

PAPER

The Patient Reported Outcomes in Lupus (PATROL) study: role of depression in health-related quality of life in a Southern California lupus cohort

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This study examines the relationship between psychosocial factors, ethnicity, disease activity and quality of life in systemic lupus erythematosus. *Methods:* One hundred and twenty-five adult Caucasian and Hispanic lupus patients were recruited from four Southern California medical centers. Linear regression analysis was performed to assess the correlation of ethnicity, socioeconomic factors (age, income), and disease activity (patient and physician reported), as well as psychological (depression, internality, helplessness) variables with quality of life (QOL) as measured by the Short Form (SF)-36. Hierarchical multiple regression analysis was then used to determine the stepwise contribution of the above determinants on the eight domains of the SF-36 questionnaire. *Results:* Depression negatively correlated with QOL in both Caucasians ($r = -0.488$ to -0.660) and Hispanics ($r = -0.456$ to -0.723). Patient-reported disease activity was moderately related ($r = -0.456$ to -0.698) to seven of the eight SF-36 domains in Hispanics, and none in Caucasians. Physician-reported disease activity, measured by SLEDAI, did not correlate with QOL among Hispanics or Caucasians. When linear and hierarchical regression was used, depression significantly correlated ($p < 0.0001$) with the majority of the SF-36 domains, except general health, while age had a significant effect in only one domain of the SF-36, physical functioning ($p < 0.0001$). *Conclusion:* Depression, and not disease activity, appears to have a major influence on quality of life in both Hispanic and Caucasian patients in this lupus cohort. *Lupus* (2011) **20**, 1285–1292.

Key words: depression, quality of life, systemic lupus erythematosus

Introduction

Systemic lupus erythematosus (SLE) is a complex inflammatory, autoimmune disease, characterized by production of autoantibodies against various nuclear antigens and involvement of multiple organ systems. Advances in the treatment of this condition made in the last decade have led to an increase in favorable prognoses for patients with SLE. Since SLE is a chronic disease, quality of life is an important factor in patients' overall health and a greater understanding of the impact

of the illness on patients is needed.¹ Health-related quality of life (HRQoL) is a primary concern with chronic conditions and is often used as a research outcome measure in both clinical and observational studies. HRQoL is a particularly relevant outcome in chronic disease, in which a cure may be unavailable and health goals involve living with, and managing, one's condition.

Health-related quality of life in lupus was found to be significantly worse in comparison with patients suffering from other chronic diseases such as heart failure.² Disease activity and organ-system damage were poor indicators of quality of life in some SLE studies.^{3,4} In a longitudinal study, Kuriya et al. found that Short Form (SF)-36 scores changed little over an 8-year period, and were not affected by disease activity or damage accumulation.⁵ A study by Thumboo et al.⁶

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suggests that psychosocial and behavioral factors (e.g. helplessness) may be associated with quality of life in patients with SLE. Other studies have found predictors of poor self-reported quality of life to include socioeconomic–demographic, psychological, behavioral, and cultural variables.⁷ A study by Friedman *et al.* examined patients' self-perceived functional levels and found that patients' reported level of functioning was more closely associated with their attitudes toward their disease than with objective measures of disease activity or organ damage.⁸ The results of these studies indicate the importance of utilizing patients' self-reported instruments when examining SLE outcome measures, as these may differ greatly from objective measurements made by physicians.

SLE appears to be predominant in certain ethnic groups, rendering this medical condition particularly suitable for studying the topic of health disparities in musculoskeletal disease. There is growing evidence to indicate that genetic and environmental factors affect outcomes observed in patients with SLE and that the influence of these factors may differ depending on ethnicity.⁹ The LUMINA (Lupus in Minorities, Nature vs. Nurture) study showed that Texan Hispanics and African Americans tend to have worse intermediate and final outcomes than Caucasian and Puerto Rican patients. The study also showed that socioeconomic, psychosocial, clinical, and genetic factors may contribute to the ethnic disparities observed.¹⁰ In the model promoted by LUMINA, both genetic and nongenetic factors accounted for the differences observed between ethnic groups. Genetic factors played an important role in the early stages of disease, compared with psychosocial factors such as maladaptive coping strategies, lack of health insurance, and inadequate social support, which emerged as important contributors in later disease stages.¹⁰

