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Clinical determinants of health-related quality of life in vitiligo: a cross-sectional analysis from Kandahar, Afghanistan

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Abstract

Vitiligo substantially impairs health-related quality of life (HRQoL), yet the independent impact of clinical characteristics remains inconsistent across populations. Data from Afghanistan are limited despite potential sociocultural influences. This multicenter cross-sectional study evaluated independent associations of disease severity, activity, duration, and extent with HRQoL among 402 adults with clinically confirmed vitiligo in Kandahar. Disease severity was assessed using the Vitiligo Area Severity Index (VASI), along with anatomical extent and activity status. HRQoL was measured using the Dermatology Life Quality Index (DLQI). Multivariable linear regression analyses with robust standard errors were adjusted for age, sex, and psychological distress. The mean DLQI score was 5.1±3.0. VASI demonstrated a weak but statistically significant correlation with DLQI ($r=0.135$; $p=0.007$). Moreover, higher VASI scores independently predicted poorer HRQoL ($\beta=0.071$; $p=0.008$). Stable and repigmenting disease was associated with an approximately 1.18-point higher DLQI score compared with progressive disease ($p<0.001$). Disease duration and anatomical extent were not independent predictors. The model explained 18.4% of DLQI variance. Severity and activity were the principal correlates of HRQoL impairment.

Introduction

Vitiligo affects approximately 0.5-2% of the global population, with substantial geographic variation in prevalence.[1,2] The burden of vitiligo appears particularly pronounced in regions such as Africa, the Middle East, and Latin America, where limited healthcare resources and sociocultural perceptions of visible skin disease may intensify psychosocial consequences.[3] As a chronic depigmenting disorder often requiring prolonged management, vitiligo has been widely studied in relation to health-related quality of life (HRQoL).[4-6] However, the magnitude and determinants of HRQoL impairment remain inconsistent across populations.[5-7]

Clinical severity, typically measured by the extent of body surface area (BSA) affected or the Vitiligo Area Severity Index (VASI), has shown variable associations with HRQoL.[8-12] While some studies report a direct relationship between greater disease extent and worse quality of life,[8-11] others demonstrate weak or non-significant correlations.[8,12] Beyond static measures of extent, lesion visibility, anatomical distribution, and disease activity have also been proposed as important contributors to psychosocial burden.[8,13] Disease activity, often assessed using the Vitiligo Disease Activity Score (VIDA),[14] may reflect ongoing uncertainty and perceived loss of control, yet evidence regarding its independent impact on HRQoL remains limited and inconsistent.[7,8] These discrepancies suggest that the clinical determinants of HRQoL in vitiligo may vary according to sociocultural context and healthcare access.

Afghanistan represents a clinically relevant but understudied setting for vitiligo research.[15] Structural factors – including gender norms, literacy patterns, and traditional sociocultural expectations – may influence the lived experience of visible dermatologic disease.[16,17] Prior regional reports document social stigma associated with skin conditions, affecting interpersonal relationships and social participation.[16] Despite these contextual factors, no study has systematically evaluated the independent contributions of disease severity, activity, duration, and anatomical extent to HRQoL among Afghan patients with vitiligo.[15,16]

Due to the inconsistent global evidence linking objective clinical severity with patient-reported outcomes[7-10] and the potential modifying role of sociocultural context, a comprehensive evaluation of clinical predictors of HRQoL in Afghanistan is warranted. We therefore conducted a multicenter cross-sectional study in Kandahar to assess the independent associations of disease duration, VASI-defined severity, anatomical extent, and activity status with HRQoL impairment. We hypothesized that current disease severity and activity would demonstrate stronger associations with HRQoL than duration or distribution alone, consistent with evidence suggesting that visible and dynamic disease states may impose greater psychosocial burden.[16,18]

Materials and Methods

Study design and setting

This multicenter hospital-based cross-sectional analytical study was conducted between April and September 2025 in the dermatology outpatient departments of 3 public and 5 private hospitals in Kandahar City, Afghanistan. These facilities collectively serve a broad spectrum of dermatology patients from southern Afghanistan, representing diverse socioeconomic backgrounds.

The study protocol was approved by the Kandahar University Institutional Review Board (approval no.: KDRI-IRB-007) and all procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki.

