

Health-Related Quality of Life in Elderly Psychiatric Patients: Associations with Clinical and Pharmacological Factors in a Cross- Sectional Study

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Research Article

Keywords: health-related quality of life, SF-36, geriatric psychiatry, elderly, polypharmacy, anticholinergic burden, drug-drug interactions, India, cross-sectional study

Posted Date: May 30th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9700728/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

Psychiatric disorders in older adults are associated with impaired health-related quality of life (HRQoL), and their management is often complicated by multimorbidity and complex medication regimens. Evidence from Indian geriatric psychiatric cohorts linking clinical and pharmacological variables to HRQoL remains limited. This study assessed HRQoL and its sociodemographic, clinical and pharmacological correlates among elderly psychiatric outpatients attending a tertiary care centre in India.

Methods

In this hospital-based cross-sectional observational study, 710 patients aged 60 years or older were consecutively enrolled from a tertiary care psychiatry outpatient department. Sociodemographic, diagnostic and prescription data were collected. Anticholinergic burden was quantified using the Anticholinergic Cognitive Burden (ACB) scale, and major drug-drug interactions (DDIs) were identified using the Lexicomp database. HRQoL was assessed using the validated Hindi-language Short Form-36 Health Survey version 2 (SF-36 v2), generating norm-based Physical Component Summary (PCS) and Mental Component Summary (MCS) scores. Analyses included Kruskal-Wallis and chi-square tests, Spearman rank correlations and multivariable linear regression.

Results

The mean age was 63.93 $\pm$ 4.87 years; 399 participants (56.2%) were male, and polypharmacy was present in 139 participants (19.6%). ACB scores and major DDI prevalence differed significantly across diagnostic categories. In adjusted analyses, lower PCS was independently associated with older age ($\beta = -0.46$, $p < 0.001$), higher total drug count ($\beta = -0.48$, $p = 0.005$) and longer illness duration ($\beta = -0.03$, $p = 0.042$). Lower MCS was independently associated with longer illness duration ($\beta = -0.03$, $p = 0.044$), while patients with substance use disorders had higher MCS than those with mood disorders ($\beta = 5.50$, $p = 0.002$). ACB score showed a weak inverse bivariate correlation with MCS ($\rho = -0.075$, $p = 0.046$). Sex, antipsychotic use, adverse drug reaction occurrence and major DDI presence were not independently associated with either PCS or MCS.

Conclusions

Among elderly psychiatric outpatients, physical HRQoL was associated with age, cumulative medication burden and illness chronicity, whereas mental HRQoL was associated with illness chronicity and diagnostic category. The observed bivariate association between ACB and MCS supports careful review

of anticholinergic exposure, but adjusted effects of ACB require further evaluation. Routine HRQoL assessment, structured medication review and anticholinergic stewardship may help identify potentially modifiable contributors to poorer patient-centred outcomes in geriatric psychiatric care.

Background

Psychiatric disorders in older adults are a growing public health challenge, particularly in low- and middle-income countries undergoing rapid demographic transition [1, 2]. India has more than 140 million people aged 60 years and older, and this population is expected to increase substantially over the coming decades [3]. Mental health conditions in older adults, including mood disorders, psychotic disorders, cognitive impairment and substance use disorders, contribute materially to disability and reduced wellbeing [4]. Beyond symptom burden, these conditions are associated with functional limitation, social withdrawal, impaired self-perceived health and reduced health-related quality of life (HRQoL) [5, 6].

Medication complexity is a central concern in geriatric psychiatric practice. Older patients with psychiatric disorders frequently receive psychotropic medications in combination with treatments for comorbid hypertension, diabetes mellitus, pain syndromes and other chronic conditions. Polypharmacy, commonly defined as the concurrent use of five or more medications, increases the risk of adverse drug reactions, drug-drug interactions (DDIs), non-adherence and functional decline [7, 8]. In psychiatric care, medication burden may be further complicated by anticholinergic exposure from selected antidepressants, antipsychotics, anxiolytics and other agents. Elevated anticholinergic burden has been associated with cognitive impairment, falls, constipation, urinary retention and other adverse outcomes that may affect HRQoL in older adults [9–13].

HRQoL provides a patient-centred assessment of health status that extends beyond diagnostic categories or symptom severity. The Medical Outcomes Study Short Form-36 Health Survey (SF-36) is widely used for HRQoL assessment and has established validity and reliability in Indian populations [14]. The SF-36 produces eight domain scores and two summary measures: the Physical Component Summary (PCS) and the Mental Component Summary (MCS). These scores allow physical and mental dimensions of HRQoL to be examined separately, which is especially relevant in geriatric psychiatric cohorts where biological ageing, psychiatric chronicity and medication exposure may affect these domains differently.

Although international studies have linked polypharmacy, inappropriate prescribing and anticholinergic exposure to poorer outcomes in older adults [15, 16], Indian data on HRQoL in geriatric psychiatric outpatients remain limited. Existing Indian studies have often focused on general elderly populations or on prescribing burden without systematically linking pharmacological exposures to patient-reported HRQoL outcomes [17]. Therefore, this study aimed to assess HRQoL using the SF-36 in elderly psychiatric outpatients attending a tertiary care hospital in India and to identify sociodemographic, clinical and pharmacological correlates of PCS and MCS scores.

