

CAREGIVER BURDEN AS A POTENTIAL PROXY
MARKER OF POOR PSYCHOSOCIAL FUNCTIONING
AFTER HOSPITALISATION FOR PSYCHOSIS:
A BRIEF REPORT

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Abstract

Functional recovery after hospitalisation for psychosis may remain incomplete despite symptomatic improvement, and relatives often provide substantial informal care during this period. This post-hoc analysis examined whether caregiver burden at one-year follow-up was associated with patient psychosocial functioning and whether it could identify poor psychosocial functioning. Data were obtained from a prospective study of 96 patients hospitalised for psychotic exacerbation and their primary caregivers. Psychosocial functioning was assessed with the Personal and Social Performance Scale (PSP), and caregiver burden with the Burden Assessment Scale (BAS). Multivariable linear regression tested the association between BAS and PSP at follow-up, adjusting for diagnosis, age, comorbidity, baseline admission duration, and psychiatric re-hospitalisation. Receiver operating characteristic analysis examined BAS classification accuracy for poor psychosocial functioning, defined as $PSP < 60$. Complete regression data were available for 83 patients. Higher BAS at follow-up was independently associated with poorer PSP, $B = -0.906$, $SE = 0.152$, $\beta = -0.535$, $p < 0.001$; the model explained 45.7% of PSP variance. BAS showed good classification accuracy for $PSP < 60$, $AUC = 0.822$, 95% CI [0.718, 0.927], $p < 0.001$. Caregiver burden may serve as a clinically useful family-reported proxy marker of poor psychosocial functioning after hospitalisation for psychosis.

Key words: caregiver burden, psychosis, psychosocial functioning, informal care, functional recovery

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Introduction. Psychotic disorders are associated with persistent impairments in social, occupational and interpersonal functioning. Although acute symptoms often improve after hospitalisation, functional recovery may remain incomplete and patients may continue to require support in everyday activities, treatment adherence, social participation and role functioning. Psychosocial functioning is therefore an important post-discharge outcome alongside symptomatic improvement [1].

A substantial part of care for individuals with psychosis is provided informally by relatives. Family members often support patients during the transition after discharge and throughout recovery, including supervision, emotional support, practical assistance, and coordination with services. Caregiver burden may consequently reflect not only relatives' strain, but also the practical consequences of patients' impaired functioning in everyday life [2].

Previous analyses from the broader Bulgarian costs-and-outcomes study described informal-care burden before admission and one year after discharge. The follow-up analysis showed that burden decreased after discharge but remained substantial, and identified illness severity, threats, time spent in care, stigma and younger caregiver age as predictors of higher burden [3,4]. The present brief report extends this work by focusing specifically on individuals with psychosis and by examining caregiver burden from an additional perspective: not as the primary outcome, but as a potential family-reported proxy marker of patient psychosocial functioning.

Functional impairment is not always fully captured by symptom ratings or patient reports. Family members observe dependence, withdrawal from social roles, reduced autonomy and need for supervision in daily contexts. High caregiver burden may therefore signal incomplete functional recovery and identify patient-caregiver dyads requiring additional psychosocial or family-focused support. The aim of this brief report was to examine whether caregiver burden at one-year follow-up was associated with psychosocial functioning at the same time point, and whether it could identify poor psychosocial functioning, defined as PSP < 60.

Material and methods. This was a post-hoc analysis of a previously reported prospective study of costs and outcomes among individuals hospitalised for psychosis in Bulgaria [3–5]. Patients with psychotic disorders and their primary caregivers were assessed during hospitalisation for psychotic exacerbation and one year after discharge. Participants were adults with affective or non-affective psychosis, classified as F2 or F3 according to ICD-10 [6]. Psychotic exacerbation was defined as PANSS total score ≥ 60 and a score ≥ 4 on at least two positive-subscale items [7]. Exclusion criteria were substance-induced psychosis, severe comorbid somatic illness, and severe cognitive impairment impeding adequate participation. Recruitment took place between January 2015 and January 2016. Each month, the first ten consecutively admitted eligible patients were considered for participation. All patients and caregivers provided written informed consent.

The baseline cohort included 96 patients: 56 with non-affective psychosis and 40 with affective psychosis. Follow-up information at 12 months was available for 88 patients, and complete data for the multivariable regression model were available for 83. Psychosocial functioning at follow-up was measured with the Personal and Social Performance Scale (PSP) [8], and caregiver burden with the Burden Assessment Scale (BAS) [9].