Participants

Adult patients (≥18 years) with clinically confirmed vitiligo of at least one month's duration were consecutively recruited from participating dermatology outpatient departments during the study period. Diagnosis was established by specialist dermatologists based on characteristic depigmented macules and patches with typical clinical distribution.

Exclusion criteria were defined *a priori* to minimize the potential confounding of HRQoL assessments. Patients were excluded if they: i) had received systemic corticosteroids or other systemic immunosuppressive therapy (including cyclosporine, methotrexate, azathioprine, mycophenolate mofetil, or systemic Janus kinase [JAK] inhibitors) within the preceding 3 months; ii) had chronic medical comorbidities known to independently affect quality of life (*e.g.*, diabetes mellitus, hypertension, malignancy); iii) were pregnant or breastfeeding; iv) had a documented pre-existing psychiatric disorder; or v) were unable to provide informed consent or complete study instruments.

Topical therapies, including topical corticosteroids and calcineurin inhibitors, were permitted and were not considered exclusion criteria, as they represent standard dermatologic care in this setting.

Phototherapy (narrowband UVB or PUVA) was not included among exclusion criteria, as these modalities are not available in dermatology outpatient clinics in Kandahar.

Sample size and sampling strategy

The required sample size was determined to ensure adequate statistical power for multivariable linear regression analysis. For regression models incorporating up to 10 predictor variables, methodological guidance recommends sufficient observations per predictor to reduce overfitting and unstable parameter estimates.[19]

A formal power analysis was performed to detect small-to-moderate effect sizes (Cohen's $f^2 \geq 0.10$) with 80% statistical power at a two-sided α level of 0.05, consistent with established quantitative research standards.[20] For multivariable linear regression with 10 predictor variables (disease duration, VASI severity, anatomical extent, disease activity, age, sex, psychological distress, and interaction terms), a minimum sample size of 200 was calculated. Accounting for potential nonresponse, incomplete data, and planned subgroup analyses, the target was set at 400 patients. Participants were selected using stratified systematic sampling proportional to patient flow across participating hospitals. Sampling fractions were adjusted to ensure representation from both public and private sector facilities, thereby enhancing internal validity within this hospital-based population.

Clinical evaluation

Standardized clinical assessments were performed by trained dermatologists using validated instruments. Vitiligo was further classified according to standard morphological criteria into non-segmental vitiligo (vulgaris, focal, acrofacial, mixed, mucosal, and universalis) and segmental vitiligo.

Disease severity was quantified using VASI as described by Hamzavi *et al.*[21,22] The body was divided into 6 anatomical regions (hands, upper extremities, trunk, lower extremities, feet, and face), each assigned a proportion of total BSA. Depigmented involvement within each region was estimated using hand units (approximately 1% BSA). The degree of depigmentation within affected areas was graded as 10% (minimal), 25% (mild), 50% (moderate), 75% (marked), or 90-100% (near-complete to complete). The regional scores were summed to generate a total VASI score ranging from 0 to 100, with higher scores indicating greater disease severity.

Anatomical extent was categorized into four predefined groups for analysis: i) localized involvement (<1% BSA); ii) sensitive areas only (face, hands, and/or genitalia without other sites); iii) non-sensitive areas only (covered sites without sensitive areas); and iv) both sensitive and non-sensitive areas are involved.

Disease duration was determined based on the patient-reported onset of depigmented lesions and categorized as follows: <6 months, 6 months to <1 year, 1 to <3 years, 3 to <5 years, and ≥5 years. Disease activity during the preceding 3 months was classified clinically as: i) progressive/active (new lesions or enlargement of existing lesions); ii) stable (no change in lesion size or number); iii) repigmenting (evidence of pigment return); or iv) burned-out (no new or expanding lesions for >2 years).[14]