Methods

Study design and setting

This hospital-based, observational, cross-sectional study was conducted in the psychiatry outpatient department of a tertiary care academic hospital in India. Consecutive eligible patients attending the outpatient clinic were approached during the study recruitment period. The tertiary care setting was selected to capture a clinically diverse sample of older adults with psychiatric diagnoses and medication regimens reflective of specialist outpatient practice.

Study population

A total of 710 elderly psychiatric outpatients were enrolled. Patients were eligible if they were aged 60 years or older, had a clinically established primary psychiatric diagnosis, were receiving at least one prescribed medication, were able to provide written informed consent and could comprehend and respond to the SF-36 questionnaire in Hindi or English. Patients were excluded if they had severe cognitive impairment or advanced dementia precluding reliable self-report, incomplete medical or prescription records, declined participation or were unable to provide informed consent.

Data collection and study variables

Sociodemographic data included age and sex. Clinical data included primary psychiatric diagnosis and duration of illness, recorded in months from first psychiatric diagnosis to enrolment. Diagnoses were assigned by treating clinicians and classified into five mutually exclusive groups for analysis: mood disorders (major depressive disorder, bipolar affective disorder and persistent mood disorders), psychotic disorders (schizophrenia and related conditions), cognitive disorders (mild to moderate neurocognitive disorders), substance use disorders and others (including anxiety disorders, obsessive-compulsive disorder, somatic symptom disorder, sleep-wake disorders and residual diagnostic categories).

Prescription-related variables included total number of prescribed drugs, number of psychotropic agents, polypharmacy status, Anticholinergic Cognitive Burden (ACB) score, antipsychotic use, major DDI presence, DDI count and adverse drug reaction (ADR) occurrence as documented in clinical records. Polypharmacy was defined as the concurrent prescription of five or more medications at a single clinic visit, consistent with commonly used geriatric pharmacology thresholds [7].

Outcome measure

Outcome measure

HRQoL was assessed using the validated Hindi-language version 2 of the SF-36 (SF-36 v2). The SF-36 includes 36 items across eight domains: Physical Functioning, Role Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role Emotional and Mental Health. Norm-based scoring was applied, transforming domain scores into a standardized metric with a population mean of 50 and standard deviation of 10. PCS and MCS scores were calculated. Higher scores indicate better self-perceived HRQoL [14, 50].

Pharmacological assessment

ACB score was calculated by summing the individual ACB ratings of all prescribed medications using the validated ACB scale, which assigns scores of 1 for possible anticholinergic activity, 2 for moderate activity and 3 for definite anticholinergic activity; medications without recognized anticholinergic activity were assigned a score of 0 [18]. Major DDIs were identified using the Lexicomp Drug Interactions database. Interactions classified as major severity or contraindicated were coded as present. For correlation analyses, the number of major DDIs was also recorded.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki and applicable national regulatory requirements. Ethical approval was obtained from the Institutional Ethics Committee of AIIMS Rishikesh before commencement of data collection (Reference No. 467/IEC/PGM/2021, dated 26 November 2021). Written informed consent was obtained from all participants before enrolment. Participant data were anonymised, participation was voluntary and participants retained the right to withdraw at any time.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA) and R version 4.2.0 (R Foundation for Statistical Computing, Vienna, Austria). A two-tailed p value < 0.05 was considered statistically significant. Continuous variables are presented as mean $\pm$ standard deviation (SD), and categorical variables as frequency and percentage. The Shapiro-Wilk test showed non-normality for PCS ($W = 0.983$, $p < 0.001$) and MCS ($W = 0.978$, $p < 0.001$); therefore, non-parametric tests were used for group comparisons.

Differences in continuous pharmacological variables across diagnostic groups were assessed using the Kruskal-Wallis H test. Differences in categorical proportions were assessed using the chi-square test or Fisher exact test when expected cell counts were fewer than five. Spearman rank correlation coefficients were calculated to evaluate bivariate associations between pharmacological variables and SF-36 summary scores. Univariate linear regression was used to estimate unadjusted associations between candidate predictors and PCS or MCS. Multivariable linear regression models were then constructed using simultaneous entry of selected predictors. Variables entered into the adjusted models included age, sex, total drug count, antipsychotic use, ADR occurrence, major DDI presence, diagnostic category

and duration of illness. Polypharmacy was examined in univariate analyses but was not entered into adjusted models because it is a dichotomised derivative of total drug count. Multicollinearity was assessed using variance inflation factors (VIFs); no predictor exceeded a VIF of 5.

Results

Baseline characteristics

A total of 710 elderly psychiatric outpatients were enrolled. The mean age was 63.93 +/- 4.87 years, and most participants were aged 60–64 years (n = 501, 70.6%). There were 399 male participants (56.2%). The most common diagnostic category was others (n = 326, 45.9%), followed by mood disorders (n = 269, 37.9%), psychotic disorders (n = 63, 8.9%), cognitive disorders (n = 27, 3.8%) and substance use disorders (n = 25, 3.5%). Polypharmacy was present in 139 participants (19.6%). The mean duration of illness was 17.91 +/- 18.57 months (Table 1).

