Eur Arch Psychiatry Clin Neurosci (2006) 256 : 122–130 DOI 10.1007/s00406-005-0619-1

ORIGINAL PAPER

Anne Maria Möller-Leimkühler

Multivariate prediction of relatives' stress outcome one year after first hospitalization of schizophrenic and depressed patients

Received: 2 May 2005 / Accepted: 7 September 2005 / Published online: 4 November 2005

Abstract *Objective* The present study presents the 1-year follow-up findings of the Munich 5-year follow-up study on relatives of first hospitalized patients with schizophrenia or depression. The aim of the study was to determine which factors moderate the impact of the patient's illness on the stress experienced by his key relative in different dimensions. *Method* Of the relatives who had participated in the baseline assessment, 90 % could be reassessed (n = 69) with respect to their objective and subjective burden, well-being, self-rated symptoms and subjective quality of life as well as different personal dispositions and resources. *Results* Data demonstrate a considerable level of burden in most of the relatives at 1-year follow-up. Compared to baseline, a significant reduction in objective and subjective burden as well as significant improvements in well-being, self-rated symptoms and subjective quality of life occured in two-thirds of the relatives, while well-being and self-rated symptoms remained worse when compared to norm values. Although stress reduction was significantly associated with patients' residual symptoms on the bivariate level, no main effects on relatives' stress outcome at 1-year follow-up could be observed under multivariate conditions. In multivariate linear regression models for each stress indicator, different combinations of predictors resulted, explaining up to 75 % of the total variance of the stress indicators. The most relevant predictors were relatives' expressed emotion and neuroticism, their generalized negative stress response and life stressors, having significant direct and indirect effects on relatives' stress outcome. Stress reduction was mainly caused by an interaction of relatives' generalized positive stress response and patients' residual symptoms. *Conclusion* Findings support the transactional character of the stress process in caring for a patient with a severe mental disease. A multidimensional approach is necessary to identify the most important predictors of burden in order to improve family intervention strategies which aim to reduce burden.

Key words relatives' burden · expressed emotion · negative stress response · schizophrenia · depression

Introduction

Although caregiver-burden studies have become more differentiated in the last years due to the implementation of stress models, insight into relatives' burden has remained limited because of several methodological weaknesses. Among these, one weakness is the lack of studies with longitudinal designs looking at time-related changes in burden and coping with burden. There are only a few studies [Ray et al. 1991; Jones 1996; Cornwall and Scott 1996; Boye et al. 2001; Scazufca and Kuipers 1998; Brown and Birtwistle 1990; Magliano et al. 2000; Jungbauer et al. 2003; The Scottish Schizophrenia Research Group 1992], offering inconsistent findings. While burden was found to be lower at 6-month follow-up in relatives of schizophrenic patients with predominantly positive symptoms, it was found to be stable among those of patients with predominantly negative symptoms [Ray et al. 1991]. During a 5-year follow-up period, high distress of the relatives of first-admission patients was related to poor outcome of the patients (The Scottish Schizophrenia Research Group 1992). Relatives' burden was found to be stable at a 15-year follow-up in a sample of relatives who had not received any specific intervention (Brown and Birtwistle 1990) as well as in a 1-year follow-up (Magliano et al. 2000). In sum, no consistent pattern in burden experienced across time emerged. Additionally, factors other than the patient's psychopathology that might be related to caregiver bur-

Priv. Doz. Dr. rer. soc. A. M. Möller-Leimkühler
Department of Psychiatry
Ludwig-Maximilians-University
Nußbaumstr. 7
80336 Munich, Germany
Tel.: +49-89/5150-5785
Fax: +49-89/5160-5522
E-Mail: Anne-Maria.Moeller-Leimkuehler@med.uni-muenchen.de

EAPCN 619

den and development of burden have often not been evaluated, so that it remains unclear which factors increase or reduce burden. There are only a few hints from the literature which suggest that – beside the symptomatology of the patient – the expressed emotion (EE) level of the relatives influences the level of perceived burden (Boye et al. 2001; Scazufca and Kuipers 1988). Magliano et al. (2000) found that burden decreases at 1-year follow-up only under the condition that relatives adopt less emotion-focused coping strategies and receive social support from their networks. Similar results were reported by Joyce et al. (2003).

One main problem in analysing burden in a stress-coping framework is that the underlying stress models have been heterogenous and often reduced to one or two potential predictors of burden, whereas other predictors and their interrelations have been neglected. This is especially true for longitudinal studies. Thus, most designs have failed to address caregiver burden in a broader context of social and individual determinants, mediating influences and outcomes, cross-sectionally as well as longitudinally. However, a multidimensional approach seems to be necessary to identify the most important predictors of burden in order to develop effective strategies to reduce burden.

Empirical evidence for using a comprehensive stress model has recently been given by the baseline results of the Munich 5-year follow-up study on relatives of first hospitalized patients with schizophrenia or depression (Möller-Leimkühler 2004). Relatives' stress outcome was measured within a transactional stress model in terms of objective and subjective burden, well-being, self-rated symptoms and global satisfaction with life. Potential moderating variables included age and gender, generalized stress response and illness-related coping strategies, beliefs of control, perceived social support, personality factors, expressed emotion and life stressors. While relatives' stress outcome was independent of the objective stressors (severity of the illness, kind of symptoms, level of psychosocial functioning at first admission), it was significantly associated with several psychosocial resources and dispositions of the relatives. Multivariate linear regression analyses indicated that expressed emotion, emotion-focused coping strategies and generalized negative stress response were the most relevant predictors of burden.