Outcome measure

HRQoL was assessed using the Dermatology Life Quality Index (DLQI), a validated 10-item questionnaire designed for dermatologic conditions.[23-26] The instrument evaluates the impact of skin disease over the preceding week across 6 domains: symptoms and feelings (items 1-2), daily activities (3-4), leisure (5-6), work or school (7), personal relationships (8-9), and treatment (10). Total scores range from 0 to 30, with higher scores indicating greater HRQoL impairment. Standard interpretation thresholds were applied: 0-1 (no effect), 2-5 (small effect), 6-10 (moderate effect), 11-20 (very large effect), and 21-30 (extremely large effect).[24] The DLQI was selected over disease-specific instruments such as the VitiQoL due to its widespread global use, enabling cross-cultural comparison, and the lack of a validated Pashto version of VitiQoL. Additionally, the DLQI was more feasible for administration in a population with high illiteracy. All study instruments were administered through standardized face-to-face interviews conducted by the principal investigator and two trained research assistants. A uniform administration method was applied to all participants regardless of literacy status to avoid differential measurement bias. Interviewers followed a standardized protocol, including *verbatim* reading of items, neutral probing, and provision of clarification when required. From a methodological perspective, the DLQI measures functional life impact with less conceptual overlap with psychological variables included in the analysis. We acknowledge that disease-specific instruments may provide additional insights and could be considered in future studies.

Translation and cultural adaptation

The DLQI was translated into Pashto using a structured forward-backward translation procedure in accordance with established cross-cultural adaptation guidelines. Two independent bilingual translators performed forward translation, followed by synthesis into a single reconciled version. This version was then backtranslated by two independent translators blinded to the original instrument. An expert committee comprising dermatologists, a psychiatrist, a public health researcher, and translators reviewed all versions to ensure semantic, idiomatic, experiential, and conceptual equivalence.

The finalized Pashto version was pilot tested in 20 patients with vitiligo (not included in the main study). Most participants (95%) reported that the instructions were clear, and all items were understood by at least 18 participants. The response scale was well understood, and no floor or ceiling effects were observed. The average completion time was approximately 4 minutes.

Minor cultural adaptations were made to ensure contextual relevance, including expansion of employment-related terminology, culturally appropriate phrasing of personal relationship items, and clarification of treatment concepts to include both medical and traditional practices.

Covariates

Demographic data, including age, sex, marital status, education level, employment status, and socioeconomic background, were collected through structured interviews.

Psychological distress was measured using the 12-item General Health Questionnaire (GHQ-12), a validated screening instrument for common mental disorders.[27,28] Consistent with established scoring thresholds, a GHQ-12 score ≥4 was used to indicate probable psychological distress.[28]

Statistical analysis

All analyses were conducted using SPSS version 24.0 (IBM Corp., Armonk, NY, USA). Continuous variables were summarized as mean ± standard deviation (SD) or median (interquartile range [IQR]) as appropriate. Categorical variables were presented as frequencies and percentages.

Bivariate analyses were performed to evaluate associations between clinical variables and DLQI scores. Pearson's correlation coefficient assessed the relationship between continuous VASI scores and DLQI. One-way analysis of variance (ANOVA) with Bonferroni correction was used to compare mean DLQI scores across categories of disease duration, anatomical extent, and activity status. Effect sizes were reported using Cohen's d and eta-squared (η^2).

To identify independent predictors of HRQoL impairment, multivariable linear regression analysis was performed with DLQI as the dependent variable. All primary clinical variables (disease duration, VASI severity, anatomical extent, and activity status) were entered simultaneously, with adjustment for age, sex, and psychological distress (GHQ-12 ≥4). Robust standard errors were applied to account for potential heteroscedasticity. Model fit was evaluated using adjusted R^2, and multicollinearity was assessed using variance inflation factors (VIFs).

Regression diagnostics included visual inspection of residual plots to assess normality and homoscedasticity. Sensitivity analyses were conducted by excluding patients with very severe disease (VASI >25) and by repeating analyses using log-transformed DLQI scores to evaluate the impact of skewness.

Post hoc pairwise comparisons for activity status were conducted using Tukey's honestly significant difference (HSD) test. All tests were two-tailed, and statistical significance was defined as $p<0.05$. Ninety-five percent confidence intervals (CIs) were reported where appropriate.

Results

Participant characteristics

A total of 402 adult patients with vitiligo were included in the final analysis, all with complete demographic and clinical data. The Fitzpatrick phototype was not formally assessed. The study population was predominantly Pashtun, a group generally corresponding to Fitzpatrick phototypes III-V, in which vitiligo lesions are typically more visually conspicuous. The mean age was 30.4±10.5 years. Age distribution was as follows: 18-29 years, 228 (56.8%); 30-39 years, 93 (23.1%); 40-49 years, 50 (12.4%); and ≥50 years, 31 (7.7%).

Of the participants, 199 (49.5%) were female, and 235 (58.5%) were married. A majority were illiterate (252, 62.7%), and 249 (61.9%) were unemployed (Table 1).