Table 1
Baseline demographic and clinical characteristics of the study population (N = 710)

Variable	N = 710
Age, years, mean (SD)	63.93 (4.87)
Age group, n (%)	
60–64 years	501 (70.6%)
65–69 years	114 (16.1%)
70–74 years	58 (8.2%)
>=75 years	37 (5.2%)
Sex, n (%)	
Male	399 (56.2%)
Female	311 (43.8%)
Primary psychiatric diagnosis, n (%)	
Mood disorders	269 (37.9%)
Others	326 (45.9%)
Psychotic disorders	63 (8.9%)
Cognitive disorders	27 (3.8%)
Substance use disorders	25 (3.5%)
Polypharmacy (> = 5 drugs), n (%)	
Yes	139 (19.6%)
No	571 (80.4%)
Duration of illness, months, mean (SD)	17.91 (18.57)

Data are presented as mean (standard deviation [SD]) for continuous variables and n (%) for categorical variables. Percentages may not total 100 because of rounding.

Drug burden and prescribing quality profile

Drug burden and prescribing quality indicators by diagnostic group are shown in Table 2. Mean total drug count did not differ significantly across diagnostic groups (Kruskal-Wallis $p = 0.271$). The mean number of psychotropic medications also showed no statistically significant variation. In contrast, ACB score differed significantly across diagnostic groups (Kruskal-Wallis $p < 0.001$). The highest mean ACB score

was seen in patients with psychotic disorders (3.59 +/- 1.93), followed by mood disorders (2.60 +/- 1.73), while the lowest mean score was seen in substance use disorders (1.00 +/- 1.32).

The proportion of patients with at least one major DDI also differed significantly between diagnostic groups (chi-square $p < 0.001$). The highest prevalence was observed in mood disorders (53/269, 19.7%), followed by others (30/326, 9.2%), substance use disorders (2/25, 8.0%), psychotic disorders (4/63, 6.3%) and cognitive disorders (1/27, 3.7%).

Table 2
Drug burden and prescribing quality profile by psychiatric diagnosis group (N = 710)

Diagnosis group	n	Total drugs, mean +/- SD	Psychotropics, mean +/- SD	ACB score, mean +/- SD	Major DDI, n (%)
Mood disorders	269	3.28 +/- 1.91	2.04 +/- 1.08	2.60 +/- 1.73	53 (19.7%)
Psychotic disorders	63	3.14 +/- 1.82	2.19 +/- 1.11	3.59 +/- 1.93	4 (6.3%)
Substance use disorders	25	2.68 +/- 1.89	1.40 +/- 0.76	1.00 +/- 1.32	2 (8.0%)
Cognitive disorders	27	3.26 +/- 1.87	1.63 +/- 1.04	2.15 +/- 1.68	1 (3.7%)
Others	326	3.03 +/- 1.89	1.69 +/- 0.81	2.16 +/- 1.51	30 (9.2%)

Kruskal-Wallis test: total drugs $p = 0.271$; ACB score $p < 0.001$. Chi-square test for major DDI proportions: $p < 0.001$. ACB, Anticholinergic Cognitive Burden; DDI, drug-drug interaction; SD, standard deviation.

SF-36 domain and summary scores

Mean SF-36 domain and summary scores by diagnostic group are presented in Table 3. Physical Functioning ($p = 0.137$), Role Physical ($p = 0.241$) and Role Emotional ($p = 0.056$) did not differ significantly across diagnostic groups. Significant between-group differences were observed for Bodily Pain ($p = 0.002$), General Health ($p < 0.001$), Vitality ($p = 0.018$), Social Functioning ($p < 0.001$) and Mental Health ($p = 0.011$).

Both composite summary scores differed significantly across diagnostic groups (PCS $p = 0.028$; MCS $p = 0.009$). The substance use disorder group had comparatively higher PCS and MCS scores, whereas the cognitive disorder group showed lower scores across several domains. These diagnostic subgroup findings should be interpreted cautiously because the substance use disorder and cognitive disorder groups were small.

Table 3
SF-36 domain and summary scores by psychiatric diagnosis group (N = 710)

SF-36 domain	Mood (n = 269)	Psychotic (n = 63)	Substance use (n = 25)	Cognitive (n = 27)	Others (n = 326)	p value
Physical Functioning	50.4 +/- 8.7	50.7 +/- 8.6	51.7 +/- 8.9	46.4 +/- 9.9	50.1 +/- 9.3	0.137
Role Physical	50.9 +/- 7.6	49.9 +/- 8.9	51.5 +/- 8.2	47.7 +/- 8.5	50.6 +/- 8.2	0.241
Bodily Pain	47.7 +/- 11.0	44.1 +/- 9.5	50.3 +/- 10.8	43.1 +/- 11.1	45.2 +/- 11.0	0.002
General Health	36.7 +/- 7.8	35.5 +/- 7.5	43.5 +/- 9.1	33.7 +/- 6.8	36.2 +/- 7.8	< 0.001
Vitality	42.5 +/- 7.8	43.4 +/- 9.3	46.5 +/- 7.4	39.9 +/- 6.8	41.8 +/- 8.0	0.018
Social Functioning	43.0 +/- 7.2	40.7 +/- 7.8	45.7 +/- 7.9	37.3 +/- 8.3	41.7 +/- 7.5	< 0.001
Role Emotional	44.0 +/- 8.1	42.6 +/- 9.8	46.4 +/- 8.3	39.1 +/- 9.3	44.3 +/- 7.8	0.056
Mental Health	34.4 +/- 8.8	33.8 +/- 8.7	41.2 +/- 9.7	32.7 +/- 9.6	34.3 +/- 9.3	0.011
PCS	50.9 +/- 7.9	49.6 +/- 7.5	52.3 +/- 8.3	47.1 +/- 8.8	49.7 +/- 8.0	0.028
MCS	36.4 +/- 8.0	35.5 +/- 8.9	41.7 +/- 9.0	33.1 +/- 8.6	36.3 +/- 8.4	0.009

Data are presented as mean +/- SD. Kruskal-Wallis H test. Higher scores indicate better HRQoL. Norm-based scoring applied. HRQoL, health-related quality of life; MCS, Mental Component Summary; PCS, Physical Component Summary; SD, standard deviation; SF-36, Short Form-36 Health Survey.