This paper presents the results of the 1-year follow-up assessment of the same Munich 5-year follow-up study with regard to the following research questions:

1. Do stress outcome experienced by the relatives and their illness-related coping strategies change during one year after first admission of the patient?
2. If changes do occur, are they related to changes in patients' symptoms?
3. Will expressed emotion, emotion-focused coping strategies, and generalized negative stress response, which have been found to be the most relevant predictors of burden at first admission of the patient, prove to be stable predictors at 1-year follow-up?

Material and methods

Caregivers' variables

Expressed Emotion

The *Five Minute Speech Sample* (FMSS) (Magana et al. 1986) was used as well as the *Family Questionnaire* (Wiedemann et al. 2002). Although the FMSS shows a high concurrent reliability with the Camberwell Family Interview and a high interrater reliability, a systematic underassessment of high EE relatives has been observed, even exceeding 28% in this study. This is the reason why the Family Questionnaire was preferred in data analysis at baseline and follow-ups. Relatives were rated as high EE if their sum score on the scale 'criticism' and/or their sum score on the scale 'emotional overinvolvement' exceed the cut-off points.

Stress-coping relationship

Contacting the caregivers and creating a motivational basis for further participation in the study was based on a *semi-structural biographical interview* lasting for about 2 hours. In this interview life situation, development of the illness, perception of the patient's behaviour and own response patterns as well as subjective meaning, evaluations and problems were addressed. This was also the basis for the follow-up interviews in which changes of the situation were picked out as a central theme.

Illness-related burden

Burden was measured with the *Family Burden Questionnaire* (FBQ), which was adapted by the author from the semi-structural interview of Pai and Kapur (1981). This instrument is psychometrically tested and applicable to relatives of schizophrenic as well as depressive patients. With regard to several life domains (daily living, family atmosphere, leisure, financial aspects and well-being), objective and subjective aspects of burden are assessed with 29 items for the last 3 months. Objective burden is defined as observable changes in routine arrangements and is bipolarly assessed by the relative (e. g. "Does his/her behaviour disturb daily routine?" The answer is yes or no). Subjective burden refers to each item of objective burden with the question "How burdensome is this for you?" The answer consists of a three-point scale: not at all/moderate/very burdensome.

While Pai and Kapur offer only one global score of subjective burden, the author has constructed several scores for objective and subjective burden, one time with regard to each life domain and one time with regard to a global measure of the objective and subjective dimension of burden. To make the scores more perceptual, the quotients (sums of item values are divided through number of items) are transferred to percentage by multiplication by 100.

Reliability test (n = 83) for the global percentage of objective burden resulted in alpha = 0.83, for the global percentage of subjective burden in alpha = 0.88, and for the entire scale in alpha = 0.92.

Life stressors

Qualitative interview data were used to assess an additional dimension of burden independent of the psychiatric disorder of the patient: *'life stressors'*. Life stressors were defined to include either chronic everyday burden (e. g. financial problems, own disorders of the caregiver, job strain, marital strain, family conflicts, caring for small children and/or other chronically ill family members) or several life events in the last 6 months (e. g. moving, loss of a job, birth of a child, accident). The occurrence and the degree of subjective burden with regard to these life stressors was assessed by the author on a 4-point-scale (0 = no additional life stressors, 4 = several strong life stressors with a degree of burden comparable to the manifestation of the psychiatric disorder).

Generalized stress-response

The German questionnaire 'Stressverarbeitungsbogen' (SVF) (Janke and Erdmann 1997) was chosen to measure general coping strategies of the caregivers. It includes 19 subscales which are summed up in 'positive' and 'negative' stress response.

Illness-related coping

Strategies aimed at coping with typical symptoms/events of the illness were assessed with the German version *'Skala zur Erfassung des Bewältigungsverhaltens'* (SEBV) (Ferring and Filipp 1989) of the 'Ways of Coping Checklist' (Folkman and Lazarus 1989), which differentiates two scales: problem-focused and emotion-focused coping.

Subjective beliefs of competence and control

General beliefs about one's competence to solve problems and one's control over the environment represent an important coping resource and were measured with the *'Fragebogen zu Kompetenz- und Kontrollüberzeugungen'* (FKK) (Krampen 1991). The questionnaire consists of four scales, two of them related to internality and two of them related to externality. These four scales are summed up into two secondary scales 'general self-efficacy' and 'general externality of control beliefs'.

Personality

In order to assess the influence of further personality dimensions on the caregivers' burden, the German version of the *'NEO Five-Factor Inventory'* (NEO-FFI) (Borkenau and Ostendorf 1993) was used. The five personality descriptors are: neuroticism, extraversion, openness to experience, sociability and conscientiousness. They are self-rated on a five-point-scale. Under the assumption that these personality dimensions are stable traits, they were assessed only at baseline.

Perceived social support

Perceived social support represents an important dimension of social resources, being measured with the short form of the German *'Fragebogen zur Sozialen Unterstützung'* (SOZU) (Sommer and Frydrich 1989), including 22 items and a five-point rating scale.

Subjective well-being

In order to assess the current subjective well-being of the caregivers, the German *'Befindlichkeitsskala'* (Bf-S) (von Zerssen 1976) was used, which includes a broad scope of bipolar structured cognitive-emotional states. Occurrence and degree of current symptoms were also self-rated by the caregivers by using the *'Symptom-Checklist-90-R'* (SCL-90) (Derogatis 1977).

