Predictors of Burden and Infectious Illness in Schizophrenia Caregivers

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Objective: The objective of the study was to test predictive models of schizophrenia caregiver burden and infectious illness episodes for caregivers who had regular contact with their mentally ill family members. **Methods:** A nurse interviewer, blind to the patient's symptoms, caregiver burden, and psychosocial status, administered the Health Review to 70 caregivers. A second family interviewer, blind to caregiver health status and patient symptoms, assessed caregiver resources (eg, active coping and social support), vulnerabilities (eg, anger expression and passive coping) and burden. Concurrently, independent patient raters, blind to caregiver health and psychosocial status, assessed caregiver stressors. The Brief Psychiatric Rating Scale and the Modified Scale for the Assessment of Negative Symptoms were used to assess the severity of positive (eg, hallucinations and delusions) and negative (eg, anhedonia and asociality) symptoms, respectively. **Results:** Predictive models, including measures of stressors, resources, and vulnerability factors for caregiver burden and for presence of infectious illness, were each highly significant, accounting for 40% and 29% of the variance, respectively. However, the specific measures that predicted burden and infectious illness differed. Greater burden was predicted by more severe patient negative symptoms (stressor), greater anger control and blame self-coping (vulnerability), and decreased tangible social support (resource). Presence of infectious illness episodes was predicted by more severe patient positive symptoms (stressor) and less satisfaction with social support while controlling for the frequency of reporting on the Health Review. When scores from the Brief Psychiatric Rating Scale (stressors) were categorized into quartiles, it was found that the frequency of infectious illness in the highest quartile was four times that in the lowest quartile. Other results indicated that even though burden was not associated with infectious illness, it was associated with "continuing health problems," perceived stress, and depression. **Conclusions:** These data indicate that although schizophrenia caregiver burden and infectious illness are predicted by measures of patient stressors, vulnerabilities, and resources, the specific measures predicting these outcomes differ. The results also call attention to the powerful influence of patient symptoms as a predictor of burden and the presence of infectious illness among caregivers. **Key words:** schizophrenia, caregiver, positive symptoms, negative symptoms, infectious illness, burden.

ADL = activities of daily living; ANOVA = analysis of variance; AX = Anger-Expression Inventory; BPRS = Brief Psychiatric Rating Scale; CES-D = Center for Epidemiological Studies in Depression Scale; DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition; FBIS = Family Burden Interview Schedule; ISEL = Interpersonal Support Evaluation List; MSANS = Modified Scale for the Assessment of Negative Symptoms; PSS = Perceived Stress Scale; RWCCL = revised Ways of Coping Checklist; SCID = Structured Clinical Interview for DSM-IV; SSQ = Social Supports Questionnaire.

INTRODUCTION

Over the past 35 years, families of persons with severe and persistent mental illness have increasingly assumed caregiving responsibilities for their adult family members. Recent estimates indicate that between one-third and two-thirds of persons with long-term psychiatric disabilities currently reside with family members. Studies indicate that families are significantly affected by the responsibility of their caregiving function (1–4; Rheinhard et al., unpublished manuscript). Objective demands of and subjective reactions to this responsibility have been labeled burden (5). Factors affecting burden include a number of patient illness variables, such as the severity of symptoms, length of hospitalization, number of previous hospitalizations, and length of illness (6–14).

The family caregiving burden of persons with severe mental illness includes financial responsibilities, missed work, disturbance of domestic routines, constraints on social and leisure activities, and reduced attention to other family members (15, 16). The financial strain due to medical costs and the patient's economic dependency are considerable (17). Often family members forego work outside the home to provide care for the person with mental illness. Siblings who must cope with the problem may need therapy, which increases medical bills (18). Gubman and Tessler (19) suggest that family members may become ill and/or indebted and that divorce may result from the chronic financial and emotional strain. In addition, behavioral problems of the patient contribute to the experience of burden, including frequent and intense arguments, with-

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drawal, bizarre behavior that is disturbing to neighbors, and threatened or actual harm to self or others. Also identified as sources of burden are a variety of household complaints about patient behavior, such as being noisy at night, failing to adhere to a regular time schedule, being generally uncooperative, refusing to do household chores, being verbally abusive, and making unreasonable demands (4). The caregiver often suffers from severe mental and emotional drain, feels utterly defeated, and has feelings of anxiety, resentment, and anger, with stress being cumulative over time (20, 21). A study of unresolved grief in families of persons with severe mental illness found that levels of grief increased over time (22).