Correlation analysis

Spearman correlation analysis is summarized in Fig. 1. Age showed a significant inverse correlation with PCS ($\rho = -0.245$, $p < 0.001$) but not with MCS ($\rho = -0.044$, $p = 0.247$). Total drug count was inversely correlated with PCS ($\rho = -0.156$, $p < 0.001$) but not with MCS ($\rho = -0.036$, $p = 0.335$). ACB score was weakly and inversely correlated with MCS ($\rho = -0.075$, $p = 0.046$) but not with PCS ($\rho = -0.014$, $p = 0.718$). The number of psychotropic agents was not significantly correlated with either PCS or MCS. DDI count showed a weak inverse correlation with PCS ($\rho = -0.081$, $p = 0.031$) but not with MCS ($p = 0.750$).

Univariate linear regression analysis

Univariate linear regression results are shown in Table 4. Older age was a significant negative predictor of PCS (beta = -0.51 +/- 0.06, $p < 0.001$) but not MCS. Total drug count (beta = -0.64 +/- 0.31, $p < 0.001$) and polypharmacy (beta = -1.90 +/- 0.75, $p = 0.011$) were negatively associated with PCS. Duration of illness was negatively associated with both PCS (beta = -0.04 +/- 0.02, $p = 0.013$) and MCS (beta = -0.04 +/- 0.02, $p = 0.031$). Using cognitive disorders as the reference category, mood disorders and substance use disorders were associated with higher PCS, and substance use disorders were associated with higher MCS. Sex, antipsychotic use, ADR occurrence and major DDI presence were not significantly associated with PCS or MCS in univariate analyses.

Table 4
Univariate linear regression analysis: predictors of SF-36 PCS and MCS (N = 710)

Variable	beta +/- SE (PCS)	p value (PCS)	beta +/- SE (MCS)	p value (MCS)
Age, years	-0.51 +/- 0.06	< 0.001	-0.05 +/- 0.07	0.500
Sex, male vs female	0.58 +/- 0.61	0.300	0.21 +/- 0.64	0.700
Total drugs	-0.64 +/- 0.31	< 0.001	-0.19 +/- 0.32	0.200
Polypharmacy, yes	-1.90 +/- 0.75	0.011	-1.00 +/- 0.80	0.200
Antipsychotics, yes	0.04 +/- 0.53	0.940	0.01 +/- 0.56	0.990
ADR, yes	-0.48 +/- 0.77	0.530	-0.18 +/- 0.82	0.830
Major DDI, yes	0.02 +/- 0.56	0.970	0.60 +/- 0.61	0.320
Diagnosis group (reference: cognitive disorders)				
Mood disorders	3.70 +/- 1.60	0.021	3.30 +/- 1.70	0.053
Others	2.50 +/- 1.60	0.119	3.20 +/- 1.70	0.059
Psychotic disorders	2.50 +/- 1.80	0.170	2.40 +/- 1.90	0.210
Substance use disorders	5.20 +/- 2.20	0.020	8.60 +/- 2.30	< 0.001
Duration of illness, months	-0.04 +/- 0.02	0.013	-0.04 +/- 0.02	0.031

beta, unstandardised regression coefficient; ADR, adverse drug reaction; DDI, drug-drug interaction; MCS, Mental Component Summary; PCS, Physical Component Summary; SE, standard error.

Multivariable linear regression analysis

Adjusted multivariable linear regression results are presented graphically in Fig. 2. In the PCS model, older age remained independently associated with lower PCS (beta = -0.46 +/- 0.06, $p < 0.001$), indicating that each additional year of age was associated with a 0.46-point lower PCS after adjustment. Higher total drug count was also independently associated with lower PCS (beta = -0.48 +/- 0.17, $p = 0.005$).

Duration of illness was independently associated with lower PCS (beta = -0.03 +/- 0.02, p = 0.042) and lower MCS (beta = -0.03 +/- 0.02, p = 0.044).

Among diagnostic categories, with mood disorders as the reference group, substance use disorders were independently associated with higher MCS (beta = 5.50 +/- 1.78, p = 0.002). Psychotic disorders showed a borderline association with lower PCS (beta = -2.05 +/- 1.12, p = 0.069), and cognitive disorders showed a borderline association with lower MCS (beta = -2.89 +/- 1.71, p = 0.092); neither reached statistical significance. Sex, antipsychotic use, ADR occurrence and major DDI presence were not independently associated with PCS or MCS.

Discussion

This study examined HRQoL among 710 elderly psychiatric outpatients and evaluated how sociodemographic, clinical and pharmacological variables related to SF-36 PCS and MCS scores. The central finding is that HRQoL impairment in this population was domain-specific rather than uniform. Lower PCS was independently associated with older age, higher total drug count and longer duration of psychiatric illness, whereas lower MCS was independently associated with longer illness duration and diagnostic category (Fig. 2). ACB differed substantially across diagnostic groups and showed a weak inverse bivariate correlation with MCS, but ACB was not included in the reported multivariable models; therefore, the current data support ACB as an exploratory signal rather than as an adjusted independent predictor of mental HRQoL. This distinction strengthens the interpretation and avoids overstating the pharmacological findings.