The role of psychosocial factors in systemic lupus erythematosus has been reviewed by Seawell *et al.*¹¹ Anxiety and depression were found to be highly prevalent in lupus. In addition, a major finding of this review was that psychological distress was found to be the best predictor of quality of life in patients with SLE.^{12,13} However, a limitation of previous studies is that they have lacked a theoretical perspective that examines the role of ethnicity along with other factors as predictors of quality of life. Building on this literature, our study adopted an integrated model in which the independent and relative contributions of disease activity, socioeconomic, and psychosocial factors as determinants of quality of life in two ethnically diverse

lupus cohorts from Southern California were examined.

Patients and methods

One hundred and twenty-five adult Caucasian and Hispanic lupus patients from four medical centers from the greater Southern California area (Cedars-Sinai Medical Center, Harbor-UCLA Medical Center, Los Angeles County/USC Medical Center, and Loma Linda University Medical Center) were recruited. Each center recruited approximately 30 subjects, giving a total of 60 Hispanic (45 Hispanic/Mexican and 15 Hispanic/non-Mexican) and 65 Caucasian patients. The patients had to be over 18 years of age and meet at least four of the 11 ACR criteria for SLE.^{14,15} During their scheduled clinic visit, the patients were asked to complete a battery of either self-reported instruments in the English language or the equivalent Spanish instruments for the Spanish-speaking patients, in order to assess disease activity, quality of life, damage, and psychosocial adjustments due to illness. Additionally, sociodemographic data were obtained, including age, household income, and years of formal education.

Disease activity was assessed from both the patient and the physician perspective. Patient-reported disease activity was evaluated by the Systemic Lupus Activity Questionnaire (SLAQ), a questionnaire developed by Karlson *et al.* based on items from the physician-administered Systemic Lupus Activity Measure (SLAM).¹⁶ The SLAQ has been shown to have adequate reliability and construct validity.¹⁷ The SLAQ questionnaire was translated into Spanish by trained, professional interpreters. Physician-reported disease activity was assessed at the time of the visit using the SLE disease activity index (SLEDAI), a well-known validated disease activity measure in SLE studies.¹⁸ A SLEDAI score of greater than 3 was considered to be indicative of active disease.

Psychological measures included the Helplessness (five items) and Internality (seven items) subscales of the Rheumatology Attitudes Index (RAI), and the Patient Health Questionnaire (PHQ-9). The complete RAI is a 15-item questionnaire modified from the Arthritis Helplessness Index¹⁹ to apply to rheumatologic conditions other than rheumatoid arthritis. A study by Engle *et al.*²⁰ demonstrated support for the external validity of the RAI in SLE and also suggested that the learned helplessness index

may be relevant to the outcomes of morbidity and mortality in patients with SLE. The PHQ-9, a self-report measure of depression, is based on the nine criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-IV) for the diagnosis of clinical depression. Both the English and Spanish versions were developed by Kroenke *et al.*²¹ and have been determined to be reliable screening measures for depression.²²

In order to examine patients' perceived quality of life, the English and Spanish versions of the SF-36 outcome measure were administered.²³ The SF-36 questionnaire measures quality of life in eight areas of perceived health: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health.²⁴

The statistical analysis was performed using both linear and hierarchical multiple regression analyses. In the hierarchical multiple regression analysis, the model that we used involved four steps. The analysis was performed for each of the eight domains of the SF-36, in order to evaluate the stepwise contribution of independent variables. Predictor variables were entered into the equation in the following sequence. Ethnicity was entered at step 1. At step 2, annual income, age, and education (sociodemographic factors) were introduced. At step 3, SLAQ and SLEDAI (disease activity measurements) were added. Finally, at step 4, psychological measurements of depression (PHQ-9), helplessness and internality (RAI) were included in the analysis. In this manner, the independent contribution of psychological variables was examined after the effects of all prior variables had been evaluated.

