

Patterns of symptomatic and functional outcomes in treated schizophrenia: A cross-sectional multinomial analysis from South India

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Abstract

Purpose:

Schizophrenia outcomes are increasingly understood as multidimensional, encompassing symptomatic and functional domains. However, most research continues to conceptualize outcomes dichotomously. This study examined the distribution and correlates of distinct symptomatic–functional outcome states in treated schizophrenia within a tertiary care setting in South India.

Methods:

In this cross-sectional study, 100 adults with ICD-10 schizophrenia receiving outpatient treatment for ≥ 6 months were assessed. Symptomatic remission was evaluated using the Brief Psychiatric Rating Scale (BPRS), and functional remission using the Personal and Social Performance (PSP) scale. Participants were classified into four outcome states: concurrent symptomatic and functional remission, functional-only remission, symptomatic-only remission, and no remission. Bivariate analyses were conducted using chi-square, Fisher–Freeman–Halton exact, and Kruskal–Wallis tests. Multinomial logistic regression examined independent correlates of outcome state membership, using no remission as the reference category.

Results:

Concurrent remission was observed in 25% of participants, functional-only remission in 16%, symptomatic-only remission in 6%, and no remission in 53%. Being married and shorter duration of illness were independently associated with concurrent remission relative to no remission (RRR = 7.22, 95% CI: 2.23–23.42; RRR = 0.89 per year increase, 95% CI: 0.79–1.00). Other socio-demographic and treatment-related variables were not significantly associated with outcome state after adjustment. Model fit statistics indicated modest explanatory power.

Conclusion:

Treated schizophrenia demonstrated structured heterogeneity across symptomatic and functional domains. Multidimensional classification of outcome states may provide a more informative epidemiological framework than binary recovery models.

INTRODUCTION

Schizophrenia has traditionally been conceptualized as a chronic psychiatric disorder associated with persistent symptoms, functional impairment, and poor long-term outcomes. Early conceptualizations and outcome assessments emphasized disability and symptom persistence, reinforcing pessimistic expectations regarding prognosis [1], [2].

Over the past two decades, however, longitudinal studies from diverse settings have demonstrated substantial heterogeneity in the course and outcomes of schizophrenia. A proportion of individuals achieve sustained symptomatic improvement and meaningful functional stability over time, challenging earlier deterministic views of the illness. This variability in outcomes has led to increasing attention toward more nuanced and domain-specific outcome measures[3], [4].

Contemporary outcome research distinguishes between symptomatic remission and functional remission, recognizing that reduction in psychopathology does not necessarily translate into restoration of social and occupational functioning.

The proposal of standardized remission criteria by Andreasen et al.[5], provided a framework for evaluating symptomatic stability, while subsequent work emphasized the concept of functional remission as a related but distinct outcome domain [6]. Empirical studies have demonstrated only partial overlap between these domains, with patients sometimes achieving adequate functional roles despite residual symptoms, while others remain functionally impaired despite symptomatic improvement[7], [8].

Recovery in schizophrenia has therefore been operationalized in multiple ways, ranging from symptom-based remission to broader functional and psychosocial criteria [9]. While consumer-led recovery models emphasize personal meaning and autonomy, clinical research has increasingly focused on measurable symptomatic and functional outcomes that are more readily applicable in routine psychiatric practice[1], [5].

In low- and middle-income countries such as India, schizophrenia outcomes are further shaped by distinctive sociocultural and service-related factors, including strong family involvement, variations in treatment access, and prolonged engagement with general hospital psychiatry services. Indian longitudinal studies have demonstrated considerable heterogeneity in illness course. While some cohorts have reported relatively favourable long-term functioning and sustained community living, others have highlighted persistent impairments in social functioning and variable patterns of symptomatic remission over extended follow-up[10], [11]. More recent Indian research has emphasized the multidimensional nature of recovery, demonstrating variability in psychological recovery stages even among patients who meet criteria for clinical remission[9].

Despite these observations, few studies from routine Indian clinical settings have examined how symptomatic and functional remission states distribute within treated populations, or whether their clinical and demographic correlates differ. Most studies have focused either on symptom remission or disability, limiting insights into how these outcome domains overlap or diverge in everyday psychiatric practice.