These results add to the limited Indian literature on patient-reported outcomes in geriatric psychiatry. Prior work from similar psychiatric outpatient settings has described polypharmacy and anticholinergic burden as prescribing-quality concerns in older adults [9], while validation work has supported use of the SF-36 in Indian populations [14]. The present analysis extends this literature by linking medication burden and illness chronicity to patient-centred physical and mental HRQoL outcomes in a clinically heterogeneous psychiatric cohort.

The independent inverse association between age and PCS is consistent with gerontological evidence that physical HRQoL declines with advancing age. Ageing is accompanied by sarcopenia, reduced strength and power, osteoarthritis, multimorbidity, pain and declining functional reserve, all of which are captured by SF-36 domains that load strongly on the PCS [20–23]. The absence of a parallel adjusted association between age and MCS suggests that self-perceived mental wellbeing does not necessarily deteriorate linearly with chronological age. This divergence is consistent with studies of community-dwelling older adults showing that physical HRQoL is often more sensitive than mental HRQoL to age-related functional decline [46]. In clinical terms, psychiatric stability in an older patient should not be assumed to imply preserved physical HRQoL; physical functioning, pain and role limitation require direct assessment.

Total drug count was also independently associated with lower PCS after adjustment for age, sex, diagnosis, illness duration, antipsychotic use, adverse drug reaction occurrence and major DDI status. This finding is consistent with evidence that medication burden in older adults is associated with functional decline and poorer HRQoL [6, 7, 27–29]. Several mechanisms may explain this relationship. A larger medication count may be a marker of greater physical comorbidity, frailty or illness severity, but it may also contribute directly to reduced physical wellbeing through sedation, dizziness, orthostatic hypotension, extrapyramidal effects, falls, metabolic complications, gastrointestinal effects, treatment burden and poorer adherence. Because this study did not include a formal comorbidity or frailty index, the observed association should be interpreted as a clinically important signal rather than as proof of medication-related causality.

The association between longer duration of illness and lower PCS further suggests that chronic psychiatric morbidity may contribute to physical HRQoL through cumulative pathways. Long-standing mental illness is associated with social disadvantage, reduced activity, poorer access to preventive care, physical comorbidity and excess mortality [42, 43]. Chronic stress-related biological processes, including allostatic load, have also been proposed as mechanisms linking long-term psychiatric illness to adverse somatic outcomes [41]. In this cohort, duration of illness remained associated with both PCS and MCS after adjustment, indicating that chronicity may function as a broad marker of cumulative clinical, functional and social burden.

Mental HRQoL was most clearly related to illness duration and diagnosis. The negative association between duration of illness and MCS is clinically plausible because chronic psychiatric disorders may impair emotional wellbeing through recurrent symptoms, repeated treatment changes, stigma, family burden, occupational disruption and reduced social participation. In the Indian context, the social and economic consequences of mental illness can be substantial and may reinforce the subjective burden of chronic disease [42]. The finding supports longitudinal monitoring of HRQoL as part of routine follow-up, particularly in patients whose psychiatric illness has persisted over multiple treatment episodes.

The diagnostic pattern requires more nuanced interpretation. Patients with substance use disorders had higher adjusted MCS than those with mood disorders. This should not be interpreted as evidence that substance use disorders are intrinsically associated with better mental HRQoL in older adults. The subgroup was small, and the cross-sectional outpatient design may have preferentially captured patients who were engaged in treatment, were in partial remission or were attending during a relatively stable phase of recovery. Quality of life is increasingly recognised as an important recovery outcome in addiction research and clinical care, and improvements in social functioning and perceived wellbeing may be evident among patients who are treatment-engaged [35]. The lower mean ACB score in the substance use disorder group (Table 2) may also have contributed to better MCS, but this pathway was not tested using an adjusted mediation model.

By contrast, patients with cognitive disorders had comparatively low SF-36 domain and summary scores, although adjusted diagnostic coefficients did not reach statistical significance. This pattern is consistent

with evidence that cognitive impairment is linked to poorer HRQoL and subsequent dementia-related outcomes in older adults [37]. The small number of patients with cognitive disorders in the present cohort limits statistical precision; nevertheless, the direction of findings is clinically coherent because cognitive impairment can reduce autonomy, social engagement, treatment adherence and perceived wellbeing.

ACB scores differed significantly by diagnostic category, with the highest means ACB observed among patients with psychotic disorders (Table 2). This is consistent with the known anticholinergic properties of several psychotropic agents used in psychiatric practice and with the vulnerability of the ageing brain to central muscarinic blockade [18, 30, 31]. The weak inverse correlation between ACB and MCS is directionally consistent with evidence linking anticholinergic exposure to cognitive impairment, neuropsychiatric symptoms, poorer physical function and reduced HRQoL [10–13, 32–34, 53, 54]. In the European Prospective Investigation into Cancer and Nutrition (EPIC)-Norfolk cohort, baseline anticholinergic burden predicted poorer baseline and longer-term HRQoL [33], and a recent resource-limited setting study also found high anticholinergic burden to be associated with lower HRQoL after adjustment [54].