Models of Burden and Infectious Illness

Although the economic, social, and emotional impacts of mental illness on families are well documented (5), there has been little systematic work evaluating the role and relative weights of predictive variables within the context of a conceptual model. Similarly, little is known about the predictors of caregiver health status and the extent to which such effects are mediated by caregiver burden. Although it has been speculated that a lifetime of caregiving carries the potential for increasing health risk (16, 18), this has not been systematically evaluated (23). Because the experience of caregiving burden is related to many care recipient and caregiver variables, it is reasonable to assume that it is a multivariate phenomenon. With this guiding assumption, Vitaliano et al. recently adapted a heuristic multivariate model to conceptualize and measure the predictors of burden (23) and physiological dysregulation (24) in spouse caregivers of persons with Alzheimer's disease. In this model, subjective burden and distress (23) are assumed to result from three independent sources: stressors, vulnerabilities, and resources. The model is represented by the following expression: Burden = (Exposure to Stress × Vulnerability)/(Psychological and Social Resources). The predictors in the model are exposure to stressors (care recipient characteristics and level of positive and negative symptoms), vulnerability (anger and passive coping: wishful thinking, avoidance, blame of self, and blame of others), and resources (active coping: problem focused, seeking support, and religiosity; and social support: tangible support and satisfaction with support). We used this conceptual model to test and compare predictive models of burden and infectious illness.

METHODS

Sample

The sample consisted of 70 persons with a diagnosis of schizophrenia or schizoaffective disorder and their primary family caregivers. Patient participants were between 21 and 58 years of age, had regular contact with their parents, and were receiving care at a large community mental health center in Spokane, Washington.

Patient Symptom Assessment

The assessment of patient participants began with the SCID (25), which permitted differential diagnosis of schizophrenia, schizophreniform disorder, and schizoaffective disorder. For study inclusion, patients had to have met DSM-IV criteria for schizophrenia or schizoaffective disorder. The SCID also incorporates diagnostic modules that allow exclusion of major depressive disorder, bipolar disorder, brief reactive psychosis, delusional disorder, and psychotic disorder not otherwise specified. After the diagnostic interview, patients were administered their first of up to 28 monthly assessments of severity of positive and negative symptoms (see below). Independent raters trained in the use of the BPRS (26) and MSANS (27) followed a semistructured interview to ensure that rated phenomena were reviewed.

The 24-item version of the BPRS was used to measure positive psychiatric symptoms. Positive symptoms are those that characterize schizophrenia during an acute exacerbation of the illness (ie, relapse) and often lead to an intensification of mental health services or hospitalization. Each symptom was rated on a seven-point scale of severity ranging from 1 ("not present") to 7 ("extremely severe"). The BPRS (28) is the most commonly used measure for evaluating psychotic symptoms and relapse in patients with severe and persistent mental illness. In the present analyses, we used the mean of the five psychotic items designed to define positive symptoms: conceptual disorganization, hallucinations, unusual thought content, grandiosity, and suspiciousness.

Negative symptoms were measured by the MSANS (27). Negative symptoms are those more persistently stable characteristics of schizophrenia and include the following five symptom clusters: affective flattening, alogia, avolition/apathy, anhedonia/asociality, and attention. The MSANS consists of 24 items that contain five-point ratings (1 = "not present"; 5 = "severe") of symptoms within each symptom cluster and five items that provide a global rating for each of the five symptom clusters. The mean of these five global ratings served as a composite measure of negative symptoms.

In addition to measuring the severity and type of patient symptoms, we recorded several demographic variables (age, education, and gender), length of illness, and number of psychiatric hospitalizations.