Subjective quality of life

Subjective quality of life was assessed with a German adapation of the *'Lancashire Quality of Life Profile'* (LQLP) by Priebe et al. (1995). Questions cover objective conditions in different life domains, subjective satisfaction with these domains, and global satisfaction with life, which is rated on a 7-point-scale (1 = totally dissatisfied to 7 = totally satisfied).

Interim events

In order to approximately control effects of potential intervening factors influencing the level of burden, positive and negative life events were assessed between baseline and all follow-ups on the basis of the relatives'narratives. These events should have been independent of the patient's illness. They were rated by the author on a 3-point scale (0 = no event, 1 = one or more events which the relative experienced as mainly positive, 2 = one or more events which the relative experienced as mainly negative, 3 = some events which the relative experienced differently, neither as positive nor as negative).

Patients' variables

Patients' data were assessed by psychiatrists involved in naturalistic follow-up studies of schizophrenic and depressive patients, which have been part of the German Research Networks of Schizophrenia and Depression/Suicidality (the author would like to thank PD Dr. Ronald Bottlender and his research group for placing the patients' data at the author's disposal.). Patients were diagnosed according to ICD-10 (F 20–29 and F 30–39). For the caregiver study, the following variables were selected.

Severity of disorder

The severity of depression at admission was assessed with the *'Hamilton Depression Scale'* (HAMD) (Hamilton 1960), and the severity of schizophrenia with the *'Positive and Negative Syndrome Scale'* (PANSS) (Kay et al. 1987).

Global functioning

Global functioning of the patients was measured using the *'Global Assessment of Functioning Scale'* (GAF) (American Psychiatric Association 1987) including a range from 1 to 100. Scores represent the sum of psychopathological symptoms and disturbances of psychosocial adjustment. Lower scores indicate a higher level of disturbance, higher scores a lower level of disturbance.

Relapse and residual symptoms at follow-up

Clinical data of the patients assessed by the psychiatrists were incomplete at 1-year follow-up. This was due to clinical overburden preventing the psychiatrists involved from reassessing all patients already participating in the index assessment. In order to "compensate" this deficit, two additional variables were constructed by the author on the basis of the relatives' interviews: patients' relapse (yes/no) and patients' residual symptoms independent of a relapse on a 4-point scale (1 = completely remitted, 2 = slight residual symptoms, 3 = moderate residual symptoms, 4 = severe residual symptoms).

Subjects

In-patients first hospitalized for a schizophrenic or depressive episode were recruited within the German Research Networks of Schizophrenia or Depression. Patients who lived with a relative or had a facial contact of at least 15 hours per week were informed of the caregiver study and asked to name the person to whom they had the closest contact. After getting the informed consent from the patient, the relative was contacted and, if he/she agreed to participate in the study, he/she was interviewed by the author about 3 weeks after the first hospitalization of the patient. The index interview was audiotaped, and a protocol was written by the author adapting to the wording of the caregiver. The questionnaires were filled in by the caregivers at home.

At baseline, 87 key relatives participated in the study. Of these, two participants refused to complete the questionnaires and to participate any further because of older age. Additionally, two other participants who were interviewed did not complete the questionnaires in spite of repeated reminders. Thus, full standardized data files of 83 caregivers were available at baseline (48 relatives of depressed patients, 35 relatives of schizophrenic patients).

Of the 85 key relatives, 73 (90.41 %) could be reassessed at 1-year follow-up (45 relatives of the depressed patients, 25 relatives of the schizophrenic patients). Of the 12 drop-outs, 4 relatives were unsatisfied with their patient's treatment or had not enough time to participate, 4 relatives could not be contacted again, 2 dropped out because of patients' suicide, and 2 because of separation. Four relatives participated in the interview but did not complete the questionnaires. As a result, complete data files of 69 key relatives were available at 1-year follow-up.

Statistical analysis

Changes in stress indicators and potential stress moderators between baseline and 1-year follow-up were calculated with t-test for paired differences.

Differences between groups were identified with Student's t-test and ANOVA. Correlation analyses were performed using either Pearson's correlation coefficient or Spearman's Rho depending on the distribution of the variables. Multiple linear regression analyses were separately calculated for each stress indicator.

Analyses were performed with SPSS 12.0 for Windows.

Results

Of the patients' relatives, 75.7 % were spouses, 22.9 % were parents, and one relative was a brother, most of them living together with the patient (91.1 %). The mean age was 48.3 years (SD 17.9), the percentage of male relatives was 48.5 %, the percentage of relatives of depressed patients predominated with 64.9 % (without differences in mean age compared to the relatives of schizophrenic patients). A total of 51.4 % of the relatives had a full-time or part-time job; 48.6 % were housewives or had retired.

Changes in relatives' stress outcome, illness-related coping, EE level and other characteristics at 1-year follow-up

One year after first admission of the patients, 82.6 % of the relatives report illness-related objective burden (mean % score: 20 % ± 20 %), and 76.5 % report illness-related subjective burden (mean % score: 14 % ± 18 %) (Table 1).

