–0.28 [†]
SF	46.22	10.78	0.08
P	45.84	12.58	–0.39*
GH	43.00	9.35	–0.15
PHC	42.24	12.13	–0.33*
MHC	45.49	12.00	–0.25 [†]
GHC	43.38	11.78	–0.30*

EOI emotional over-involvement, PF physical functioning, RLP role limitations due to physical health, RLE role limitations due to emotional or personal problems, EF energy and fatigue, EWB emotional well-being, SF social functioning, P pain, GH general health, PHC physical health composite, MHC mental health composite, GHC general health composite, * $p_{\text{rep}} \geq 0.90$, $P \leq 0.03$; [†] $p_{\text{rep}} \geq 0.85$, $P \leq 0.07$

Table 3 Relationship between EOI at baseline and subscales of the RAND-36 at follow-up controlling for caregivers' health at baseline

	<i>B</i>	β	<i>sr</i> ² (unique)
PF	-0.59	-0.06	
RPL	-3.17*	-0.31	0.08
RLE	-1.73	-0.15	
EF	-0.76	-0.10	
EWB	-2.39*	-0.28	0.07
SF	-3.38*	-0.35	0.11
P	0.15	0.02	
GH	-0.40	-0.06	
PHC	-0.87	-0.09	
MHC	-2.21 [†]	-0.23	0.05
GHC	-1.86 [†]	-0.20	0.03

B unstandardized regression coefficient, β standardized regression coefficient, *sr*² squared semipartial correlation, *PF* physical functioning, *RPL* role limitations due to physical health, *RLE* role limitations due to emotional or personal problems, *EF* energy and fatigue, *EWB* emotional well-being, *SF* social functioning, *P* Pain, *GH* general health, *PHC* physical health composite, *MHC* mental health composite, *GHC* general health composite; * $p_{\text{rep}} \geq 0.90$, $P \leq 0.03$; [†] $p_{\text{rep}} \geq 0.85$, $P \leq 0.06$

subscales as well as the Mental Health Composite Score which each approached criteria for the minimal clinically important difference (i.e., they differed from the population mean by more than 3 but less than 5 points) and the Energy and Fatigue subscale which did not differ from the norm. Ten of the eleven correlations with EOI were in the expected direction (i.e., negatively correlated). Five correlations reached criteria for statistical significance, and two approached criteria for statistical significance. These data indicate that caregivers in our study were already in relatively poor health at the start of our study. Moreover, higher levels of EOI among Mexican-American caregivers are associated with more role limitations due to emotional and physical health, more pain, and lower scores on global measures of physical and general health. Additionally, these findings raise the possibility that higher levels of EOI may also be associated with worse emotional well-being and mental health among Mexican-American caregivers (Table 3).

Longitudinal analyses

After controlling for key relatives' scores on the respective indices of the RAND-36 at baseline, EOI at baseline predicted greater role limitations due to physical health ($B = -3.17$; $\beta = -0.31$; $p_{\text{rep}} = 0.94$; $P = 0.01$), lower emotional well-being ($B = -2.39$; $\beta = -0.28$; $p_{\text{rep}} = 0.91$; $P = 0.03$), and worse social functioning ($B = -3.38$; $\beta = -0.35$; $p_{\text{rep}} = 0.94$; $P = 0.01$) at follow-up. Additionally, the relationship between EOI at baseline and key relatives' scores on the mental health and general health composite scores approached criteria for statistical significance after controlling for key relatives' scores on these health composites at baseline (Mental Health Composite:

$B = -2.21$; $\beta = -0.23$; $p_{\text{rep}} = 0.88$; $P = 0.05$; General Health Composite: $B = -1.89$; $\beta = -0.20$; $p_{\text{rep}} = 0.87$; $P = 0.06$). EOI at baseline was not associated with any of the remaining index or composite scores from the RAND-36 (all $p_{\text{rep}} \leq 0.74$).