In order to avoid the risk of a type I statistical error in the multiple comparisons that we performed, the Simes correction, a derivative of the Bonferroni procedure,^{25,26} was applied to all the *p* values for each of the analyses performed. Only the *p* values that were found to be statistically significant after application of the Simes correction were considered in reporting the results.

Results

One hundred and twenty-five patients participated in the study. The baseline demographic characteristics of SLE subjects enrolled in the study are illustrated in Table 1. There were 119 women and six men enrolled in the study, with a mean age of 44.2 years. Caucasian patients in our cohort were older, reported a higher income and level of education,

had more self-reported disease activity as assessed by SLAQ, and were found to be more depressed than Hispanics. No other significant differences between the two ethnic groups were found.

In the first part of the statistical analysis, linear multiple regression analysis was performed for the eight domains of the SF-36 questionnaires. The results are shown in Table 2. The statistically significant results are shown in bold. The majority of the SF-36 domains correlated negatively with depression, except for the SF-36 general health domain. Age had a negative correlation with physical function, while internality was positively correlated with pain and general health. Patient-reported disease activity was negatively correlated with social functioning. Of note, no correlation was observed between physician-assessed disease activity, ethnicity, education, income, or helplessness and any of the outcome variables from the SF-36.

When we examined the two individual ethnic groups, Caucasian and Hispanic, some significant differences were observed. Internality was a major determinant in Caucasian patients, positively correlating with all the SF-36 outcome measures, as opposed to Hispanics, in whom no correlation was observed. SLAQ scores were not correlated with any of the SF-36 measures in the Caucasian population; however, in the Hispanic patients, SLAQ scores were correlated with the majority of outcome measures, general health excepted. Depression was negatively correlated with the majority of the SF-36 outcome measures in both ethnic groups. Again, no correlation was observed between SLEDAI and any of the SF-36 subscales in either of the two ethnic groups. The results of the statistical analysis are illustrated in Tables 3 and 4. The significant values are shown in bold.

Finally, hierarchical multiple regression analysis was performed for each of the eight domains of the SF-36 questionnaires, as outlined in the Methods section. The results of the statistical analysis are summarized in Table 5. Only the statistically significant values are shown.

At the first step of the regression analysis, ethnicity did correlate with some of the SF-36 domains, such as role physical, vitality, and general health. However, at the second step of the regression analysis the correlation with ethnicity was lost. Age was found to have a negative correlation with physical functioning, which persisted throughout the remainder of the hierarchical analysis. The main determinant at this stage was SLAQ, which had a negative correlation with all the variables, except general health. At the fourth step of the analysis, when depression, internality, and

Table 1 Demographics

	Total (n = 125)	Caucasian (n = 65)	Hispanic (n = 60)	t test
Age (years)	44.2 (SD = 13.25)	46.68 (SD = 14.31)	41.422 (SD = 11.43)	2.26*
SLEDAI	3.43 (SD = 3.55)	3.71 (SD = 3.49)	3.18 (SD = 3.61)	0.821
SLAQ	19.6 (SD = 14.37)	27.41 (SD = 13.99)	11.16 (SD = 8.86)	7.56***
Internality	23.76 (SD* = 5.99)	23.18 (SD = 5.69)	24.45 (SD = 6.25)	-1.19
Helplessness	15.2 (SD = 4.17)	15.25 (SD = 4.07)	15.22 (SD = 4.31)	0.04
PHQ-9 Sum	7.92 (SD = 6.12)	9.43 (SD = 6.81)	6.55 (SD = 5.29)	2.62**
Highest grade	11.5 (SD = 4.75)	15.02 (SD = 2.72)	7.82 (SD = 3.4)	12.98***
Annual income	4.47 (SD = 2.58)	5.86 (SD = 2.32)	2.82 (SD = 2.82)	7.62***

SD: standard deviation, SLAQ: Systemic Lupus Activity Questionnaire.