Understanding the distribution of these outcome states within real-world treated cohorts has important implications for outcome measurement, rehabilitation planning, and realistic goal-setting in schizophrenia care. Therefore, the present study aimed to examine the point distribution of symptomatic and functional remission states among patients with schizophrenia attending a tertiary care general hospital psychiatry unit in South India, and to identify their clinical and demographic correlates.

METHODOLOGY

STUDY DESIGN AND SETTING

This cross-sectional epidemiological study was conducted over one year in the Outpatient Department (OPD) of a General Hospital Psychiatry Unit in southern India.

PARTICIPANTS

Patients attending the psychiatry OPD were approached for participation, and written informed consent was obtained. Purposive sampling was employed. Inclusion criteria were: Age ≥ 18 years, Diagnosis of schizophrenia according to the ICD-10 Diagnostic Criteria for Research (ICD-10 DCR) [12], Receiving antipsychotic treatment for at least 6 months, $\geq 80\%$ treatment adherence over the preceding 6 months. Exclusion criteria included: Comorbid substance use disorders, other psychiatric disorders, chronic medical illnesses likely to impair functioning. Ethical approval was obtained from the Institutional Ethics Committee.

Sample size was calculated using Fisher's formula assuming a remission prevalence of 41% [13] with a 5% margin of error. Due to lower-than-expected patient flow, the margin of error was revised to 10%, yielding a final target sample size of 100

participants.

PROCEDURE

Diagnosis of schizophrenia was confirmed using ICD-10 DCR criteria through clinical interview. The Mini International Neuropsychiatric Interview (M.I.N.I.)[14] was administered to rule out comorbid psychiatric and substance use disorders.

Information regarding treatment adherence, illness course, and duration of symptomatic stability was obtained through patient interview, caregiver interview, and review of medical records. Adequate adherence was operationally defined as $\geq 80\%$ medication intake over the preceding 6 months based on corroborative patient, caregiver, and record review.

Diagnosis of schizophrenia was confirmed using ICD-10 DCR criteria after clinical interview. The Mini International Neuropsychiatric Interview (M.I.N.I.)[14] was administered to rule out comorbid psychiatric and substance use disorders. Caregiver and patient interviews provided information on treatment adherence and duration of symptomatic stability. Additional information on the adherence was obtained from caregivers and patient records. Adequate adherence was defined as $\geq 80\%$ medication intake based on patient and caregiver report.

Symptom severity was assessed using the Brief Psychiatric Rating Scale (BPRS) [15] .

Symptomatic remission was operationally defined as scores < 3 on all BPRS items. To ensure stability of remission, Andreasen's duration criterion[5] was applied: patients were considered to be in sustained symptomatic remission only if this status had been maintained for at least 6 months, verified through OPD records and caregiver reports. Any documented exacerbation during this period excluded the patient from sustained remission status. Functional status was assessed using the Personal and Social Performance Scale (PSP). Functional remission was defined as PSP scores between 71–100 [16].

Participants were categorized into **four outcome states** based on the presence or absence of sustained symptomatic remission and functional remission for ≥ 6 months: Both symptomatic and functional remission; Symptomatic remission without functional remission; Functional remission without symptomatic remission; Neither symptomatic nor functional remission. This classification allowed examination of the dissociation and overlap between symptomatic and functional outcomes in treated schizophrenia.

STATISTICAL ANALYSIS

Descriptive statistics were used to summarize socio-demographic and clinical characteristics of the sample. Continuous variables are presented as means and standard deviations (SD), and categorical variables as frequencies and percentages. The point distribution of symptomatic–functional outcome states (concurrent remission, functional-only remission, symptomatic-only remission, and no remission) was calculated using simple proportions.

For bivariate comparisons across the four outcome states, the Kruskal–Wallis test was used for continuous variables due to non-normal distribution, and Pearson's chi-square test was applied for categorical variables. When expected cell counts were less than five, the Fisher–Freeman–Halton exact test was employed. A two-sided p value < 0.05 was considered statistically significant.

Multinomial logistic regression analysis was performed to examine independent associations between socio-demographic and clinical variables and outcome state membership, using “no remission” as the reference category. Relative Risk Ratios (RRR) with 95% confidence intervals (CI) were reported. To address sparse data and avoid quasi-complete separation, middle and upper socio-economic categories were combined for regression analyses, and clozapine

was grouped within the atypical antipsychotic category. Model fit was evaluated using the likelihood ratio chi-square statistic and McFadden's pseudo R^2 .