Family Caregiver Assessments

Two interviewers (psychosocial and health), blind to the results of each other's assessment and to patient symptom status, assessed family caregivers. After obtaining informed consent from the patient and being given permission to talk with their family members, the psychosocial interviewer provided a brief description of the study, answered questions, and extended an invitation to meet with the family to more fully explain the study and to obtain informed consent. The family was given the option of meeting either in their home or at an office. The initial family interview began with all interested family members. A self-rating scale constructed for the study asked about the frequency of contact, involvement with the patient, and caregiving responsibilities. The primary caregiver was identified and the psychosocial interview initiated. The interview included a baseline assessment of stressful life events, coping strategies, sources of social support, emotional distress, depression, and burden. The interview lasted approximately 2 hours. At the end of the initial interview, a second interview was arranged to assess health issues.

Caregiver Health Assessment

The health interview was conducted by a registered nurse who was blind to the psychosocial status of the caregiver and to the symptom status of the mentally ill family member. A portion of this interview used the Health Review (28), which included a checklist of specific illness symptoms related to infectious disease (primarily upper respiratory illness), isolated illnesses, and continuing problems. The tool was used by Kiecolt-Glaser et al. (29) in their assessment of health problems among caregivers of patients with Alzheimer's disease. The first administration of the tool, on which the current results were based, was conducted face to face. At this time, subjects were asked about their symptoms in the past 6 months. It is noteworthy that Jenkins et al. (28) showed that diagnoses based on telephone administration were the same as those defined by a computer algorithm using Health Review clusters in 77% of the cases examined. Subjects were read the symptom list and asked to indicate which symptoms occurred and how long they lasted. Additionally, subjects were asked to note whether they saw a physician for their problems as well as the number of days that they were unable to perform their normal daily activities because of their illness. The International Classification of Disease-9 (30) coding system, established by the World Health Organization, was used by a rater as a guide in determining whether the participant had an infectious illness condition, an isolated event, or continuing health problems. Interrater reliability of classifying symptoms as an infectious illness episode was established on a subsample of 33 interviews. Interrater agreement on the frequency of infectious illness episodes was 96%.

Caregiver Psychosocial Variables

Caregiver psychosocial variables included demographic variables (age, gender, education, and income), caregiver burden and distress, caregiver vulnerabilities (anger expression and passive coping), and caregiver resources (social support and active coping).

Caregiver burden was assessed with the FBIS (31). This comprehensive instrument contains 13 subscales assessing economic burden, assistance in daily living, supervision, and contributions to household, as well as sections measuring caregiver attributes, such as worry, attribution, stigma, and family affective response. For the present study, a composite burden score was developed. Scoring for each subscale followed the recommendations of the authors. Subscale scores were entered into a principal component analysis. Ten of the 13 scales were found to load on the first component. A burden measure was formed from the 10 subscales (the inverse of gratifications, objective and subjective ADL care, objective and subjective supervision, subjective financial expenditures, objective impact, stigma, worry, and displeasure) by ranking subjects by magnitude on each subscale and then summing the ranks.

Caregiver stress was measured using Cohen's PSS (32). Designed to measure the degree to which persons appraise their lives as stressful, this 14-item scale required participants to rate, from zero to four ("never" to "always"), the frequency of their daily stressors. Cohen and Williamson (33) reported that the mean score in the general population was 20.2 ± 7.8 for women and 18.8 ± 6.9 for men.

Caregiver depression was assessed using the CES-D scale (34). The CES-D was developed as a measure of depression in the general population. The instrument was normed on a sample of more than 3000 respondents from the general population and 105 psychiatric patients. The scale was found to be predictive of several depressive outcomes and to be linearly related to severity of a depressive disorder. The 20-item scale assesses the dimensions of depressed mood, appetite loss, sleep disturbance, and energy level. Internal consistency is 0.85 for the general sample and 0.90 for the psychiatric group. Test-retest correlations range from 0.51 to 0.67 when tested over 2 to 8 weeks and 0.32 to 0.54 when tested over 3 months to 1 year. The CES-D is reported to have excellent concurrent validity, correlating significantly with several other depression and mood scales. It also discriminates between the psychiatric and general populations. Scores on the CES-D range from 0 to 60, with scores of 16 and above indicative of clinically significant depressive symptomatology in adults.