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

Table 2 Linear Regression

Variable		SF-36 PhFx	SF-36 R/PH	SF-36 R/EH	SF-36 NGR/F	SF-36 EMO	SF-36 SOC	SF-36 Pain	SF-36 GH
Age	β^a	-0.322	-0.087	-0.138	-0.151	-0.082	-0.012	-0.082	0.050
	p^b	0.0001	0.301	0.089	0.040	0.280	0.874	0.273	0.563
Annual income		-0.158	0.026	-0.053	-0.048	0.076	0.127	0.147	0.001
		0.082	0.791	0.573	0.576	0.391	0.145	0.091	0.995
Highest grade		0.064	-0.136	-0.004	-0.082	0.114	0.110	-0.103	-0.005
		0.598	0.307	0.974	0.477	0.341	0.349	0.380	0.973
Ethnicity		0.030	-0.059	-0.160	0.091	-0.118	-0.144	-0.061	0.143
		0.814	0.668	0.228	0.446	0.345	0.238	0.618	0.311
SLEDAI		0.064	0.082	-0.079	0.063	0.028	-0.028	0.039	0.025
		0.395	0.318	0.313	0.372	0.703	0.694	0.585	0.766
SLAQ		-0.071	-0.150	-0.149	-0.078	-0.129	-0.265	-0.214	0.011
		0.459	0.153	0.140	0.390	0.171	0.005*	0.021	0.916
PHQ-9		-0.421	-0.367	-0.493	-0.450	-0.572	-0.594	-0.424	-0.273
		0.0001	0.007						
Helplessness		-0.088	-0.068	0.110	-0.047	0.028	0.136	-0.108	0.208
		0.337	0.494	0.247	0.583	0.749	0.121	0.220	0.041
Internality		0.238	0.112	0.099	0.189	0.138	0.038	0.253	0.297
		0.104	0.239	0.279	0.023	0.110	0.653	0.003	0.003

PHQ: Patient Health Questionnaire, SF: Short Form, SF EMO: SF 36 Emotional Health, SF GH: SF 36 General Health, SF NGR/F: SF 36 Vitality, SF Pain: SF-36 Bodily Pain, SF PhFx: SF 36 Physical Function, SF R/EH: SF 36 Role Emotional, SF R/PH: SF 36 Role Physical Function, SF SOC: SF 36 Social Functioning, SLAQ: Systemic Lupus Activity Questionnaire.

^a β standardized coefficient, ^b p value. The values marked in bold are statistically significant after applying the Simes correction.

Table 3 Caucasian Correlations

Variable		SF-36 PhFx	SF-36 R/PH	SF-36 R/EH	SF-36 NGR/F	SF-36 EMO	SF-36 SOC	SF-36 Pain	SF-36 GH
PHQ-9	β^a	-0.502	-0.488	-0.517	-0.569	-0.660	-0.561	-0.506	-0.478
	p^b	0.0001							
Internality		0.474	0.305	0.288	0.521	0.339	0.309	0.557	0.563
		0.0001	0.017	0.024	0.001	0.007	0.014	0.0001	0.0001
Helplessness		-0.309	-0.275	-0.125	-0.276	-0.336	-0.204	-0.431	-0.351
		0.014	0.032	0.338	0.028	0.007	0.112	0.0001	0.005
SLEDAI		0.041	0.050	-0.079	-0.008	-0.024	-0.179	-0.063	-0.100
		0.755	0.709	0.558	0.950	0.853	0.175	0.637	0.448
SLAQ		-0.129	-0.147	-0.191	-0.143	-0.185	-0.289	-0.223	-0.124
		0.315	0.259	0.141	0.265	0.146	0.023	0.081	0.332

PHQ: Patient Health Questionnaire, SF: Short Form, SF EMO: SF 36 Emotional Health, SF GH: SF 36 General Health, SF NGR/F: SF 36 Vitality, SF Pain: SF-36 Bodily Pain, SF PhFx: SF 36 Physical Function, SF R/EH: SF 36 Role Emotional, SF R/PH: SF 36 Role Physical Function, SF SOC: SF 36 Social Functioning, SLAQ: Systemic Lupus Activity Questionnaire.

^a β standardized coefficient, ^b p value. The values marked in bold are statistically significant after applying the Simes correction.