Assessment of mediation and indirect effects

In situations in which EOI at baseline predicted caregivers' score for a given index/composite of the RAND-36 at follow-up, we evaluated whether burden and/or social support mediated this relationship using the z' statistic developed by MacKinnon and colleagues [25]. The z' statistic is a modification of the Sobel test [39] that accounts for the non-normal distribution of this test statistic. Evaluation of the multiple methods for assessing mediation suggests that the z' statistic outperforms other methods of assessing mediation with regard to Type I and Type II error [26]. As we were testing a model in which multiple mediating variables may be present, if a statistically significant mediator was identified using the z' statistic (e.g., objective burden), we examined whether the magnitude of the effect of the specific mediating variable was significantly greater than effect of the non-statistically significant mediating variables (e.g., social support) using the technique outlined by MacKinnon [24]. However, as the test statistic provided by this technique is likely not normally distributed as it is the difference of products of two sets of regression coefficients [26], we determined statistical significance using the distribution of the z' test statistic as this distribution has been shown to more accurately characterize the distribution of the product of regression coefficients than the standard normal distribution [25].

Assessment of mediation

In situations in which EOI at baseline predicted caregivers' score for a given index/composite of the RAND-36 at follow-up (i.e., role limitations due to physical health, emotional well-being, social functioning, mental health composite, general health composite), we evaluated whether burden and/or instrumental support at follow-up mediated this relationship. Baseline scores for burden and social support were included in these analyses as covariates.

Results of the analysis of burden and social support as mediators of the relationship between EOI and key relatives' health outcomes are listed in Table 4. Of the five longitudinal health outcome associated with EOI, caregivers' instrumental support mediated the relationship between EOI and four of these health outcomes (i.e., role limitations due to physical health, emotional well-being, mental health composite, and general health composite), and objective burden

Table 4 Analyses of burden and social support as mediators of the relationship between EOI and key relatives' health outcomes

	Objective burden (z')	Subjective burden (z')	Instrumental support (z')	Magnitude of effect of mediators
RLP	0.05	0.08	-0.95*	IS > OB*
EWB	-0.98*	-0.53	-1.44*	IS > SB [†]
				IS > SB*
SF	0.56	0.03	-0.29	No significant difference between OB vs. SB or OB vs. IS
MHC	-0.98*	-0.69 [†]	-1.08*	-
GHC	-0.87*	-0.79*	-1.27*	No significant difference between OB vs. SB, OB vs. IS or SB vs. IS
				No significant difference between OB vs. SB, OB vs. IS or SB vs. IS

RLP role limitations due to physical health, EWB emotional well-being, SF social functioning, MHC mental health composite, GHC general health composite, OB objective burden, SB subjective burden, IS instrumental support; * $p_{rep} \geq 0.90$, $P < 0.03$; [†] $p_{rep} \geq 0.85$, $P \leq 0.06$

mediated the relationship between EOI and three of these health outcomes (i.e., emotional well-being, mental health composite, and general health composite). Subjective burden mediated the relationship between EOI and one health outcome (i.e., general health composite) and was a near statistically significant mediator of the relationship between EOI and caregivers' mental health composite score.

Discussion

Within the expressed emotion literature, several studies have demonstrated that exposure to caregivers who display high levels of EOI is associated with worse outcomes among individuals with schizophrenia (e.g., [4]). However, relatively less attention has been directed toward exploring whether EOI may be associated with worse physical and psychological health for caregivers themselves. Our results suggest that over-involvement is a marker of poor current health status and predicts worse future health among Mexican-American caregiving relatives of individuals with schizophrenia. Given that the caregivers in our study were already in relatively poor health at the time of the baseline assessment, our findings suggest that over time the health of caregivers high in EOI changes from bad to worse.