Measures of caregiver resources, such as social supports and coping, included the ISEL (35), the SSQ (36), and the RWCCL (37). The ISEL is a 40-item self-report scale (38) specifically designed to assess the extent to which emotional and tangible support functions would be available if needed. The ISEL contains subscales of tangible support, self-esteem, belonging, and appraisal. Subjects indicate how much they agree with a list of statements that describe the presence or absence of support on a five-point Likert scale from "strongly disagree" to "strongly agree."

The SSQ has six items, each with the following two parts: the number of available people the individual can turn to in times of need in each of a variety of situations and the individual's degree of satisfaction with the perceived available support. Separate factor analyses of the two SSQ scales have shown the number and satisfaction scores to be composed of different, unitary dimensions with only a moderate correlation (0.34) between the two components. The number and satisfaction scales of the SSQ have test-retest reliabilities of 0.75 and 0.79 (4-week interval) and coefficient α values of 0.90 and 0.93, respectively (36).

The WCCL was originally developed by Folkman and Lazarus (38) and revised by Vitaliano et al. (37). The revised scales were shown to be more reliable for medical students, spouses of persons with Alzheimer's, and psychiatric outpatients than were the original scales. The five revised scales that were developed were Problem Focused (15 items; eg, "made a plan of action and followed it"), Wishful Thinking (8 items; eg, "wished for a miracle to happen"), Seeks Social Support (6 items; eg, "talked to others and accepted their sympathy"), Avoidance (10 items; eg, "tried to forget the whole thing"), and Blame Self (3 items; eg, "blamed yourself"). Other coping subscales that proved informative in the present study were Religiosity (3 items; eg, "prayed about it") and Count Your Blessings (6 items; eg, "focused on the good things in my life"). For each coping item, respondents are asked to record the degree to which they used that strategy to deal with their problem. Options include "never used," "rarely used," "sometimes used," and "regularly used" and are scored from 0 to 3, respectively. In previous work with caregivers of patients with dementia of the Alzheimer type, Vitaliano et al. (39) reported that distressed caregivers had lower Problem Focused and higher Wishful Thinking scores than their nondistressed counterparts.

Anger and hostility, behavioral dispositions long regarded as important factors in the pathogenesis of essential hypertension and coronary heart disease (40, 41), were assessed with the AX (42). The AX is a 24-item scale that, in addition to providing an overall measure of the frequency with which anger is expressed, contains three 8-item subscales: anger-in, anger-out, and anger control. Anger-in reflects the tendency to suppress or hold in angry feelings, anger-out reflects the tendency to express anger toward environmental objects or other people, and anger control measures the frequency with which an individual attempts to control the expression of anger. The internal consistency, test-retest reliability, and convergent and discriminant validity of these scales are quite acceptable and are summarized by Spielberger et al. (42). In the present study, internal consistency was 0.81 for total anger expression, 0.76 for anger-in, 0.71 for anger-out, and 0.83 for anger control.

RESULTS

Results are presented in five sections: 1) description of the sample; 2) summary statistics on measured variables; 3) partial correlations for the burden and infectious illness measures with each measure of the predictive variable categories of the conceptual model (ie, stressors, resources, and vulnerabilities), controlling for under- and overreporting bias; 4) multiple regression analyses predicting burden and infectious illness episodes from significant variables within each of the measured categories of the conceptual model; and 5) a categorical breakdown of the BPRS measure of positive symptoms showing the associations with the frequency of caregiver infectious illness.

Sample Description

The mean age of the 70 patients was 33 (SD = 9) years. They were predominantly men (74%) and white (94%). The mean length of patient illness was approximately 10 (SD = 8) years, and the average number of psychiatric hospitalizations over that time was 5 (SD = 6). Less than half of the patients lived with their families (40%), but usually the caregiver was a parent (77%) and married or living with a partner (67%). The mean age of caregivers was 52 (SD = 12) years. Unlike the patients, caregivers were predominantly women (83%). Approximately 91% of caregivers had completed high school, and 26% had completed college. Median annual family income was approximately $20,000.