Table 4 Hispanic Correlations

Variable		SF-36 PhFx	SF-36 R/PH	SF-36 R/EH	SF-36 NGR/F	SF-36 EMO	SF-36 SOC	SF-36 Pain	SF-36 GH
PHQ-9	β^a	-0.504	-0.456	-0.534	-0.533	-0.571	-0.723	-0.668	-0.240
	p^b	0.0001	0.070						
Internality		0.061	0.145	0.371	0.269	0.298	0.206	0.266	0.123
		0.670	0.278	0.004	0.045	0.029	0.121	0.042	0.359
Helplessness		-0.263	-0.149	0.009	-0.077	-0.074	-0.080	-0.073	-0.162
		0.059	0.264	0.944	0.573	0.595	0.549	0.583	0.224
SLEDAI		0.171	0.089	-0.090	0.126	0.067	0.134	0.088	0.086
		0.240	0.519	0.511	0.369	0.642	0.330	0.518	0.534
SLAQ		-0.456	-0.557	-0.518	-0.533	-0.519	-0.658	-0.698	-0.197
		0.0001	0.143						

PHQ: Patient Health Questionnaire, SF: Short Form, SF EMO: SF 36 Emotional Health, SF GH: SF 36 General Health, SF NGR/F: SF 36 Vitality, SF Pain: SF-36 Bodily Pain, SF PhFx: SF 36 Physical Function, SF R/EH: SF 36 Role Emotional, SF R/PH: SF 36 Role Physical Function, SF SOC: SF 36 Social Functioning, SLAQ: Systemic Lupus Activity Questionnaire.

^a β standardized coefficient, ^b p value. The values marked in bold are statistically significant after applying the Simes correction.

helplessness were added to the analysis, SLAQ was no longer related to the outcome measures, except for social functioning. Age remained negatively correlated with physical function. Internality was positively correlated with pain and general health. Depression was the major determinant at this level, and negatively correlated with all the eight domains of SF-36. No other determinants showed any correlation with the SF-36 domains, including ethnicity and physician-assessed disease activity as measured by the SLEDAI score in our patient population.

Discussion

In our study, we evaluated the impact of ethnicity, age, disease activity, and psychological factors on the quality of life in lupus patients as assessed by the eight domains of the SF-36 questionnaire. We used a hierarchical model in which the variables were added in a stepwise manner, in order to determine the contribution of each new group of variables over the previous ones.

Ethnicity did not strongly correlate with any of the domains of the SF-36 questionnaire. However, when the two ethnic groups were examined separately, a strong correlation of SF-36 with internality was observed in Caucasians, as opposed to Hispanics, in whom patient-reported disease activity, as measured by SLAQ, was correlated with all the SF-36 domains, except general health. Importantly, in both ethnic groups, depression was a major determinant of quality of life.

The most interesting phenomenon was observed in the hierarchical regression analysis, in which SLAQ arose as the major determinant in the third

step of the analysis, correlating with all the outcome variables except general health. However, when the psychological variables were added at the fourth step of the analysis, SLAQ lost its contribution, and depression became the major determinant for all the eight domains of SF-36. This suggests that the major factor influencing quality of life in our analysis was depression, and that the effect of the SLAQ on the preceding step was accounted for by depression.

We did not find any relationship between quality of life and socioeconomic status, as measured by annual income, or with physician-assessed disease activity measured by the SLEDAI score in our patient population. Note, however, that the mean SLEDAI scores were close to 3 in both ethnic groups, indicating relatively low disease activity as assessed by the physician. Such low disease activity could have played some role in diminishing the relationship between SLEDAI and SF-36 scores. The apparent lack of correlation between certain measures of disease activity, such as SLEDAI, and quality of life in lupus patients as measured by SF-36 has been observed in other studies,²⁷⁻²⁹ and one explanation could be that the patients were evaluating disease activity based on their psychological and physical well-being, as opposed to physicians, who rated disease activity using clinical and physical signs and symptoms of lupus.²⁸ Other authors have found a relationship between SF-36 and lupus disease activity as measured by SLAM or the British Isles Lupus Assessment Group (BILAG).^{30,31} The SLAQ score is derived from the SLAM, eliminating the questions that pertain to the physician and making it a patient-reported measure. In our study, the influence of SLAQ on all domains of SF-36 was lost after the addition of