RESULTS

A total of 100 patients with schizophrenia receiving outpatient treatment were included in the analysis. The mean age of the sample was 37.37 ± 12.30 years, and the mean age at onset of illness was 29.58 ± 10.1 years. Males constituted 55% of the sample, and 46% were married. The majority of participants belonged to the lower socio-economic group (62%). The most common duration of illness was 2–5 years (37%) and 6–10 years (35%). A family history of schizophrenia was present in 12% of patients. Most participants were diagnosed with the paranoid subtype (83%). With regard to treatment, 72% were receiving atypical antipsychotics and 19% were receiving typical antipsychotics (Table 1).

Table 1
Socio-demographic and clinical profile of patients with treated schizophrenia evaluated for outcome states

S.No	Variable	Subcategories	N = 100	Observations (%)
1.	Age (years) (Mean±Sd)		37.37±12.30 years	
2.	Sex	Male (%)	55	55%
		Female(%)	45	45%
3.	Marital Status	Married	46	46%
		Unmarried	54	54%
4.	Religion	Hindu	89	89%
		Muslim	10	10%
		Christian	1	1%
5.	Socio-economic status	Lower	86	86%
		Middle	12	12%
		Upper	2	2%
6.	Duration of illness	< 1 year	5	5%
		2–5 years	37	37%
		6–10 years	35	35%
		> 10 years	23	23%
7.	Family history of schizophrenia	Yes	12	12%
		No	88	88%
8.	Subtypes of schizophrenia	Paranoid	83	83%
		Non- Paranoid *	17	17%
9.	Age of Onset of Illness (Mean±Sd)		29.58± 10.1 Years	
10.	Type of Antipsychotic received	Typical	19	19%
		Atypical	72	72%
		Clozapine	9	9%

Across the four symptomatic–functional outcome states, 25% of patients met criteria for concurrent symptomatic and functional remission. Functional remission without symptomatic remission was observed in 16%, symptomatic remission without functional remission in 6%, and 53% of patients did not meet remission criteria in either domain (Table 2).

Table 2
Distribution of patients across symptomatic and functional remission states (N = 100)

Functional Remission (PSP 71–100)	Symptomatic Remission (BPRS < 3 for ≥ 6 months)	N = 100	Observation (%)
Yes	Yes	25	25%
Yes	No	16	16%
No	Yes	6	6%
No	No	53	53%
Patients achieving both symptomatic and functional remission (operationally defined as recovery) constituted 25% of the sample			

Comparisons across the four outcome states are presented in Table 3. Age and age at onset did not differ significantly across groups (Kruskal–Wallis $p = 0.61$ and $p = 0.15$, respectively). Sex distribution was comparable across outcome categories ($\chi^2 = 2.14$, $p = 0.544$). Marital status differed significantly across outcome states ($\chi^2 = 9.72$, $p = 0.021$), with a higher proportion of married individuals in the concurrent remission group. Socio-economic status also demonstrated a significant association with outcome distribution ($p = 0.018$, Fisher–Freeman–Halton exact test). Duration of illness showed a trend toward significance ($\chi^2 = 16.84$, $p = 0.051$). Type of antipsychotic treatment was associated with outcome state distribution ($p = 0.031$), whereas family history of schizophrenia and diagnostic subtype were not significantly associated with outcome status.

Table 3
Comparison of socio-demographic and clinical variables across symptomatic–functional outcome states.

Variable	Subcategory	Concurrent (n = 25)	Functional only (n = 16)	Symptomatic only (n = 6)	No remission (n = 53)	Statistical test	p value
Age		38.75±14.77	38±14.33	40.5±10.62	36.39±11.11	Kruskal– Wallis H = 1.82	0.61
Sex	Male	15	6	4	30	Fisher– Freeman– Halton	0.544
	Female	10	10	2	23		
Marital Status	Unmarried	8	8	3	35	Fisher– Freeman– Halton	0.021*
	Married	17	8	3	18		
Socio- economic Status	Lower	20	10	5	27	Fisher– Freeman– Halton	0.018*
	Middle	4	6	0	20		
	Upper	1	0	1	6		
Duration of illness	< 1 year	2	1	1	1	Fisher– Freeman– Halton	0.051
	2–5 years	11	2	1	23		
	6–10 years	8	9	0	18		
	> 10 years	4	4	4	11		
Family history of schizophrenia	No	23	15	4	46	Fisher– Freeman– Halton	0.209
	Yes	2	1	2	7		
Subtypes of schizophrenia	Paranoid	23	15	4	41	Fisher– Freeman– Halton	0.284
	Non- Paranoid	2	1	2	12		
Age of onset (Mean ± SD)		30.08±12.06	32.56±11.63	30.16±15.77	28.26±7.88	Kruskal– Wallis H = 5.31	0.150
Type of antipsychotic treatment	Typical	5	2	2	10	Fisher– Freeman– Halton	0.031*
	Atypical	16	14	4	41		
	Clozapine	4	0	0	2		