However, the present analysis should be framed carefully. Because ACB was not entered into the multivariable regression model shown in Fig. 2, the study cannot establish ACB as an independent predictor of MCS after adjustment for age, total drug count, diagnosis and illness duration. This is especially important because ACB is likely to be correlated with diagnosis, psychotropic exposure and total medication count. Future analyses should test ACB in adjusted models, examine variance inflation and consider whether ACB mediates the relationship between diagnosis or drug count and MCS. Sensitivity analyses using alternative anticholinergic burden scales would also be valuable because available scales differ in drug ratings and predictive performance [12, 13, 53].

Major DDI status was not independently associated with PCS or MCS. This null finding should not be interpreted as evidence that DDIs are clinically irrelevant. The study measured potential prescription-level major DDIs rather than clinically adjudicated interaction-related harm. Some flagged interactions may have been anticipated by prescribers, mitigated by dose adjustment or monitoring, or may not have produced symptoms during the observation window. Prior reviews indicate that DDIs and adverse drug reactions are important concerns in older adults exposed to polypharmacy [44], but patient-reported HRQoL is likely to be affected only when interactions translate into clinically meaningful symptoms, functional decline or treatment disruption.

Similarly, antipsychotic prescription as a binary variable was not independently associated with either HRQoL summary score. This finding should be interpreted as a limitation of exposure measurement rather than as reassurance that antipsychotic-related treatment burden is absent. A class-level variable does not capture dose, duration, indication, anticholinergic activity, sedative load, extrapyramidal effects, metabolic adverse effects or cumulative psychotropic burden. Studies in residential aged care have reported associations between psychotropic medication exposure and poorer quality of life [48],

suggesting that more granular measures of psychotropic burden may be more informative than simple antipsychotic yes/no classification. The absence of sex differences in adjusted models also suggests that, in this tertiary psychiatric cohort, clinical chronicity and pharmacological burden may have been more salient determinants of HRQoL than sex alone.

The findings support a practical, patient-centred model of geriatric psychiatric care. First, HRQoL should be assessed directly rather than inferred from symptom control or prescription review alone. The SF-36, Short Form-12 Health Survey (SF-12) or other validated patient-reported outcome tools can help identify patients with poor physical functioning, pain, fatigue, social impairment or emotional role limitation that may otherwise remain under-recognised. Second, the independent association between total drug count and PCS supports periodically structured medication review, particularly in patients with increasing medication burden or declining physical functioning.

Third, although ACB was not confirmed as an adjusted independent predictor in this analysis, the observed diagnostic variation in ACB and its inverse bivariate association with MCS support anticholinergic stewardship as a rational safety priority. In practice, this would involve identifying medications with anticholinergic properties, considering lower-burden alternatives when clinically appropriate, avoiding unnecessary duplication of anticholinergic agents and reassessing ongoing need at each follow-up. Explicit tools such as the Screening Tool of Older Persons' Prescriptions/Screening Tool to Alert to Right Treatment (STOPP/START) version 3 and deprescribing frameworks can support medication rationalisation in older adults, but decisions must remain individualised and should balance psychiatric stability against medication-related harm [51, 52].

Finally, the association of illness duration with both PCS and MCS indicates that chronic psychiatric illness should trigger broader review beyond medication adjustment. Longitudinal care plans should include functional assessment, physical comorbidity screening, rehabilitation referral where indicated, caregiver support, social-work input and relapse-prevention planning. This is particularly relevant for patients with cognitive disorders and long-standing mood or psychotic disorders, in whom HRQoL may deteriorate despite stable outpatient attendance.

This study has several strengths. It included a large sample of elderly psychiatric outpatients from a tertiary care setting and used a validated SF-36 instrument to assess patient-reported HRQoL. It also evaluated multiple pharmacological variables in the same cohort, including total drug count, polypharmacy, ACB, antipsychotic use and major DDI status. The real-world psychiatric outpatient setting enhances clinical relevance, and the inclusion of diagnostic subgroups provides insight into how HRQoL may differ across common geriatric psychiatric presentations.

Several limitations should be considered when interpreting the findings. The cross-sectional design prevents causal inference and cannot establish whether medication burden leads to poorer HRQoL, whether poorer health leads to more medication use, or whether both reflect underlying comorbidity. The single-centre tertiary care setting may limit generalisability to community or primary-care populations. Residual confounding is likely because physical comorbidity, frailty, socioeconomic status, educational

attainment, caregiver support, psychiatric severity, cognition and adherence were not included in the adjusted models. HRQoL was self-reported and may be influenced by current mood state, insight, recall and cognitive capacity. The cognitive disorder and substance use disorder subgroups were small, limiting the precision of diagnosis-specific estimates. Finally, although ACB was clinically relevant and correlated weakly with MCS, it was not included in the reported adjusted regression models; therefore, independent ACB effects cannot be inferred from the current multivariable analysis.

Future research should use longitudinal designs to clarify temporal relationships among medication burden, anticholinergic exposure, illness chronicity and HRQoL. Adjusted models should include ACB alongside total drug count, psychiatric diagnosis, psychotropic dose, comorbidity indices and symptom-severity measures to distinguish medication effects from confounding by indication. Studies incorporating pharmacist-led medication review, deprescribing interventions and repeated HRQoL measurement would be particularly useful for determining whether reducing medication or anticholinergic burden improves patient-centred outcomes in geriatric psychiatric practice.