A multivariable linear regression model examined whether BAS score at follow-up was associated with PSP score at follow-up. The model was adjusted for diagnosis, age, comorbidity, duration of baseline admission, and psychiatric re-hospitalisation during follow-up. An exploratory ROC analysis examined whether BAS could identify poor psychosocial functioning, defined as $PSP < 60$. Cut-off values were interpreted cautiously because of the modest sample size and exploratory purpose.

Results. The baseline sample included 96 patients with psychotic disorders, 45 (47%) of whom were female. Mean patient age was 39 years ($SD = 15$), and mean illness duration was 12 years ($SD = 13$). Forty-two patients (44%) had schizophrenia. At 12-month follow-up, the mean duration of the baseline admission was 24 days ($SD = 11$), and 13 patients (15%) had been hospitalised again. PSP scores improved from 35 ($SD 6$) at baseline to 70 ($SD = 19$) at follow-up, $z = -7.694$, $p < 0.001$. BAS scores decreased from 44 ($SD = 12$) to 35 ($SD = 11$), $t(82) = 7.679$, $p < 0.001$.

The regression model (Table 1) was statistically significant, $F(6, 76) = 10.678$, $p < 0.001$, and explained 45.7% of PSP variance (adjusted $R^2 = 0.415$). Higher caregiver burden was independently associated with poorer psychosocial functioning: each one-point BAS increase corresponded to a 0.91-point decrease in PSP score, $B = -0.906$, $SE = 0.152$, $\beta = -0.535$, $p < 0.001$. Older age was also associated with lower PSP scores, $B = -0.359$, $SE = 0.124$, $\beta = -0.288$, $p = 0.005$.

Table 1
Multivariable linear regression model for psychosocial functioning at follow-up

Predictor	B	SE	β	t	p
Patient age (years)	-0.359	0.124	-0.288	-2.886	0.005
Diagnosis (affective psychosis)	12.630	3.324	0.333	3.799	< 0.001
Comorbidity (yes)	1.597	3.824	0.040	0.418	0.677
Caregiver burden at follow-up (BAS total)	-0.906	0.152	-0.535	-5.977	< 0.001
Baseline admission duration (days)	-0.022	0.145	-0.014	-0.149	0.882
Psychiatric rehospitalisation (yes)	-8.447	4.732	-0.164	-1.785	0.078

Note: Dependent variable: PSP at 12-month follow-up. Diagnosis coded 0 = non-affective psychosis, 1 = affective psychosis. BAS = Burden Assessment Scale; PSP = Personal and Social Performance Scale. Model summary: $R = 0.676$, $R^2 = 0.457$, adjusted $R^2 = 0.415$, $SE = 14.435$

Affective psychosis was associated with higher PSP scores than non-affective psychosis, $B = 12.630$, $SE = 3.324$, $\beta = 0.333$, $p < 0.001$. Comorbidity, admission duration and rehospitalisation were not significant in the adjusted model.

The ROC analysis showed good classification accuracy for poor psychosocial functioning: $AUC = 0.822$, $SE = 0.053$, 95% CI $[0.718, 0.927]$, $p < 0.001$ (Fig. 1). The highest Youden index was observed at $BAS > 29.5$, corresponding in practice to $BAS \geq 30$. This threshold showed high sensitivity but modest specificity. A higher threshold, $BAS \geq 41$, provided greater specificity at the expense of sensitivity.