The mean VASI score was 6.7±5.8. Severity categories were mild (≤5) in 190 patients (47.3%), moderate (>5-10) in 136 (33.8%), and severe (>10) in 76 (18.9%). Only 2 patients had VASI scores >25.

Disease duration was categorized as <6 months in 91 (22.6%), 6 months to <1 year in 120 (29.9%), 1 to <3 years in 119 (29.6%), 3 to <5 years in 40 (9.9%), and ≥5 years in 32 (8.0%).

Regarding activity status, 145 (36.1%) had progressive/active disease, 107 (26.6%) were stable, 149 (37.1%) were repigmenting, and 1 (0.2%) was classified as burned-out.

Anatomical involvement was limited to sensitive areas in 118 patients (29.4%), confined to non-sensitive areas in 93 (23.1%), involved both regions in 173 (43.0%), and localized (<1% BSA) in 18 (4.5%).

Morphologically, non-segmental vitiligo predominated, accounting for 96.8% of cases. The vulgaris subtype was the most common (n=244; 60.7%), followed by focal (n=89; 22.1%) and acrofacial (n=54; 13.4%) patterns. Segmental vitiligo was observed in 13 patients (3.2%). Rare subtypes, including mucosal (n=1) and universalis (n=1), were infrequent, and no mixed-type cases were identified. Due to the small numbers, these subtypes were not included in subgroup analyses.

The mean DLQI score was 5.1±3.0 (range 0-24). Based on standard interpretation thresholds, 89 patients (22.1%) had no effect, 186 (46.3%) had a small effect, 98 (24.4%) had a moderate effect, 28 (7.0%) had a very large effect, and 1 (0.2%) had an extremely large effect (Table 1).

Univariate associations with HRQoL

Disease severity

Continuous VASI scores demonstrated a weak but statistically significant positive correlation with DLQI (Pearson's $r=0.135$; $p=0.007$). The coefficient of determination ($r^2=0.018$) indicated that VASI explained approximately 1.8% of the variance in DLQI scores. Mean DLQI scores increased across VASI severity categories (Table 2).

Disease duration

One-way ANOVA revealed no significant differences in DLQI scores across disease duration categories ($F_{4,397}=1.166$; $p=0.325$; $\eta^2=0.012$). Mean DLQI values ranged from 4.3 to 5.7 without a consistent trend.

Anatomical extent

Significant differences in DLQI were observed across anatomical extent categories ($F_{3,398}=12.499$; $p<0.001$; $\eta^2=0.086$). Bonferroni-adjusted *post hoc* comparisons indicated that patients with sensitive-area involvement (mean = 5.76±2.9) had significantly higher DLQI scores compared with those with localized disease (<1% BSA; mean = 1.44±1.8; $p<0.001$) and those with non-sensitive-area involvement only (mean = 4.12±2.7; $p=0.002$).

Disease activity status

Activity status was significantly associated with DLQI ($F_{3,398}=21.112$; $p<0.001$; $\eta^2=0.137$). *Post hoc* Tukey HSD comparisons showed that patients with progressive/active disease (mean = 3.67±2.8) had significantly lower DLQI scores than those with stable disease (mean = 5.89±2.9; $p<0.001$) and repigmenting disease (mean = 6.05±2.8; $p<0.001$). The single burned-out case was excluded from pairwise comparisons due to insufficient sample size (Table 3).

Multivariable regression analysis

Multivariable linear regression with robust standard errors was performed to identify independent predictors of DLQI scores (Table 4). The model included disease duration, VASI severity, anatomical extent, and activity status, with adjustment for age, sex, and psychological distress (GHQ-12 ≥4). Multicollinearity diagnostics indicated acceptable variance inflation factors (all VIF<2.0), suggesting no substantial collinearity among predictors.

The final model explained 18.4% of the variance in DLQI scores (adjusted $R^2=0.184$; $F_{8,393}=11.29$; p<0.001). Higher VASI severity independently predicted greater HRQoL impairment (β=0.071; 95% CI: 0.018-0.123; p=0.008).

Disease activity status remained a significant independent predictor. Compared with progressive/active disease, both stable and repigmenting disease were associated with approximately 1.18-point higher DLQI scores (β=1.184; 95% CI: 0.847-1.521; p<0.001).