Summary Statistics of Measured Variables

The stressor, vulnerability, and resource variables all had acceptable levels of internal consistency (Table 1). The sample mean PSS scores (21.5) were similar to those reported by Cohen and Williamson (33) for men and women in the general population. However, mean CES-D scores (14.1) were close to the level (16.0) established as the cutoff for clinically significant depression. It is noteworthy that 31% of the sample scored 16 or higher on the CES-D. A review of a subsample of caregiver medical charts for a 2-year period before study entry revealed that 9 of 33 (27%) had been prescribed antidepressant medications. Sample means on the psychological vulnerability (anger expression) and resource (social support) measures were within the normal range.

The mean level of positive symptom severity on the five-item BPRS (4) total was in the “very mild” range (9.9), with scores ranging from “no symptoms” (5.0) to “moderate symptoms” (22.0). Similarly, the mean level of negative symptoms as reflected by the five-item MSANS total was in the “mild” range (8.4), with scores ranging from “no symptoms” (5.0) to “moderate symptoms” (16.5). The mild to moderate level of symptom severity observed reflects that patients were recruited from an outpatient setting and that they had their illness for an average of 10 years.

Caregiver infectious illness measures indicated that during the 6-month baseline period, 44% of caregivers were ill. Caregivers also reported an average of 2.7 isolated events and 2.5 continuing health problems, and, in each case, 79% of the sample reported having a problem.

Correlations

A number of important relationships were found between measures of burden and the presence of infectious illness and caregiver vulnerability, resources, and stressors (Table 1). Some were likely measures or sequelae of burden. For example, depression is likely an expression of subjective burden. Other variables, listed as stressors, were related to burden in a different manner. For example, negative symptoms of the patient likely contribute to caregiver burden rather than being merely a manifestation of burden. It was interesting that perceived stress correlated with both burden and illness. Positive patient symptoms and the number of years since onset of patient illness correlated significantly with caregiver illness as well.

Variables for social support tended to be inversely related to burden. ISEL subscales listed under Resources in Table 1 were inversely related to burden. Social support satisfaction, measured by the SSQ, also showed a negative relation.

It was counterintuitive that caregivers demonstrating a problem-focused coping strategy tended to report high burden. The other forms of coping, listed as resources, did not correlate significantly with burden. It is significant, however, that caregivers expressing coping strategies involving faith in a deity and those satisfied with their social support systems tended not to have an infectious illness.

Of the variables listed under vulnerabilities, all coping strategies were found to correlate significantly with burden. Controlled anger correlated with burden, whereas outward anger correlated with illness.

TABLE 1. Internal Consistency Reliability Coefficients and Partial Correlation Coefficients (Controlling for Frequency of Reporting Continuing Problems and Isolated Events) for Burden and Infectious Illness

Variable	Scale	α	Burden	Illness
Burden/distress				
Burden	FBIS	0.86	1.00	0.07
Depression	CES-D	0.89	0.36[a]	0.14
Perceived stress	PSS	0.90	0.49[a]	0.24[a]
Stressors				
Negative symptoms	MSANS	0.79	0.33[a]	0.01
Positive symptoms	BPRS	0.90	0.19	0.27[a]
Illness onset	NA[b]	NA	−0.20	−0.26[a]
Resources				
Social support satisfaction	SSQ	0.93	−0.17	−0.31[a]
Tangible social support	ISEL	0.86	−0.30[a]	−0.08
Belonging	ISEL	0.73	−0.30[a]	−0.16
Self-esteem	ISEL	0.60	−0.23[a]	−0.16
Appraisal	ISEL	0.80	−0.19	−0.04
Problem-focused coping	RWCCL	0.81	0.24[a]	0.12
Seeks social support coping	RWCCL	0.74	0.12	0.12
Count your blessings coping	RWCCL	0.64	−0.13	−0.01
Religiosity coping	RWCCL	0.74	−0.04	−0.23[a]
Vulnerabilities				
Blame self	RWCCL	0.65	0.21[a]	0.00
Wishful thinking	RWCCL	0.80	0.34[a]	0.12
Avoidance	RWCCL	0.73	0.36[a]	0.15
Blame others	RWCCL	0.79	0.26[a]	0.22[a]
Anger control	AX	0.83	0.23[a]	0.01
Anger-in	AX	0.76	0.16	0.07
Anger-out	AX	0.71	0.01	0.21[a]
Demographics				
Caregiver age	FBIS	NA	−0.21[a]	−0.22[a]
Caregiver gender	FBIS	NA	−0.24[a]	−0.06
Patient age	FBIS	NA	−0.38[a]	−0.05
Patient gender	FBIS	NA	0.10	−0.03

[a] Significant.
[b] NA = not applicable.