Multinomial logistic regression analysis was conducted to examine independent associations between socio-demographic and clinical variables and outcome state membership, using “no remission” as the reference category (Table 4). After adjustment, being married was independently associated with higher relative risk of concurrent remission compared to no remission (RRR = 7.22, 95% CI: 2.23–23.42, $p = 0.001$). Longer duration of illness was inversely associated with concurrent remission (RRR = 0.89 per year increase, 95% CI: 0.79–1.00, $p = 0.049$). No other predictors demonstrated

statistically significant associations with functional-only or symptomatic-only remission states relative to no remission. The overall model demonstrated modest explanatory power (Likelihood ratio χ^2 (df = 15) = 20.36, p = 0.159; McFadden pseudo R^2 = 0.089).

Table 4

Multinomial logistic regression examining correlates of symptomatic–functional outcome states (N = 100) **Outcome reference category:** No remission

Predictors: Marital status, illness duration (years), SES (Non-lower vs Lower), antipsychotic type (Typical vs Atypical), family history

Effect size reported: Relative Risk Ratio (RRR = e^{β})

Predictor	Concurrent vs No remission RRR (95% CI)	p	Functional-only vs No remission RRR (95% CI)	p	Symptomatic-only vs No remission RRR (95% CI)	p
Married (vs Unmarried)	7.22 (2.23–23.42)	0.001	1.64 (0.46–5.88)	0.451	1.33 (0.16–11.35)	0.793
Duration of illness (years)	0.89 (0.79–1.00)	0.049	1.02 (0.92–1.12)	0.754	1.06 (0.91–1.23)	0.475
SES: Non-lower (Middle/Upper) vs Lower	1.62 (0.39–6.77)	0.508	0.40 (0.05–3.50)	0.405	1.18 (0.11–12.53)	0.889
Typical vs Atypical	1.42 (0.38–5.34)	0.606	0.73 (0.14–3.95)	0.717	2.40 (0.33–17.50)	0.387
Family history present (vs absent)	0.74 (0.13–4.40)	0.742	0.47 (0.05–4.30)	0.507	2.68 (0.38–18.96)	0.323
Model fit: Likelihood ratio χ^2 (df = 15): 20.36; Model p-value: 0.159; McFadden pseudo R^2: 0.089						
<i>Notes.</i>						
1. Reference outcome category: No remission.						
2. RRR = Relative Risk Ratio.						
3. SES was retained as Lower/Middle/Upper in descriptive analyses. For multinomial regression, Middle and Upper were combined because the Upper category (n=2) occurred only in the reference outcome, producing complete separation and non-estimable coefficients.						
4. Antipsychotic treatment was categorized as Typical versus Atypical; clozapine was grouped within the atypical category due to small cell counts in certain outcome states and to avoid.						

DISCUSSION

This study examined the distribution and correlates of symptomatic–functional outcome states among patients with treated schizophrenia in a tertiary care setting in South India. Four distinct outcome configurations were identified: concurrent symptomatic and functional remission (25%), functional-only remission (16%), symptomatic-only remission (6%), and absence of remission in both domains (53%). These findings demonstrate structured heterogeneity in treated schizophrenia rather than a simple recovery versus non-recovery dichotomy. Multinomial regression analysis indicated that marital status and duration of illness were independently associated with concurrent remission relative to no remission, whereas other socio-demographic and clinical variables did not demonstrate robust associations after adjustment. The overall explanatory power of the model was modest, suggesting that outcome state membership is influenced by multiple interacting factors.