Table 5 Hierarchical Regressions

	Variable		SF-36 PFx	SF-36 R/PH	SF-36 R/EH	SF-36 NGR/F	SF-36 EMO	SF-36 SOC	SF-36 Pain	SF-36 GH
Step1	Ethnicity	β^a	0.242	0.222	0.114	0.375	-0.008	-0.009	0.188	0.217
		p^b	0.105	0.013	0.207	0.0001	0.928	0.918	0.035	0.015
Step2	Ethnicity		0.201	0.124	0.007	0.277	0.097	0.059	0.182	0.287
			0.145	0.392	0.961	0.043	0.512	0.691	0.212	0.051
	Annual income		0.153	0.011	-0.085	-0.063	0.052	0.078	0.123	0.007
			0.139	0.918	0.438	0.538	0.641	0.485	0.261	0.952
	Age		-0.351	-0.122	-0.162	-0.198	-0.122	-0.038	-0.138	-0.022
Step3	Ethnicity		0.0001	0.187	0.083	0.023	0.195	0.692	0.138	0.982
			0.107	-0.105	-0.251	-0.031	0.133	0.043	-0.062	0.088
		0.424	0.454	0.802	0.814	0.354	0.765	0.659	0.535	
	Annual income		0.085	-0.017	-0.139	0.148	-0.065	-0.150	-0.009	0.207
			0.546	0.910	0.342	0.283	0.661	0.294	0.948	0.174
	Annual income		0.178	0.041	-0.058	-0.036	0.084	0.120	0.162	0.022
			0.081	0.699	0.584	0.715	0.428	0.245	0.114	0.840
	Age		-0.347	-0.115	-0.177	-0.196	-0.124	-0.045	-0.139	-0.006
			0.0001	0.199	0.051	0.021	0.170	0.609	0.110	0.948
		Highest grade		0.138	-0.071	0.033	0.006	0.188	0.121	0.000
Step4	Ethnicity		0.296	0.606	0.810	0.961	0.178	0.370	0.999	0.405
			0.017	0.038	-0.125	0.006	-0.031	-0.073	-0.027	-0.038
		0.843	0.665	0.155	0.941	0.725	0.391	0.752	0.679	
	SLAQ		-0.277	-0.334	-0.360	-0.309	-0.389	-0.507	-0.459	0.192
			0.007	0.002	0.001	0.002	0.0001	0.0001	0.0001	0.079
	Annual income		0.041	-0.057	-0.156	0.096	-0.102	-0.159	-0.078	0.123
			0.745	0.679	0.237	0.421	0.409	0.189	0.517	0.380
	Annual income		0.160	0.027	-0.052	-0.047	0.079	0.125	0.145	-0.003
			0.079	0.786	0.581	0.578	0.373	0.150	0.096	0.976
	Age		-0.320	-0.088	-0.139	-0.150	-0.081	-0.015	-0.084	0.048
		0.0001	0.301	0.088	0.042	0.287	0.845	0.259	0.575	
	Highest grade		0.071	-0.134	-0.001	-0.080	0.124	0.102	-0.113	-0.017
			0.560	0.310	0.992	0.487	0.300	0.384	0.332	0.900
	SLEDAI		0.064	0.082	-0.081	0.064	0.027	-0.029	0.039	0.026
			0.394	0.320	0.306	0.368	0.713	0.686	0.586	0.755
	SLAQ		-0.069	-0.149	-0.147	-0.078	-0.125	-0.267	-0.217	0.007
			0.470	0.155	0.144	0.390	0.183	0.004	0.019	0.951
	Internality		0.103	0.112	0.097	0.190	0.135	0.038	0.254	0.301
			0.240	0.242	0.290	0.022	0.117	0.654	0.003	0.002
	Helplessness		-0.087	-0.067	0.112	-0.047	0.031	0.135	-0.109	-0.210
			0.341	0.497	0.241	0.582	0.731	0.122	0.213	0.038
	PHQ9		-0.421	-0.368	-0.497	-0.448	-0.575	-0.597	-0.425	-0.268
			0.0001	0.008						

PHQ: Patient Health Questionnaire, SF: Short Form, SF EMO: SF 36 Emotional Health, SF GH: SF 36 General Health, SF NGR/F: SF 36 Vitality, SF Pain: SF-36 Bodily Pain, SF PhFx: SF 36 Physical Function, SF R/EH: SF 36 Role Emotional, SF R/PH: SF 36 Role Physical Function, SF SOC: SF 36 Social Functioning, SLAQ: Systemic Lupus Activity Questionnaire.