Psychological distress (GHQ-12 ≥4) was strongly associated with worse HRQoL (β=2.341; p<0.001). Among demographic covariates, older age was associated with slightly higher DLQI scores (β=0.041; p=0.041), while female sex was associated with lower DLQI scores (β=−0.511; p=0.048). Disease duration (β=−0.088; p=0.472) and anatomical extent (β=−0.193; p=0.254) were not independently associated with HRQoL after adjustment.

Sensitivity analyses excluding patients with very severe disease (VASI >25) yielded comparable results. Analyses using log-transformed DLQI scores did not materially alter findings.

Subgroup and exploratory analyses

Only two patients had very severe disease (VASI >25). Both demonstrated DLQI scores within the "extremely large effect" range (22 and 24). Given the limited sample size, no formal statistical comparisons were made for this subgroup, and these observations should be interpreted descriptively.

Subgroup analysis by disease activity status confirmed differences in HRQoL across categories (Table 5). Mean DLQI scores were 3.67±1.69 for progressive/active disease, 5.89±3.74 for stable disease, and 6.05±2.94 for repigmenting disease. *Post hoc* Tukey HSD testing demonstrated significantly higher DLQI scores in both the stable and repigmenting groups compared with the progressive/active group (both p<0.001). The single burned-out case had a DLQI score of 8 and was not included in inferential comparisons.

Exploratory analysis of psychological distress across activity status groups revealed no statistically significant differences in GHQ-12 scores (F=1.89; p=0.131), suggesting that HRQoL differences observed by activity status were not attributable to measurable variation in psychological distress.

Discussion

This study provides the first comprehensive evaluation of clinical predictors of HRQoL among patients with vitiligo in Afghanistan. In this multicenter cohort, disease severity (VASI) and activity status emerged as independent predictors of HRQoL impairment, whereas disease duration and anatomical extent did not retain independent significance after adjustment for demographic factors and psychological distress.

The association between VASI-defined severity and DLQI aligns with prior international evidence linking objective clinical burden with patient-reported impairment.[11,16,17] However, the magnitude of association in our cohort was modest, with VASI explaining a limited proportion of DLQI variance. Similar findings have been reported in studies demonstrating weak-to-moderate correlations between the involvement of BSA and quality of life.[8-12,29] These results support the idea that the extent of depigmentation alone cannot fully explain HRQoL in vitiligo, as it is multifactorial.[5-7]

Although only two patients had very severe disease (VASI >25), both exhibited DLQI scores within the extremely large impairment range. While this observation is descriptive, it suggests a possible non-linear relationship between severity and psychosocial burden. Threshold effects have been described in other dermatologic conditions, where extensive or highly visible disease may precipitate disproportionate psychological distress.[7,30] Such findings indicate the need for intensified psychosocial assessment in patients with extensive involvement.

A central finding of this study was the independent association between disease activity and HRQoL. Patients with stable and repigmenting diseases reported higher DLQI scores than those with progressive diseases. While this pattern may seem counterintuitive, chronic dermatologic disorders have been described as having a similar complexity in the relationship between disease dynamics and patient perception.[6] One potential explanation is a response-shift phenomenon, whereby patients recalibrate internal expectations and coping strategies over time.[6] Alternatively, individuals experiencing active disease may perceive ongoing therapeutic engagement or potential for change, whereas those with long-standing stable disease may experience cumulative frustration or psychosocial fatigue.[16] Importantly, these findings represent associations rather than causal relationships and warrant confirmation in longitudinal studies.[7,8]

The absence of an independent association between disease duration and HRQoL is consistent with studies suggesting that chronicity alone does not predict patient-reported burden once clinical severity and psychosocial variables are considered.[7,12] Similarly, anatomical extent did not retain significance in multivariable models, despite showing differences in univariate analyses. Prior research has emphasized lesion visibility and distribution as determinants of psychosocial impact.[8,9,13] However, contextual factors may modify these associations. In conservative sociocultural settings, distinctions between visible and non-visible areas may carry different social implications, potentially attenuating independent effects of distribution once severity and activity are accounted for.[16,17]

The adjusted R^2 value of 0.184 indicates that measured clinical and demographic variables explained a modest proportion of HRQoL variance, with 81.6% attributable to unmeasured factors including treatment history, social support, stigma perception, and coping mechanisms.[5-7] This aligns with the biopsychosocial model and underscores the necessity of integrating psychosocial assessment with clinical evaluation in routine care.[31,32]