The observed distribution underscores the conceptual distinction between symptomatic[5] and functional domains, as proposed in consensus remission criteria and further elaborated in functional outcome frameworks [6]. Functional remission occurred more frequently than symptomatic remission, consistent with prior evidence indicating that social and occupational functioning may improve despite residual symptom burden [7].

Meta-analytic and longitudinal literature demonstrates substantial variability in remission and recovery rates across settings, ranging widely depending on operational definitions and follow-up duration [3], [17], [18], [19]. However, most prior studies conceptualized outcomes dichotomously. By operationalizing four symptomatic–functional states, the present findings align more closely with the multidimensional outcome models suggested in international cohort studies[4], [20], [21] and systematic reviews[22], while extending this framework to a treated outpatient population in an Low-Middle Income Country (LMIC) context.

Marital status emerged as a significant correlate of concurrent remission. This association is consistent with cross-cultural evidence suggesting that social integration and family structures influence illness course. In the Indian context, marital relationships often involve extended family engagement, potentially facilitating sustained caregiving, supervision of treatment adherence, and social role stabilization [23], [24]. However, reverse causation cannot be excluded; individuals with better functional capacity may be more likely to marry or remain married.

Duration of illness demonstrated an inverse association with concurrent remission. This gradient is compatible with longitudinal findings indicating that earlier illness stages are associated with greater potential for remission and functional stabilization [13], [20], [25]. The attenuation of this association in other outcome contrasts suggests that chronicity may specifically influence the probability of achieving dual-domain remission rather than isolated symptomatic or functional improvement.

Socio-economic status was associated with outcome state distribution in unadjusted analyses but did not remain significant after multivariable adjustment. This may reflect confounding by marital status or illness duration, or limited power in upper socio-economic strata. Prior epidemiological studies have reported mixed associations between socio-economic position and schizophrenia outcomes [26].

Contrary to some earlier literature linking family history to illness severity and course[27], [28], [29], family history was not independently associated with outcome state membership after adjustment. This finding may reflect the treated nature of the cohort or limited statistical power for familial subgroup analyses.

Antipsychotic class was not independently associated with outcome state in the adjusted multinomial model. Although clozapine has demonstrated superior efficacy in treatment-resistant schizophrenia[30], [31], pharmacological effects in naturalistic samples may be confounded by indication and illness severity. The absence of a strong medication signal reinforces the multifactorial nature of functional and symptomatic outcomes in routine care.

The identification of four symptomatic–functional configurations supports an epidemiological classification approach to schizophrenia outcomes. Rather than conceptualizing treated schizophrenia in binary recovery terms, the present findings suggest that outcome states cluster into distinct yet overlapping domains that may follow different socio-clinical gradients.

Such classification has implications for service planning and outcome monitoring. Dual-domain assessment may better capture clinically meaningful heterogeneity than symptom-only metrics [5], [6]. In LMIC contexts, where family involvement and community-based care structures remain prominent, functional stabilization may not map directly onto symptom remission patterns[23], [24].

STRENGTHS AND LIMITATIONS

This study contributes to the literature by operationalizing symptomatic and functional domains simultaneously and applying multinomial modeling to examine differential correlates of outcome states in a real-world treated cohort. Use of standardized instruments and transparent model-fit reporting enhances methodological rigor.

Several limitations warrant consideration. The cross-sectional design precludes inference regarding temporal stability of outcome states. The modest sample size limited power for detecting associations in less frequent categories, particularly upper socio-economic strata. Additionally, cognitive functioning and psychosocial rehabilitation exposure were not assessed, both of which may influence functional trajectories.

CONCLUSION

Treated schizophrenia in this tertiary care sample demonstrated structured heterogeneity across symptomatic and functional domains. Outcome states followed identifiable socio-clinical gradients, particularly with respect to marital status and illness duration, while overall model explanatory power remained modest. These findings support the utility of a multidimensional epidemiological classification of outcome states in schizophrenia and underscore the need for dual-domain monitoring in routine psychiatric practice.

DECLARATIONS

DECLARATION OF CONFLICT OF INTEREST

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Conflicts of Interest

Nil

Author Contribution

Conceptualization: B.T. and P.M. Methodology: D.G. and P.M. Formal analysis: P.M. and VY. Investigation: P.M. Data curation: D.G. and P.M. Writing : D.G. Review & editing: D.G. and B.T. Supervision: N.P. Project administration: S.C. and S.P.

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