^a β standardized coefficient, ^b p value. The values marked in bold are statistically significant after applying the Simes correction.

psychological variables, indicating that in our cohort the major influence on quality of life in lupus was related to psychological factors, such as depression.

Several studies have analyzed differences in HRQoL among various ethnic groups. In particular, the Lupus in Minority Populations, Nature versus Nurture (LUMINA) study used the SF-36 to examine quality of life in three ethnic groups (African American, Hispanic, and Caucasian). Baseline mental health was found to be better in

Caucasians than in non-Caucasians; however, physical health was equally impaired in all three groups.⁸ Other researchers found no influence of ethnicity on HRQoL, and the proposed explanation for the lack of difference between ethnic groups was attributed to the fact that the impact of ethnicity on HRQoL is likely to be mediated by socioeconomic factors.⁶ However, the relationship between ethnicity and socioeconomic factors appears to be complex, as suggested by another study from the LUMINA group. In that study,

African American ethnicity was related to poorer quality of life in some subscales of the SF-36, but poverty and poor social support, irrespective of ethnicity, strongly predicted worse HRQoL.⁷ In our lupus cohort, we did not find any correlation between ethnicity or socioeconomic status, as assessed by annual income, and quality of life. An interesting observation in the first part of the analysis was that, in the Hispanic population, the SLAQ negatively correlated with a majority of outcome measures, general health excepted, as opposed to the Caucasian population, in which none of the SF-36 subscales was found to be correlated with SLAQ. The significance of this finding is yet to be determined. In the second part of the analysis, the influence of ethnicity was lost as the psychosocial variables were added. This supports the hypothesis that ethnicity does not play a direct role in quality of life in our lupus patients, and that its influence may be explained by psychological variables.

Age was a negative predictor of quality of life in our study, especially in the domain of physical function. Several studies^{8,28,32} support our findings in the physical health domain.

Our study is the first to examine quality of life in a multiethnic lupus cohort from Southern California. Age had a strong correlation with physical function, and depression was found to be strongly correlated with the majority of the SF-36 subscales in both linear and hierarchical regressions, which supports the robustness of our results. Depression was the major determinant of quality of life in all domains of SF-36 in this lupus cohort. Disease activity and ethnicity were not correlated with quality of life, supporting findings from previous research.³³ Thus, our study highlights the importance of identifying and treating depression in lupus patients in order to improve their quality of life. In a prior analysis from our study group,³⁴ depression predicted worsening self-reported disease activity in the same patient cohort, suggesting the role of depression in lupus health outcomes in general. The findings in our study are further supported by the literature. In an Italian lupus cohort, anxiety and depression, along with pain, were reported to be the major determinants of quality of life.³⁵ An interesting perspective on the role of depression in lupus was provided in a recent article by Greco et al.³⁶ The authors found a significant association between depression and coronary artery calcifications in lupus patients. The association was mediated by body mass index (BMI), suggesting that depression and obesity may contribute to the inflammation in lupus, thereby increasing the risk

of coronary artery disease. Thus, it is possible that depression may negatively affect quality of life through inflammatory mechanisms that, in turn, affect the lupus disease process.

One of the limitations of our present study concerns the cross-sectional nature of the data, which did not allow an evaluation of the interrelationship between variables over time. Longitudinal research that examines the contribution of depression and disease activity to quality of life over time would address this concern. In addition, the modest sample size made it difficult to draw comparisons between ethnic groups, although, when ethnic differences were found in this study, their effects were largely accounted for by other variables. Another possible limitation is that the patients were recruited from academic centers only, and had low disease activity scores, thus limiting the generalization of the findings to patients in the community or to those with untreated disease. Nevertheless, the results from this initial study highlight the role of depression as a potential determinant of health outcomes in lupus and the importance of detecting and managing depression in rendering lupus care.

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Conflict of interest

None declared.

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