Moreover, concurrent to this decline in health status, EOI was also associated with an increase in caregiver burden and a reduction in instrumental support. In many instances, changes in these variables over time mediated the relationship between EOI and health outcomes among the caregivers. In particular, our results suggest that instrumental support and objective burden may be particularly important with regard to the relationship between EOI health outcomes. Of the five longitudinal health outcomes associated with EOI, caregivers' instrumental support mediated the relationship between EOI and four of these health outcomes (i.e., role limitations due to physical health, emotional well-being, mental health composite, and general health composite), and objective burden mediated the relationship between EOI and three of these health outcomes (i.e., emotional well-being, mental health composite, and gen-

eral health composite). Subjective burden mediated the relationship between EOI and caregivers' general health composite scores and was a near statistically significant mediator of the relationship between EOI and caregivers' mental health composite scores. These findings are consistent with studies demonstrating that less instrumental support and greater caregiver burden are associated with negative functional outcomes among individuals caring for relatives suffering from a chronic illness [27, 28].

The mean EOI score for our sample ($M = 2.65$) was higher than that from past studies of Euro-American ($M = 1.89$) [42], Norwegian ($M = 2.20$) [3], and Australian ($M = 2.01$) [34] familial caregivers of individuals with schizophrenia. Additionally, the mean EOI score for the current sample was higher than that from a past study of Mexican-American caregivers of relatives with schizophrenia ($M = 2.29$) [16]. The findings from the current study are consistent with criticisms that the traditional criteria for rating EOI using the Camberwell Family Interview may over-estimate the amount of EOI present within Mexican-American families [15]. It is important to note that EOI defined using the traditional criteria was not only predictive of health outcomes among the Mexican-American caregivers but also of clinical relapse among ill relatives within this sample [1]. In total, these findings suggest that the traditional criteria for EOI may possess predictive validity within Mexican-American families and is consistent with research highlighting the potential methodological problems associated with adapting criteria for EOI and other indices of expressed emotion to the cultural norms of a study population [23].

Of note, past studies have suggested that the level of symptomatology among individuals with schizophrenia may influence the relationship between EOI, burden, and health outcome among caregivers. More specifically, greater symptomatology has been shown to be predictive of greater EOI and burden as well as negative health outcomes among individuals caring for a relative with schizophrenia [9, 19, 35]. As such, it is interesting to note that positive and negative symptoms at baseline among study participants assessed using the guidelines provided by Ventura and colleagues [43] for the Brief Psychiatric Rating Scale

[33] were not predictive, respectively, of EOI, objective burden, subjective burden or caregivers' health outcomes at follow-up (all $p_{rep} < 0.90$). In total, these post hoc analyses raise the possibility that the relationships identified between EOI, burden, and health outcomes among caregivers in the current study may be largely independent of the level of symptomatology among the individuals with schizophrenia.

It is important to note that this study does suffer from several limitations. First, there was a relatively high drop-out rate among participants. This raises the potential that our sample may reflect more stable families and patients. Additionally, the results of our study do not provide a definitive assessment of causality in the relationship between EOI, burden, social support, and caregiver's health. Thus, although EOI may be associated with burden, social support, and health, further evaluation is needed to clarify the direction of causality in these relationships. Finally, as most of the individuals in our study had been ill for many years, it is unclear whether our results would be applicable to caregivers of individuals at other stages of schizophrenia (e.g., the prodrome or first-episode).

Within the schizophrenia literature, there is growing appreciation for the bidirectional nature of the relationship between family factors and the course of schizophrenia [21, 30]. Available evidence suggests that family factors can influence the course of schizophrenia [32] and that elements of the caregiving experience can trigger the development of specific family factors [45]. Our findings suggest an additional complexity to this relationship—family factors may affect the functioning of ill individuals *and* their caregiving relatives. Ultimately, continued exploration of the dynamic relationship between social factors and the course of schizophrenia may help to inform the development and implementation of effective family treatment programs that address the needs of both ill individuals and their caregivers.

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