Conclusions

In this cohort of elderly psychiatric outpatients from a tertiary care centre in India, lower physical HRQoL was independently associated with older age, higher total drug count and longer duration of illness. Lower mental HRQoL was independently associated with longer duration of illness, while patients with substance use disorders reported higher MCS than those with mood disorders. ACB was weakly and inversely correlated with MCS in bivariate analysis, suggesting a potential role for anticholinergic review, but this association should be confirmed in adjusted models. Integrating routine HRQoL assessment with structured medication review and anticholinergic stewardship may help improve patient-centred care for older adults with psychiatric disorders.

Abbreviations

ACB

Anticholinergic Cognitive Burden

ADR

adverse drug reaction

AIIMS

All India Institute of Medical Sciences

DDI

drug-drug interaction

EPIC

European Prospective Investigation into Cancer and Nutrition

HRQoL

health-related quality of life

ICMR

Indian Council of Medical Research
MCS
Mental Component Summary
ORCID
Open Researcher and Contributor ID
PCS
Physical Component Summary
SD
standard deviation
SE
standard error
SF-12
Short Form-12 Health Survey
SF-36
Short Form-36 Health Survey
SF-36 v2
Short Form-36 Health Survey version 2
STOPP/START
Screening Tool of Older Persons' Prescriptions/Screening Tool to Alert to Right Treatment
VIF
variance inflation factor.

Declarations

Ethics approval and consent to participate.

Ethical approval was obtained from the Institutional Ethics Committee, AIIMS Rishikesh (Reference No. 467/IEC/PGM/2021, dated 26 November 2021). Written informed consent was obtained from all participants before enrolment.

Consent for publication

Not applicable. The manuscript does not contain identifiable individual-level data, images or videos.

Availability of data and materials

All data supporting the findings of this study are included in this article and its supplementary information files. Additional de-identified data may be available from the corresponding author on reasonable request, subject to institutional and ethics committee requirements.

Competing interests

The authors declare that they have no competing interests.

Funding

This study was supported by the Indian Council of Medical Research (ICMR), Grant No. 3/2/June 2021/PG-Thesis-HRD.

Authors' contributions

MB contributed to the conception and design of the study, acquisition of data, statistical analysis, interpretation of data and drafting of the manuscript. BD contributed to the conception and design of the study and critically revised the manuscript. VSR contributed to data curation and critical review of the final draft. MG, AA, MBh and SM contributed to manuscript review and revision. All authors read and approved of the final manuscript.

Acknowledgements

The authors thank the faculty and non-faculty staff of the Department of Psychiatry for their support and assistance in completing this study.