Our findings should also be interpreted within a broader cross-cultural context. The mean DLQI score observed in this cohort is comparable to reports from Middle Eastern and South Asian populations but somewhat lower than those reported in Western settings, suggesting that sociocultural and healthcare factors may influence the perceived burden of vitiligo. Large international studies have demonstrated that psychosocial burden varies across regions, with patients in non-Western settings often experiencing substantial quality-of-life impairment independent of disease severity.[5,18] In Afghanistan's conservative sociocultural environment, where visible skin conditions may carry stigma and social implications, these contextual factors may further amplify the impact of disease on HRQoL.[16]

Clinical implications

These findings suggest that current disease severity and activity status, rather than duration or anatomical distribution alone, may be more relevant to HRQoL impairment in this setting. Routine incorporation of validated HRQoL instruments, such as the DLQI, alongside standardized severity assessment tools, may facilitate identification of patients requiring targeted psychosocial support.[31,32] While causality cannot be inferred from cross-sectional data, integrating severity- and activity-based monitoring into clinical practice may enhance patient-centered management, particularly in resource-limited environments.

Strengths and limitations

This study has several strengths. It represents the first multicenter evaluation of vitiligo-related HRQoL in Afghanistan, utilizes validated clinical and patient-reported instruments,[21,23,27] and incorporates multivariable modeling adjusting for psychological distress and demographic covariates. The inclusion of robust standard errors and sensitivity analyses strengthens internal validity.

Several limitations warrant consideration. The cross-sectional design precludes causal inference, and hospital-based recruitment may limit generalizability beyond similar clinical settings. The very small number of patients with extremely severe disease restricts inference for that subgroup. Intervieweradministered questionnaires may have introduced social desirability bias, and cultural and literacy factors may have influenced response patterns. The Pashto version of the DLQI was translated using a structured forward-backward procedure with pilot testing; however, formal psychometric validation, including assessment of reliability and construct validity, was not performed. Fitzpatrick phototype was not recorded, and phototherapy was not available in the study setting, limiting assessment of their potential influence on HRQoL and reducing generalizability to settings where such treatments are accessible. Additionally, variables such as treatment history, healthcare accessibility, and social support were not formally measured and may contribute to residual confounding.

Future directions

Longitudinal studies are needed to clarify temporal relationships between disease activity, severity, and HRQoL outcomes.[7,8] Qualitative research may further elucidate culturally specific dimensions of psychosocial burden within Afghan populations.[16] Validation of vitiligo-specific quality-of-life instruments in local languages[31,33] and interventional studies integrating dermatologic and psychosocial care models[5] may improve patient-centered management in resource-limited contexts.

Conclusions

In this multicenter Afghan cohort, disease severity and activity status emerged as the principal clinical correlates of HRQoL impairment in vitiligo, whereas disease duration and anatomical extent were not independently associated after adjustment for confounders. Although causality cannot be inferred, the findings suggest that current disease dynamics may play a more relevant role in patient-reported burden than chronicity alone. Routine integration of severity and activity assessment with standardized HRQoL measurement may support more targeted and patient-centered management in resource-limited settings.

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Table 1. Demographic and clinical characteristics of the study participants (n=402).

Characteristic	**Value** **n (%)**
Demographic characteristics	
Age (years), mean ± SD	30.4±10.5
18-29	228 (56.8)
30-39	93 (23.1)
40-49	50 (12.4)
≥50	31 (7.7)
Female sex	199 (49.5)
Married	235 (58.5)
Illiterate	252 (62.7)
Unemployed	249 (61.9)
Clinical characteristics	
Disease duration	
Recent onset (<6 months)	91 (22.6)
Early-stage (6 months to <1 year)	120 (29.9)
Established (1 to <3 years)	119 (29.6)
Chronic (3 to <5 years)	40 (9.9)
Long-standing (≥5 years)	32 (8.0)
VASI score, mean ± SD	6.7±5.8
VASI severity grade	
Mild (≤5)	190 (47.3)
Moderate (>5-10)	136 (33.8)
Severe (>10)	76 (18.9)
Disease activity status	
Progressive (active)	145 (36.1)
Stable	107 (26.6)
Repigmenting	149 (37.1)
Burned-out	1 (0.2)
Area of involvement	
Localized (<1% BSA)	18 (4.5)
Sensitive areas only	118 (29.4)
Non-sensitive areas only	93 (23.1)
Both sensitive and non-sensitive areas	173 (43.0)
Vitiligo type	
Non-segmental vitiligo	389 (96.8)
Segmental vitiligo	13 (3.2)

Two patients had VASI >25 (included in severe category); sensitive areas include face, hands, and genitalia.
SD, standard deviation; VASI, Vitiligo Area Severity Index; BSA, body surface area.