Age of the caregiver and patient correlated inversely with burden, and male caregivers reported less burden than did female caregivers. Older caregivers also had fewer infectious illness episodes.

Regression Analyses

Two predictive models were investigated, one for caregiver burden and one for the presence of infectious illness (Table 2). Both regression equations yielded significant overall probability levels and accounted for 40% and 29% of the variance in dependent variables, respectively. However, the variable makeup of the predictor models of burden and infectious illness differed from one another.

Candidate predictors for the multivariate models were chosen on the basis of their significant partial correlation with the dependent variables (Table 1). Variables significantly correlated with burden were selected for entry into a multiple stepwise linear regression analysis. Depression and perceived stress were considered manifestations of distress and were closely linked with burden ($r = 0.42$ and 0.54, respectively). They were not, therefore, entered into the multiple regression equation for predicting burden.

The results of the regression analysis for burden (Table 2) indicated support for the heuristic multivariate model, with 40% of the variance accounted for by the predictors. More severe patient negative symptoms (stressor) and greater levels of anger control and blame-self coping (vulnerability) were associated with higher caregiver burden scores, and increased tangible social support (resource) predicted lower burden. Younger patient age predicted higher burden, and because age was not specified in the heuristic model, it was broken out separately in the prediction model. When entered into the model first, patient age accounted for 16% of the variance in burden. The four psychosocial variables accounted for the additional 24% of variance.

TABLE 2. Regression Analyses Predicting Burden and Infectious Illness Episodes

	Standardized β	t	p
Burden, adjusted $R^2 = 0.40$			
Stressor exposure			
Negative symptoms	0.348	3.44	.001
Resources			
Tangible support	−0.227	−2.23	.030
Vulnerabilities			
Blame self	0.209	2.12	.038
Anger control	0.241	2.50	.015
Demographic			
Patient age	−0.339	−3.53	.001
	β	Wald	
Illness episodes,[a] adjusted $R^2 = 0.29$			
Stressor exposure			
Positive symptoms	0.031	5.73	.017
Resources			
Satisfaction with support	−0.036	7.11	.008
Control variable			
Isolated events	−0.453	5.28	.022

[a] Presence vs. absence of an infectious illness episode during a 6-month period.

The method for predicting the presence vs. absence of infectious illness episodes involved selecting the variables that were significantly correlated with the presence of illness (Table 1) and then entering them into a stepwise multiple logistic regression analysis. Stressor variables that were entered included perceived stress, patient illness onset, and positive symptoms. Resource variables were religiosity and satisfaction with social support. Vulnerability markers were blame-others coping and anger-out. Finally, the sole demographic variable significantly correlated with infectious illness, caregiver age, was entered. The regression analysis for infectious illness attempted to control for under- and/or overreporting biases by entering the frequency of reporting continuing problems and isolated events.

The results indicated that positive symptoms (stressor) predicted the presence of infectious illness (Table 2), and increased satisfaction with social support predicted the absence of infectious illness episodes. The frequency of reporting isolated events was a significant covariate, whereas the frequency of reporting continuing problems was dropped in the stepwise procedure. Together, the significant predictors explained 29% of the variance in infectious illness episodes. The two psychosocial variables accounted for 25% of the variance, and the frequency of reporting isolated events accounted for another 4% of total variance.

Categorical Breakdown of Positive Symptoms

To appreciate the magnitude of the association between positive symptoms on the BPRS and infectious illness, the BPRS distribution was divided into quartiles, and an ANOVA was used to examine differences in the frequency of infectious illness episodes. The first BPRS group ($N = 10$) had no positive symptoms, the second group ($N = 35$) had mild symptoms, the third group ($N = 16$) had mild-to-moderate symptoms, and the fourth group ($N = 8$) had moderate-to-severe symptoms. Results of ANOVA for the linear trend were highly significant ($F(1{,}65) = 6.54$, $p < .015$), with the group having the highest BPRS score exhibiting about four times as many infectious illness episodes as the group having the lowest BPRS score (Fig. 1). In the group with the highest score, almost 80% of the caregivers had an infectious illness episode during the 6-month interval.