With regard to different life domains like daily living, family atmosphere, leisure activities, financial and emotional situation, daily living is most affected by objective burden (mean % score: 28 % ± 29 %): for example, 37 % of the caregivers have reduced or stopped daily activities to have more time for the patient, and 34 % report that the normal course of life is disturbed by the patient's behaviour. Subjective burden is most pronounced in illness-related emotions (mean % score: 20 % ± 22 %) with relatives suffering mostly from hopelessness. Although most of the relatives feel able to master the problems caused by the illness in general, 57 % of them feel that this is burdensome. Relatives' burden is reflected by their general subjective well-being (Bf-S mean score: 53.72 ± 12.25) and their self-rated symptoms (SCL-90-R, GSI mean score: 0.41 ± 0.42) (Table 1), which differ significantly from the population-based norm-values (Bf-S: 50 ± 10, $p < 0.001$; SCL-90-R, GSI: 0.31 ± 0.31, $p < 0.05$).

Dependent on the patients' diagnosis, non-significant differences of relatives' burden emerged in any stress indicator except subjective quality of life, where the difference was significant. Compared to relatives of schizophrenic patients, relatives of depressed patients feel less burdened with regard to global objective burden (mean score: 17 % ± 18 % vs. 27 % ± 23 %), global subjective burden (mean score: 12 % ± 16 % vs. 19 % ± 23 %), subjective well-being (Bf-S global score: 52.41 ± 11.58 vs. 53.80 ± 17.44), self-rated symptoms (SCL-90-R, GSI: 0.35 ± 0.37 vs. 0.45 ± 0.57) and subjective quality of life (5.42 ± 1.16 vs. 4.65 ± 1.67; $p < 0.05$).

Compared to baseline, most relatives (about 70 %–80 %) experience significantly less burden with respect to objective and subjective burden, general well-being, self-rated symptoms and subjective quality of life (Table 1). Although their subjective well-being has increased to a significant extent, the global scores of the

Table 1 Changes in stress outcome of caregivers between baseline (t_0) and 1-year follow-up (t_1) (t-test for paired differences, mean, SD and difference values)

Stress indicators	n	t_0	t_1	p	diff t_0–t_1
FBQ-OB (%)	69	31 (19)	20 (20)	0.000	10.75 (12.18)
FBQ-SB (%)	68	22 (17)	14 (18)	0.000	7.70 (15.13)
Bf-S (t-values)	69	59.13 (12.38)	53.72 (12.25)	0.000	5.41 (12.00)
SCL-90-R (GSI)	69	0.51 (0.51)	0.41 (0.42)	0.034	0.10 (0.37)
LQ	68	4.57 (1.63)	5.15 (1.37)	0.001	−0.57 (1.35)

FBQ-OB % score of the theoretical maximum of the global score of objective burden (Family Burden Questionnaire); *FBQ-SB* % score of the theoretical maximum of the global score of subjective burden (Family Burden Questionnaire); *Bf-S* well-being, t-values of the sum score (lower scores reflecting better well-being); *SCL-90-R (GSI)* self-rated symptoms, global symptom index (lower scores reflecting less symptoms); *LQ* global satisfaction with life (LQLP) (1 = totally dissatisfied to 7 = totally satisfied)

Bf-S and the SCL-90-R still differ significantly from the norm-values, indicating a level of burden which remains elevated.

Changes of the potential moderators of the stress model from baseline to 1-year follow up assessments are shown in Table 2.

Under the assumption that the level of subjective burden reflects how the relative assesses his own coping capacity, it could be expected that illness-related coping strategies, especially emotion-focused coping strategies, would also decrease – due to an improvement of the patients' symptoms or due to an improvement of illness-related coping strategies. As was expected, data demonstrate a significant reduction of emotion-focused as well as problem-focused coping strategies. While perceived social support and life stressors have slightly, but significantly, decreased, generalized stress response and beliefs of control prove to be stable due to their trait characteristic.

There is also a significant decrease of the percentage of high EE relatives from 59 % to 41.4 % and a significant increase of low EE relatives from 41 % to 58.6 % ($p < 0.05$) at 1-year follow-up.

A closer look at the EE level reveals that it remains unchanged in most of the relatives (68 %) with 52 % scoring high and 48 % scoring low EE. Only 4 % of the relatives changed from low to high EE, while 27 % changed from high to low EE. With respect to stress outcome, high-high EE relatives as well as low-low EE relatives are those groups which differ significantly in all stress indicators, as is shown in Table 3.

Patients' symptoms, relatives' stress outcome and EE level

According to the relatives' reports, the relapse rate of the patients was 11.3 %. With regard to patients' symptoms, 22.5 % of the patients had completely remitted, 36.6 % had slight, 29.6 % moderate and 11.3 % severe residual symptoms. In relation to diagnosis, neither the mean score of residual symptoms (schizophrenic patients: 2.44 ± 0.87, depressed patients: 2.22 ± 0.99) nor the GAF mean scores differed significantly between schizophrenic and depressed patients (schizophrenic patients: 70 ± 14.79, depressed patients: 78.37 ± 17.27). However, there are nevertheless considerable differences in the GAF scores, which did not reach significance due to the small size of the subgroups. The mean difference of the GAF scores from baseline to 1-year follow-up is –35.40, resulting in a mean score of 75.96 ($n = 25$) one year after first admission. GAF scores and patients' residual symptoms rated on the basis of the relatives' reports are strongly correlated ($r = -0.67$; $p = 0.001$) indicating that relatives' views correspond with psychiatrists' ratings of the patients' functioning to a great extent. In Table 4, significant associations between patients' residual symptoms and relatives' stress outcome are shown.