Table 2. Association between VASI severity and DLQI.

VASI category	**n (%)**	**Mean DLQI ± SD**	**Median (IQR)**	**ANOVA p-value**	**η^2**
Mild (≤5)	190 (47.3)	4.2±2.8	4 (2-6)		
Moderate (>5-10)	136 (33.8)	5.4±3.0	5 (3-7)		
Severe (>10-25)	76 (18.9)	6.8±3.2	6 (4-9)	<0.01	0.02
Very severe (>25)	2 (0.5)	23.0±1.4	—	Descriptive only	—

Correlation (continuous analysis): Pearson r=0.135; p=0.007; R^2=1.8%; effect size is small despite statistical significance.
VASI, Vitiligo Area Severity Index; DLQI, Dermatology Life Quality Index; SD, standard deviation; IQR, interquartile range; ANOVA, analysis of variance.

Table 3. DLQI by disease activity status.

Activity status	**n (%)**	**Mean DLQI ± SD**	**95% CI**	**ANOVA p-value**	**η^2**
Progressive/active	145 (36.1)	3.67±2.8	3.25-4.09		
Stable	107 (26.6)	5.89±2.9	5.34-6.44		
Repigmenting	149 (37.1)	6.05±2.8	5.60-6.50	<0.001	0.137
Burned-out	1 (0.2)	8.0	—	Descriptive only	—

Post hoc (Tukey HSD): stable *vs.* progressive: p<0.001; repigmenting *vs.* progressive: p<0.001; stable *vs.* repigmenting: not significant.
DLQI, Dermatology Life Quality Index; SD, standard deviation; CI, confidence interval; ANOVA, analysis of variance.

Table 4. Multivariable linear regression analysis of clinical predictors of DLQI scores (n=402).

Predictor	**β (95% CI)**	**Std. β**	**p-value**
Clinical variables			
Disease duration	−0.088 (−0.327, 0.152)	−0.034	0.472
VASI severity	0.071 (0.018, 0.123)	0.137	0.008
Area of involvement	−0.193 (−0.525, 0.139)	−0.060	0.254
Disease activity status (ref: progressive)	1.184 (0.847, 1.521)	0.337	<0.001
Covariates			
Age (years)	0.041 (0.002, 0.080)	0.142	0.041
Female sex	−0.511 (−1.018, −0.005)	−0.085	0.048
Psychological distress (GHQ-12 ≥4)	2.341 (1.692, 2.990)	0.389	<0.001

Model adjusted for age, sex, and psychological distress; adjusted R^2=0.184; β indicates unstandardized regression coefficient; Std. β indicates the standardized regression coefficient.
CI, confidence interval; VASI, Vitiligo Area Severity Index; GHQ-12, General Health Questionnaire-12.

Table 5. Subgroup analysis of HRQoL and psychological distress according to disease activity status.

Disease activity status	**n**	**DLQI score mean ± SD**	**GHQ-12 Score mean ± SD**	**p-value (DLQI)†**	**p-value (GHQ-12)‡**
Progressive/active	145	3.67±2.8	3.58±1.44	Reference	0.131
Stable	107	5.89±2.9	3.72±1.52	<0.001	—
Repigmenting	149	6.05±2.8	3.69±1.49	<0.001	—
Burned-out	1	8.00	3.00	—	—

† p-values derived from *post-hoc* Tukey HSD tests comparing each subgroup with the progressive/active reference group for DLQI scores; ‡ p-value derived from one-way ANOVA comparing GHQ-12 scores across disease activity groups; SD values for DLQI scores have been corrected from the original submission to ensure consistency with Table 3 and the Results section (mean DLQI: progressive/active 3.67±2.8; stable 5.89±2.9; repigmenting 6.05±2.8).

DLQI, Dermatology Life Quality Index; GHQ-12, General Health Questionnaire-12.