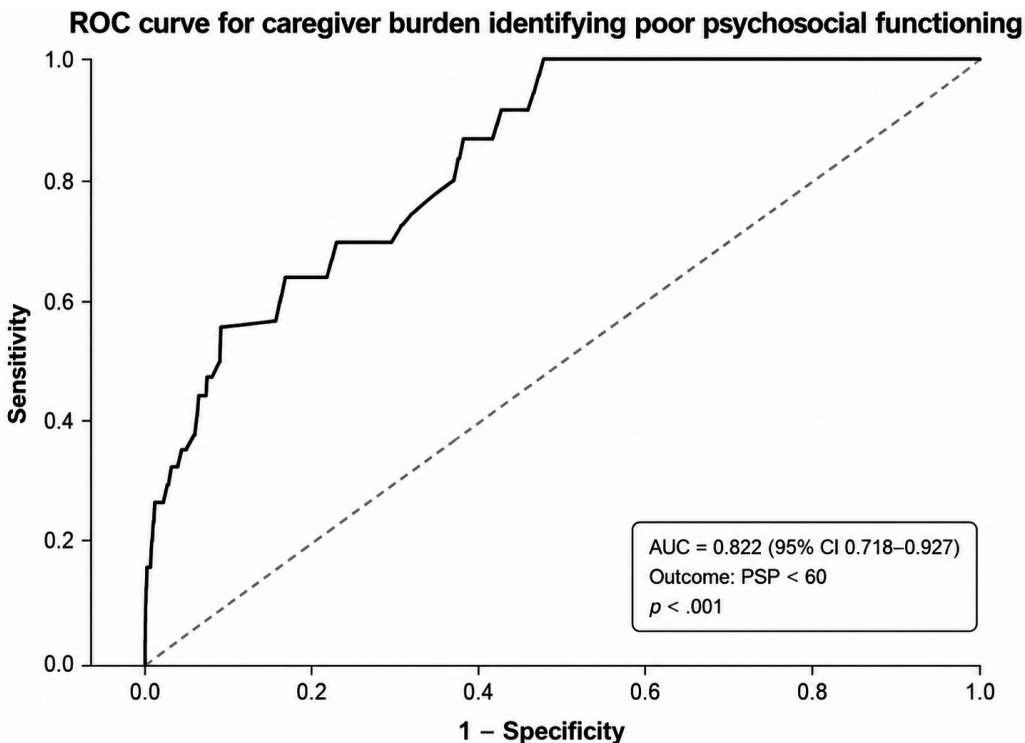


Fig. 1. Receiver operating characteristic curve for caregiver burden as a classifier of poor psychosocial functioning at follow-up

Discussion. In this post-hoc analysis of a prospective Bulgarian cohort, caregiver burden at one-year follow-up was examined as a potential marker of patient psychosocial functioning after hospitalisation for psychosis. Earlier work from this cohort treated caregiver burden primarily as an outcome and showed that burden remained substantial one year after discharge despite reductions in time spent in informal care [4]. The present brief report extends this work by focusing specifically on individuals with psychosis and by examining caregiver burden with a different emphasis: not as the primary outcome, but as a potential family-reported proxy marker of patient psychosocial functioning. This distinction

is important because the practical consequences of impaired functioning are often experienced directly by relatives in everyday care [2].

The main finding was that higher caregiver burden was strongly associated with poorer psychosocial functioning at the same time point. This association remained significant after adjustment for diagnosis, age, comorbidity, baseline admission duration and psychiatric rehospitalisation. In addition, caregiver burden showed good accuracy for identifying patients with PSP < 60. These findings support the interpretation of caregiver burden as a family-reported proxy marker of incomplete functional recovery.

This association is clinically relevant because patients, caregivers and medical professionals may value treatment outcomes differently [10]. PSP domains include socially useful activities, interpersonal relationships, self-care, and disturbing or aggressive behaviour [8]. These domains are directly related to the amount of support required from relatives in everyday life. When patients remain socially withdrawn, dependent in daily routines, unable to work or study, or in need of supervision, family members often absorb the practical and emotional consequences. Caregiver burden may therefore capture aspects of real-world functioning that are not fully visible during routine clinical encounters and inform about appropriate caregiver interventions to reduce burden of illness [5, 11].

The ROC findings support a possible screening use rather than a definitive diagnostic threshold. $BAS \geq 30$ may indicate the need for closer assessment of patient functioning and family support needs, whereas $BAS \geq 41$ may represent a stronger clinical alert. These cut-offs should be interpreted cautiously because they were derived from an exploratory analysis in a modest sample and require validation in independent cohorts. The diagnostic and age-related findings were also clinically consistent: affective psychosis was associated with better functioning than non-affective psychosis, and older age with poorer functioning.

The practical implication is that caregiver burden should not be viewed solely as an outcome affecting relatives. In follow-up care after hospitalisation for psychosis, high burden may indicate the need to reassess daily autonomy, self-care, social participation, occupational functioning, and need for supervision. Routine caregiver-burden assessment may help identify patient-caregiver dyads requiring additional post-discharge support, including psychosocial rehabilitation, structured follow-up, psychoeducation and family intervention [11].

Several limitations should be acknowledged. This was a post-hoc exploratory analysis of a modest sample. The association between BAS and PSP was cross-sectional at follow-up and does not establish causal direction. Residual confounding is possible, and the ROC thresholds should not be used as validated cut-offs. Finally, the study was conducted in Bulgaria, where family involvement in care may be shaped by the availability of formal community-based services.

In conclusion, caregiver burden was independently associated with poorer psychosocial functioning one year after hospitalisation for psychosis and showed

good ability to identify poor functional outcome. These findings suggest that caregiver burden may be clinically useful not only as a family outcome, but also as a family-reported marker of incomplete functional recovery.

Ethical standards. The study was conducted in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. All participants gave written informed consent before inclusion, and anonymity was guaranteed.

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