Patients' residual symptoms and change of their relatives' EE level are not significantly correlated (mean score of residual symptoms: 1.95 ± 0.91 in high-low EE relatives; 2.60 ± 0.96 in high-high EE relatives; and 2.13 ± 0.87 in low-low EE relatives; $p = 0.0547$). However, cross-sectional EE level at 1-year follow-up is significantly related to patients' residual symptoms (mean

Table 2 Changes of potential stress moderators at 1-year follow-up (t-test for paired differences)

Stress moderators	n	t_0	t_1	t	p
Emotion-focused coping	69	0.41 (0.21)	0.29 (0.30)	3.272	0.002
Problem-focused coping	69	0.48 (0.23)	0.34 (0.35)	3.600	0.001
Positive stress response	67	48.64 (8.58)	47.61 (9.41)	1.238	n. s.
Negative stress response	67	50.57 (12.01)	48.66 (12.02)	1.923	n. s.
Self-efficacy	69	49.57 (10.10)	50.75 (10.39)	−1.525	n. s.
External belief of control	69	45.97 (10.64)	47.09 (11.74)	−1.287	n. s.
Perceived social support	70	4.13 (0.66)	3.70 (1.56)	2.382	0.020
Life stressors	70	1.63 (1.46)	1.41 (1.42)	3.191	0.002

Table 3 Changes of EE level and stress-outcome at 1-year follow-up (ANOVA and post hoc Dunnett-t-test)

	high → low	high → high	low → low	F	p
FBA-OB (%)	11 (11)	35 (20)	9 (13)	19.608	0.000
FBA-SB (%)	6 (7)	26 (20)	5 (10)	15.763	0.000
Bf-S (t-values)	48.89 (10.55)	60.61 (11.35)	48.09 (10.39)	9.946	0.000
SCL-90-R (GSI)	0.23 (0.22)	0.74 (0.47)	0.15 (0.18)	22.535	0.000
LQ	5.67 (1.23)	4.28 (1.37)	5.82 (0.85)	11.749	0.000

FBQ-OB % score of the theoretical maximum of the global score of objective burden (Family Burden Questionnaire); *FBQ-SB* % score of the theoretical maximum of the global score of subjective burden (Family Burden Questionnaire); *Bf-S* well-being, t-values of the sum score (lower scores reflecting better well-being); *SCL-90-R (GSI)* self-rated symptoms, global symptom index (lower scores reflecting less symptoms); *LQ* global satisfaction with life (LQLP) (1 = totally dissatisfied to 7 = totally satisfied)

Table 4 Patients' residual symptoms and relatives' stress outcome at 1-year follow-up (Spearman's Rho)

Stress indicator	Patients' residual symptoms	p
FBA-OB	0.468	< 0.01
FBA-SB	0.439	< 0.01
Bf-S	0.430	< 0.01
SCL-90-R (GSI)	0.479	< 0.01
LQ	−0.300	< 0.05

FBQ-OB % score of the theoretical maximum of the global score of objective burden (Family Burden Questionnaire); *FBQ-SB* % score of the theoretical maximum of the global score of subjective burden (Family Burden Questionnaire); *Bf-S* well-being, t-values of the sum score (lower scores reflecting better well-being); *SCL-90-R (GSI)* self-rated symptoms, global symptom index (lower scores reflecting less symptoms); *LQ* global satisfaction with life (LQLP) (1 = totally dissatisfied to 7 = totally satisfied)

score of residual symptoms: 2.05 ± 0.89 in low EE relatives; 2.66 ± 0.94 in high EE relatives; $p < 0.01$). There is no relationship between the EE groups and the relapse rate, and EE at baseline does not predict the relapse rate at 1-year follow-up.

Multivariate cross-sectional stress model at 1-year follow-up

In order to estimate the impact of patients' residual symptoms on relatives' stress outcome and the moderating effects of relatives' dispositions and resources, moderator analyses were conducted. Comparing the relationship between the patients' condition at first admission, at discharge and at 1-year follow-up with relatives' stress outcome, only patients' residual symptoms at 1-year follow-up correlated significantly with relatives' stress outcome. This was the reason why patients' residual symptoms at 1-year follow-up was selected as stressor for testing the underlying transactional stress model. For each stress indicator, stepwise multiple linear regression analysis was performed including those moderators which were significantly correlated to the stress indicator on the bivariate level as well as the interactions between patients' symptom scores and these moderators as additional independent regressors. Expressed emotion (low/high) was transformed into a dummy variable to fit the regression procedure. Multicolinarity did not exist. The results are presented in Table 5 and graphically summarized for global stress outcome in Fig. 1.

Data indicate that there were no main effects of patients' residual symptoms on relatives' stress outcome. The impact of the patients' condition was rather moderated by relatives' EE, negative stress response, neuroticism, and life stressors, which also have direct effects on the stress experienced by the relatives.

Multivariate stress model with regard to stress reduction at 1-year follow-up

The next question was which predictors would explain best the reduction of stress resulting from baseline to 1-year follow-up assessments. For each stress indicator, mean scores of difference between baseline and 1-year follow-up were calculated. With respect to the impact of patients' condition at first admission or at discharge on changes of stress outcome, no significant association

Table 5 Multivariate prediction of relatives' stress outcome at 1-year follow-up by multiple linear regression analyses