DISCUSSION

There is now a considerable body of research supporting the idea that chronic exposure to stressors is associated with alterations in host resistance through autonomic and neuroendocrine activation (29). Chronic stress can also lower health status indirectly through alterations in health behaviors, such as increased smoking and alcohol consumption (43). Although mechanisms of stress-induced changes on infectious illness have not been fully characterized, host resistance to acute respiratory illness or infection may decrease with increased stress (44, 45), and susceptibility to the common cold may be increased (46). Moreover, evidence links interpersonal relationships, immune function, and health (29, 47). Prospective

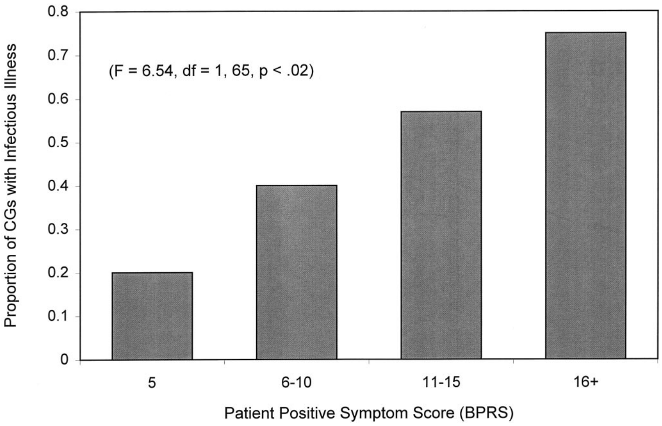

Fig. 1. Proportion of schizophrenia family caregivers (CGs) who reported at least one infectious illness episode during a 6-month period by the severity of the care recipient's positive symptoms.

studies controlling for baseline health status have shown increased mortality among individuals with fewer relationships (48), and connections between natural killer cell function and social support have been reported among breast cancer patients (49). Thus, stress and interpersonal relationships are linked to suppressed immunity and health (47). Building on previous research with caregivers of patients with dementia, the present study demonstrates significant relationships between caregiving stressors in family members of patients with schizophrenia, burden, and the presence of infectious illnesses. More importantly, consistent with Vitaliano et al.'s (23) conceptual framework, the results indicated strong support for predictive models involving measures of stressors, vulnerability factors, and personal and social resources.

The predictive model for caregiver burden indicated that the most potent stressor variable was the care recipient's negative symptoms. This observation is consistent with those of several other studies that have indicated that the negative symptoms (eg, lack of conversation, underactivity, slowness, and few leisure interests) are experienced by relatives to be more burdensome than the positive symptoms (50–52). The reasons for this are open to speculation, but it may be that the more temporally stable negative symptoms, relative to the episodic positive symptoms, translate into increased caregiving demands for family members. The negative symptoms include a variety of functional and cognitive difficulties that have burden implications for caregivers (eg, increased need for assistance in daily living and household chores). Also, consistent with the findings of at least one other study (53) on schizophrenia caregivers, the model for burden included increased tangible support as a resource variable. Similarly, Vitaliano et al. (23) found that increased satisfaction with support networks was associated with decreased objective and subjective burden. Finally, the model for burden included two vulnerability measures, anger control and blame-self coping. It is conceivable that the frequency with which an individual attempts to control the expression of anger is a marker of subjective burden. Interestingly, in a longitudinal study of caregivers of persons with dementia, increases in anger control were associated with weight gain (54). The finding that blame-self coping predicted burden was consistent with its classification as a vulnerability factor and its frequently reported association with depression.

Although not included as potential predictors of burden in the stepwise procedure, wishful thinking coping, blaming others, and avoidance were all significantly correlated with burden. All of these coping measures were highly correlated with each other and with blaming self, and their positive correlation with burden was consistent with findings of previous work (23). Although there are few published data on the relationship between coping skills and burden in caregivers of patients with schizophrenia, the finding that these measures of passive coping were associated with burden is consistent with the observation that passive coping is associated with psychological distress in other studies (23).