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Figures

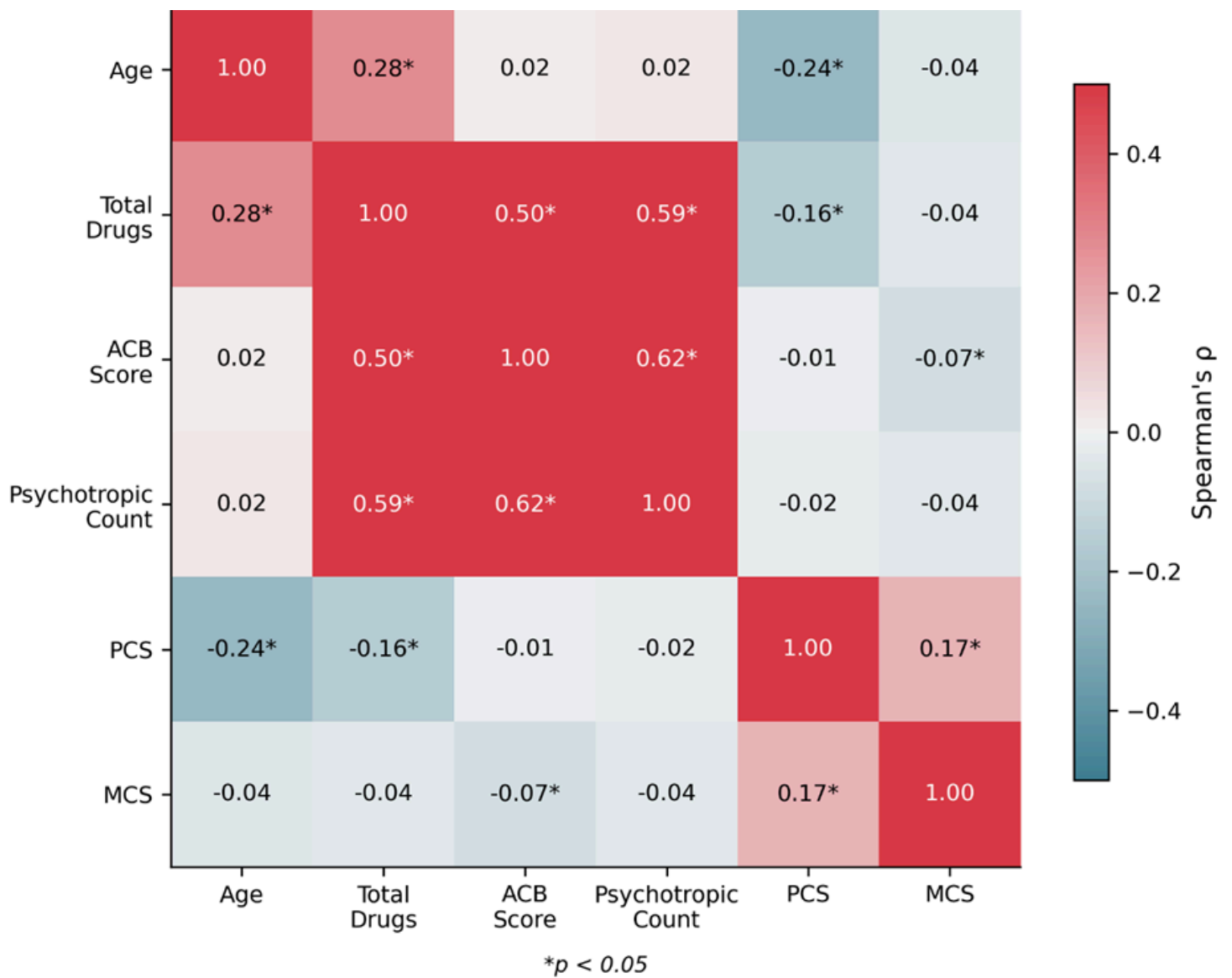


Figure 1

Spearman correlation heatmap of pharmacological variables and SF-36 summary scores (N = 710). Values are Spearman rank correlation coefficients (rho); asterisks show $p < 0.05$.

**Figure 5. Forest Plot of Multivariable Linear Regression
Independent Predictors of SF-36 PCS and MCS (N = 710)**

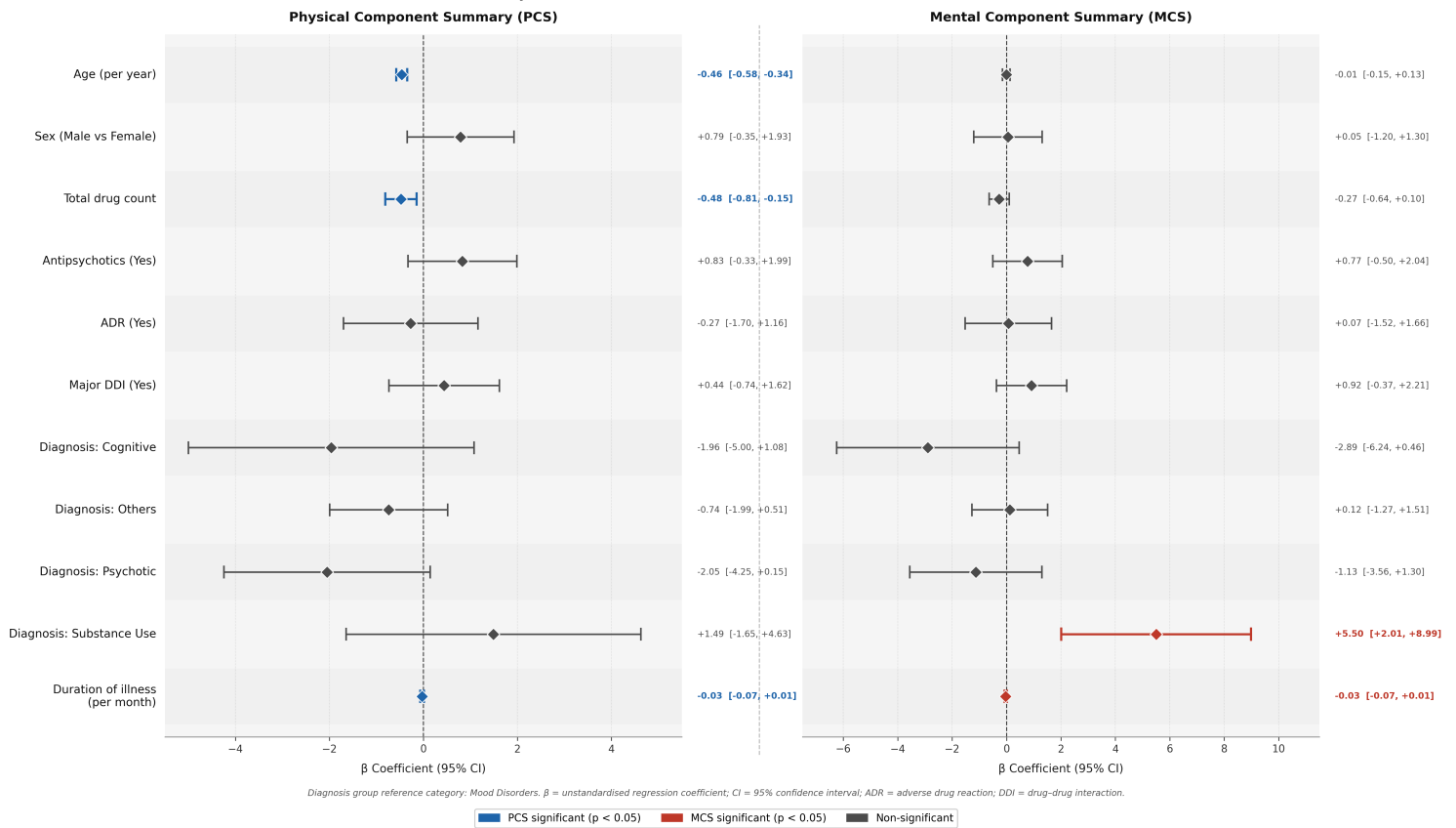


Figure 2

Forest plot of adjusted multivariable linear regression estimates for SF-36 PCS and MCS (N = 710). Error bars indicate 95% confidence intervals (CIs); estimates highlighted in blue or red indicate statistically significant predictors ($p < 0.05$).