Predictors/moderators	Stress indicators	Beta	F	p	Explained variance R^2
• Interaction of high EE and patients' residual symptoms	Objective burden (FBQ-OB)	0.455	27.852	0.000	52%
• Neuroticism		0.390		0.001	
• Interaction of high EE and patients' residual symptoms	Subjective burden (FBQ-SB)	0.453	21.905	0.000	46%
• Neuroticism		0.375		0.001	
• Interaction of negative stress response and patients'residual symptoms	Well-being (Bf-S)	0.513	25.537	0.000	60%
• External belief of control		0.274		0.008	
• Life stressors		0.246		0.011	
• Sociability	Self-rated symptoms (SCL-90-R, GSI)	−0.522	50.19	0.000	75%
• Low EE		−0.338		0.000	
• Neuroticism		0.331		0.000	
• Negative stress response	Global satisfaction with life (LQ)	−0.413	24.736	0.001	67%
• Interaction of neuroticism and patients' residual symptoms		−0.302		0.018	
• Interaction of life stressors and patients'residual symptoms		−0.232		0.009	
• Interaction of low EE and patients'residual symptoms		0.203		0.042	

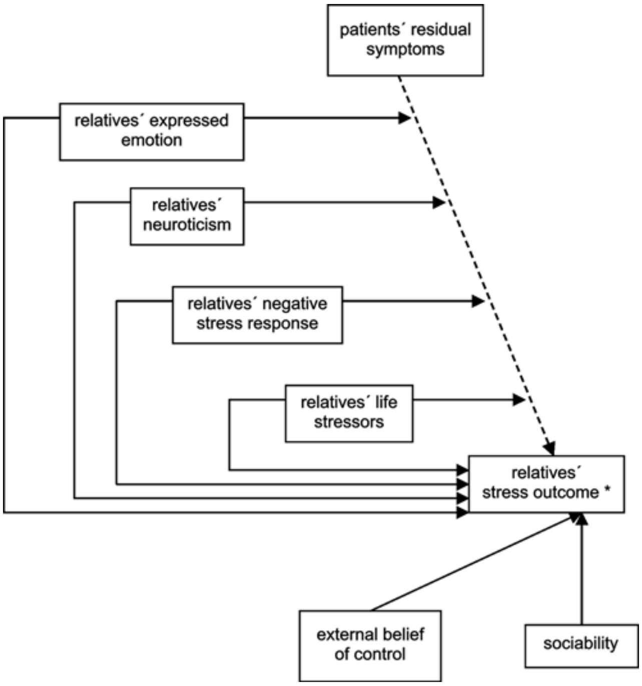

Fig. 1 Multivariate cross-sectional stress model at 1-year follow-up. * Summarized model for all stress indicators: objective and subjective burden, well-being, self-rated symptoms and global quality of life

emerged. However, there were low, but significant, negative correlations between patients' residual symptoms at 1-year follow-up and differences of objective and subjective burden of the relatives (Rho = –0.25 and –0.24, $p < 0.05$) and differences of their well-being (Rho = –0.30, $p = 0.012$). Due to this, patients' residual symptoms were included into further calculations. Using the same procedure as above, stepwise multiple regression analysis was performed for each stress indicator, now referring to the particular scores of difference and including all significant bivariate correlates with baseline values (Table 6).

The data indicate that much less of the total variance of differences in stress outcome could be explained compared to the cross-sectional model. Given this restrictive condition, differences in illness-related objective and subjective burden of the relatives could best be predicted by their generalized positive stress response which moderates the experience of burden. While a minor percentage of increased well-being was directly influenced by patients' residual symptoms, the reduction of self-rated symptoms and the improvement of subjective quality of life seem to be dependent only on personal dispositions of the relatives, mainly on their generalized stress response.

The question whether the resulting patterns of stress predictors may differ for relatives depending on the diagnosis of the patient cannot be answered due to the small number of schizophrenic patients. This was the reason for not calculating regression models for both diagnostic groups separately. The bivariate correlational patterns already showed for the relatives of the schizophrenic patients that several associations did not reach significance, although it could be expected. Thus, the resulting stress models seem to be mainly valid for relatives of depressed patients.

Discussion

The present study presents the 1-year follow-up findings of the Munich 5-year follow-up study on relatives of first hospitalized patients with schizophrenia or depression. The relatives had been consecutively recruited. At 1-year follow-up, 90 % of the relatives could be reassessed. Due to the kind of recruitment and the low number of drop-outs, severe selection bias could be excluded.

On the basis of a transactional multivariate stress model, the question was investigated which factors moderate the impact of the patient's illness on the stress experienced by his key relative in different dimensions. Data demonstrate that a significant reduction in objective and subjective burden as well as significant improvements in well-being, self-rated symptoms and sub-

Table 6 Multivariate prediction of relatives' stress reduction from baseline to 1-year follow-up by multiple linear regression analyses

Predictors/moderators	Stress indicators (mean scores of difference)	Beta	F	p	Explained variance R^2
• Interaction of positive stress response and patients' residual symptoms • Interaction of sociability and patients' residual symptoms	Difference of objective burden (FBQ-OB)	–0.877 0.563	10.053	0.000 0.008	28 %
• Interaction of positive stress response and patients' residual symptoms	difference of subjective burden (FBQ-SB)	–0.453	17.010	0.000	21 %
• Patients' residual symptoms	Difference of well-being (Bf-S)	–0.284	5.797	0.019	8 %
• Sociability • Negative stress response	Difference of self-rated symptoms (SCL-90-R, GSI)	0.432 0.404	8.620	0.001 0.002	25 %
• Positive stress response	Difference of global satisfaction with life (LQ)	0.242	4.059	0.048 0.018	6 %

jective quality of life occurred in two-thirds of the relatives, while well-being and self-rated symptoms remained worse when compared to norm-values. Although relatives experienced less burden at 1-year follow-up, a considerable level of burden persists for most of them.