The model for predicting the presence of infectious illness episodes among schizophrenia caregivers once again supported Vitaliano et al.'s (23) overall conceptualization, but variable makeup was somewhat different than it was for burden. First, the most potent stressor variable was the care recipient's positive symptoms. Although the stable negative symptoms contributed to caregiver burden, the episodic positive symptoms (which typically predict or accompany psychiatric crises, such as relapse and hospitalization) were predictive of the presence of caregiver infectious illness. On the other hand, increased satisfaction with social support predicted decreased frequency of infectious illness episodes. The beneficial health effects of satisfaction with support have been frequently reported.

It is noteworthy that burden was not significantly associated with infectious illness. Thus, burden did not seem to represent a final common pathway to acute infectious illness. In a similar vein, the reporting of isolated events was included in the model predicting infectious illness, thereby statistically controlling and reducing the chances that the predictive relationships observed were due to a generalized "physical complaint bias."

The findings linking patient symptoms with illnesses of caregivers were consistent with those of many studies that have linked the chronic stress of caregiving for patients with dementia to compromised immune function and decreased physical health. Although there are undoubtedly a number of common elements that emerge in the course of coping with dementia and schizophrenia, there are also a number of differences, as noted by Biegel et al. (55). First, the illness trajectory for persons with schizophrenia tends to be less predictable and more cyclical in nature than the trajectory for dementia. This is particularly true of the positive symptoms (eg, hallucinations, delusions, and disorganized thinking). In contrast, Alzheimer's disease demonstrates a steady downward path, which may give caregivers an opportunity to anticipate and adjust to the decline in the care recipient's functioning over time. Second, Biegel et al. have noted that caregivers of Alzheimer's disease patients may be more likely than caregivers of schizophrenia patients to institutionalize the patient when the caregiving demands become unmanageable. Also, placements of persons with dementia are more likely to be permanent as compared with persons with schizophrenia, who may go back and forth between living with the caregiver and being an inpatient. Indeed, in recent years, the shift to managed care has made it increasingly difficult to hospitalize psychiatric patients, placing even more demands on the family.

Caring for a disabled family member over an extended time period can exert a negative impact on a caregiver's physical health (56). In a recent review, it was concluded that physical health (as assessed by self-report), health-care utilization, and immune function were negatively affected among dementia caregivers (56). Although physiological measures were not obtained in the present study, the increase in reported infectious illness associated with positive symptoms is certainly consistent with the possible involvement of physiological alteration. In fact, it is known that immune compromise (29), as well as metabolic (24) and cardiovascular risk factors, are higher in caregivers of persons with dementia than in matched control subjects (57).

In the past, research on caregivers of schizophrenia patients was confined to describing the level, nature, and predictors of caregiver burden. Greenberg et al. (58) have presented preliminary evidence that stigma and worry may be associated with lower levels of self-reported physical well-being among mothers of persons with a schizophrenic illness. The current study is the first to provide evidence for a relationship between patient stressors, schizophrenia caregiver burden, and infectious illness. Future data from the current study will provide information on the extent to which the observed relationships between psychiatric patient symptoms, family burden, and health can be modified by a family education and support intervention. This intervention is designed to improve informal and formal supports and to reduce caregiver isolation as well as psychiatric symptoms and relapse among patients (59).

There are several study limitations that must be noted. First, the sample of the present study may not be representative of the larger population of caregivers of schizophrenia patients. More specifically, the caregivers in the sample elected to participate in a 2-year intervention study and may not represent eligible non-participants. In a similar vein, external validity is threatened because the study sample does not adequately represent minority populations or male caregivers. Second, the current study is correlational in nature and did not follow a controlled manipulative design; thus, inferences concerning causal hypotheses are limited. Finally, it is possible that other chronic medical conditions, such as hypertension and diabetes mellitus, could have been selected that would perhaps have shown stronger relationships than our measure of continuing health problems. Because the medical charts of all caregivers for the 2 years before the intervention, as well as the 2 years during the intervention, will be obtained, it will be possible to examine other chronic medical conditions in a subsequent report.

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