Schizophenic and depressed patients did not differ significantly with respect to residual symtoms and psychosocial adjustment, although there was a numerical difference of the GAF score in favour of the depressed patients. Differences in relatives' burden due to diagnosis were found, with caregivers of schizophrenic patients reporting higher objective and subjective burden, lower well-being and subjective quality of life (mainly nonsignificant). Given that the impact of patients' diagnosis on relatives' burden has been rarely investigated, preliminary evidence indicates that the psychosocial functioning of the patients seems to be more relevant to relatives' burden than the kind of psychiatric illness.

In the present sample, the rate of relapse was rather low (11.3 %), and not predicted by relatives' EE at baseline. This is consistent with findings from the literature, which indicate that the EE-relapse relationship in schizophrenia is strongest for patients with more chronic illness (Butzlaff and Hooley 1998). Beyond this, Butzlaff and Hooley found in their meta-analysis that the mean effect size for EE in mood disorders was significantly higher than the effect size for schizophrenia.

Reduction in relatives' stress experience was significantly associated with patients' residual symptoms on the bivariate level; however, no main effects on relatives' stress outcome at 1-year follow-up could be observed under multivariate conditions. In multivariate linear regression models for each stress indicator, different combinations of predictors resulted, explaining up to 75 % of the total variance of the stress indicator. Relatives' dispositions and resources, in particular their Expressed Emotion and neuroticism, their generalized negative stress response and life stressors, which were independent of the patients' illness, significantly moderated the impact of patients' residual symptoms on relatives' stress outcome. For this reason, data support the transactional character of the stress process caused by a severe mental disease of the spouse or child.

With regard to multivariate prediction of relatives' stress reduction at 1-year follow-up, regression analyses yielded less informative results with respect to explained variance. Nevertheless, data demonstrated that generalized positive stress response of the relatives is the most relevant factor which moderates the effects of patients' residual symptoms towards a substantial reduction of stress experience. In addition to positive stress response, relatives' sociability turned out to be another meaningful moderator and stress predictor. Again, the transactional character of the stress process is supported by these findings, reinforcing the assumption that the appraisal of burden by the relatives is more important for their stress experience than the actual deficits of the patients.

Comparing these findings to the baseline results of the same sample [11] shows principal similarities, but also some important differences. Apart from patients' psychopathology, the bivariate structure of interrelations between relatives' dispositions and resources and their stress outcome is nearly the same, at 1-year follow-up showing even stronger correlations, which is particularly true for personality factors such as neuroticism and sociability. While at baseline relatives' stress outcome was not associated with patients' psychopathology, only main effects of potential moderators on stress outcome could be observed, particularly of relatives' EE, emotion-focused coping strategies concerning typical negative illness-related events, and generalized negative stress response.

At 1-year follow-up, EE and negative stress response, but not emotion-focused coping, were supported as the most relevant stress predictors. EE and negative stress response had not only direct effects on relatives' stress outcome, but also significantly moderated the impact of patients' psychopathology on stress outcome. The same was true for relatives' neuroticism and life stressors independent of the patients' illness. In the mean, additional 18 % of the total variance of the stress indicators (except well-being) could be explained at 1-year follow-up, which points to an increasing validity of the underlying stress model.

The scope of the findings is mostly limited by the fact that the stress outcome of the relatives as well as patients' residual symptoms are based on the relatives' report. Relatives' perception may have acted as a bias covering the way of causality between patients' symptoms and relatives' burden (relatives reporting higher burden may have reported more severe symptoms of the patients vs. more severe symptoms of the patients resulting in higher burden of the relatives). However, it has been shown that patients' and relatives' reports of the patients' actual symptomatology are often concordant and correspond with the expert rating (Bottlender et al. 2003). There is also evidence that relatives' ratings may be more valid than the patients' own ratings (Ho et al. 2004). Last but not least, feelings of burden may be rather affected by relatives' subjective perception of the patients' condition than by objective expert ratings. This assumption is supported by the baseline results of the same project (Möller-Leimkühler 2004): clinical expert ratings of the patients' psychopathology at first admission and discharge as well as expert ratings of the patients' premorbid psychosocial adaptation did not correlate with relatives' burden.

This is the first time that relatives' burden has been studied in a multivariate and prospective study design in which the development of burden is followed up for 5 years. As the study sample has not been drawn from caregiver organizations, typical selection effects on illness-related burden and coping could be avoided. The present analysis offers evidence-based data on the most important determinants of burden which should be considered in developing more effective family intervention strategies. These determinants are rather relatives' own dispositions and resources than the patients' condition, because they affect burden directly as well as indirectly by moderating the impact of the patients' illness. The findings of this study indicate that the stress predictors are mainly independent of the patients' disease. This is immediately evident for relatives' neuroticism, generalized stress response, general life stressors and beliefs of control. However, this can be also held for EE. At baseline, EE appeared to be unaffected by the patients' illness characteristics while being significantly associated with relatives' external belief of control, generalized negative stress response and general life stressors (high EE relatives had higher scores). At 1-year follow-up, the probability of being high EE grew with increasing use of negative stress response and emotion-focused coping strategies, while patients' symptoms did not contribute in predicting EE. For these reasons, the present findings suggest that family interventions should focus more strongly on improving relatives' general stress response in order to reduce feelings of burden.

■ **Acknowledgement** Part of the research project was supported by the German Ministry of Education and Research in the context of the German Research Networks on Schizophrenia and Depression/Suicidality.

References

1. American Psychiatric Association (1987) Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R). Washington DC
2. Borkenau P, Ostendorf F (1993) NEO-Fünf-Faktoren Inventar (NEO-FFI) nach Costa und McCrae. Göttingen – Bern – Toronto – Seattle: Hogrefe
3. Bottlender R, Jäger M, Kunze I, Groll C, Borski I, Möller H-J (2003) Negative Symptome schizophrener Patienten aus der Perspektive der Psychiater, der Patienten selbst und deren Angehörigen. Nervenarzt 74:762–766
4. Boye B, Bentsen H, Ulstein I, Notland TH, Lersbryggen A, Lingjaerde O, Malt UF (2001) Relatives' distress and patients' symptoms and behaviours: a prospective study of patients with schizophrenia and their relatives. Acta Psychiatr Scand 104:42–50
5. Brown S, Birtwistle J (1990) People with schizophrenia and their families. Fifteen-Year outcome. Br J Psychiatry 173:139–144
6. Butzlaff RL, Hooley JM (1998) Expressed emotion and psychiatric relapse: a meta-analysis. Arch Gen Psychiatry 55:547–552
7. Cornwall PL, Scott J (1996) Burden of care, psychological distress and satisfaction with services in the relatives of acutely mentally disordered adults. Soc Psychiatry Psychiatr Epidemiol 31: 345–348
8. Derogatis LR (1977) SCL-90-R, administration, scoring and procedures. Manual for the R(evised) Version. John Hopkins University School of Medicine
9. Ferring D, Filipp S-H (1989) Bewältigung kritischer Lebensereignisse: Erste Erfahrungen mit einer deutschsprachigen Version der "Ways of Coping Checklist". Zeitschrift für Differentielle und Diagnostische Psychologie 10:189–199
10. Folkman S, Lazarus RS (1989) An analysis of coping in a middle-aged community sample. J Health Soc Behav 21:219–239
11. Hamilton M (1960) A rating scale for depression. J Neurol Neurosurg Psychiat 23:56–62
12. Ho BC, Flaum M, Hubbard W, Arndt S, Andreasen NC (2004) Validity of symptom assessment in psychotic disorders: information variance across different sources of history. Schizophr Res 68:299–307
13. Janke W, Erdmann G (1997) Streßverarbeitungsfragebogen. Göttingen – Bern – Toronto – Seattle: Hogrefe
14. Jones SL (1996) The association between objective and subjective caregiver burden. Arch Psychiatr Nurs 2:77–84
15. Joyce J, Leese M, Kuipers E, Szmukler G, Harris T, Staples E (2003) Evaluating a model of caregiving for people with psychosis. Soc Psychiatry Psychiatr Epidemiol 38:189–195
16. Jungbauer J, Wittmund B, Dietrich S, Angermeyer MC (2003) Subjective burden over 12 months in parents of patients with schizophrenia. Arch Psychiatr Nurs 3:126–134
17. Kay SR, Fiszbein A, Opler LA (1987) The Positive and Negative Syndrome Scale (PANSS) for schizophrenia. Schizophr Bull 13: 261–276
18. Krampen G (1991) Fragebogen zu Kompetenz- und Kontrollüberzeugungen (FKK). Göttingen – Toronto – Zürich: Hogrefe
19. Magana AB, Goldstein MJ Karno M, et al. (1986) A brief method for assessing expressed emotion in relatives of psychiatric patients. Psychiatr Res 17:203–212
20. Magliano L, Fadden G, Economou M, Held T, Xavier M, Guarneri M, Malangone C, Marasco C, Maj M (2000) Family burden and coping strategies in schizophrenia: 1-year follow-up data from the BIOMED I study. Soc Psychiatry Psychiatr Epidemiol 35: 109–115
21. Möller-Leimkühler AM (2004) Burden of relatives and predictors of burden. Baseline results from the Munich 5-yeat-follow up study on relatives of first hospitalized patients with schizophrenia or depression. Eur Arch Psychiatry Clin Neurosci, Nov 19:1–9
22. Pai S, Kapur RL (1981) The burden on the family of a psychiatric patient: Development of an interview schedule. Brit J Psychiat 138:332–335
23. Priebe S, Gruyters T, Heinze M, Hoffmann C, Jäkel A (1995) Subjektive Evaluationskriterien in der psychiatrischen Versorgung – Erhebungsmethoden für Forschung und Praxis. Psychiat Prax 22:140–144
24. Ray J, Kulhara P, Avasthi A (1991) Social burden of positive and negative schizophrenia. Internat J Soc Psychiatry 37:242–250
25. Scazufca M, Kuipers E (1998) Stability of expressed emotion in relatives of those with schizophrenia and its relationship with burden of care and perception of patient's social functioning. Psychol Med 28:453–461
26. Sommer G, Frydrich T (1989) Soziale Unterstützung: Diagnostik, Konzepte, F-SOZU. Dt. Ges. für Verhaltenstherapie, Tübingen
27. The Scottish Schizophrenia Research Group (1992) The Scottish first episode schizophrenia study VIII. Five-year follow-up: Clinical and psychosocial findings. Br J Psychiatry 161:496–500
28. Wiedemann G, Rayki O, Feinstein E, Hahlweg K (2002) The Family Questionnaire: Development and validation of a new self-report scale for assessing expressed emotion. Psychiatr Res 109: 265–279
29. Zerssen D von (1976) Die Befindlichkeitsskala: Parallelformen Bf-S und Bf-S'. Beltz-Test, Göttingen