Title

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Educational and vocational outcomes of adults with childhood- and adult-onset systemic lupus erythematosus: 9 years of follow-up

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Abstract

Objective—To compare educational and vocational outcomes among adults with childhood-onset SLE (cSLE) and adult-onset SLE (aSLE).

Methods—Data derive from the 2002–2010 cycles of the Lupus Outcomes Study, a longitudinal cohort of 1204 adult subjects with SLE. Subjects age 18–60 living in the U.S. (N=929) were included in the analysis, and were classified as cSLE if age at diagnosis was <18 years (N=115). Logistic regression was used to assess the unadjusted and adjusted effect of cSLE, gender, race/ethnicity, baseline age, urban or rural location and U.S. region on the likelihood of completing a bachelor's degree. Generalized estimating equations were used to assess the effect of cSLE, demographics, education, and disease-related factors on the odds of employment, accounting for multiple observations over the study period.

Results—Subjects with cSLE were on average younger (29±10 versus 44±9 years), with longer disease duration (15±10 versus 11±8 years). Subjects with aSLE and cSLE subjects were equally likely to complete a bachelor's degree. However, subjects with cSLE were significantly less likely to be employed, independent of demographic and disease characteristics (OR 0.62, 95% CI 0.42–0.91).

Conclusion—While subjects with SLE are just as likely as those with aSLE to complete college education, cSLE significantly increases the risk of not working in adulthood, even when controlling for disease and demographic factors. Exploring reasons for low rates of employment and providing vocational support may be important to maximize long-term functional outcomes in patients with cSLE.

INTRODUCTION

The prognosis for children diagnosed with systemic lupus erythematosus (SLE) has improved dramatically over the past several decades (1–4), with estimated 5-year survival rates increasing from <50% to >95% (5). This is believed to be due to earlier diagnosis, improvements in therapy, and multidisciplinary care. As more children with SLE survive

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into adulthood, long-term educational and vocational outcomes become increasingly important.

Longitudinal studies of adults with various childhood-onset chronic illnesses suggest that these individuals are at risk for poorer educational attainment and lower rates of employment, leading to lower rates of insurance coverage and poorer access to care (6, 7). Recent data from the National Longitudinal Study of Adolescent Health suggest that while young adults with childhood cancer, heart disease, diabetes or epilepsy are equally likely to marry, live independently and be engaged in romantic relationships as compared to their healthy peers, their vocational outcomes are poorer. Adults with childhood-onset chronic illness are less likely to graduate from college, less likely to be employed, and more likely to receive public assistance. Their mean income is also significantly lower (8, 9).

Little is known about the long-term educational and vocational outcomes of adults with childhood-onset SLE (cSLE). One small, retrospective study assessed 64 young adult subjects, of whom 88% had completed high school, and 55% had gone on to enroll in or complete college (10). Twenty-five percent were employed full-time, and over 70% lived in a household with total annual income below $30,000. However, follow-up was variable (range 1–26 years, mean 13.6 years) and complete data were only available on 29 of the original 64 patients included in the study.

Studies of social and vocational outcomes among young adults with juvenile idiopathic arthritis (JIA), the most common rheumatic disease of childhood, show a more mixed picture. Multiple studies suggest that educational outcomes are equivalent between young adults with JIA and their healthy peers. Studies comparing JIA patients in their late teens and early twenties with healthy peers have shown similar employment outcomes (11–13), but studies focusing on older populations have found higher rates of unemployment among subjects with JIA (14–17). This may reflect recent improvements in therapy that have successfully decreased disability among the younger generation of JIA patients, while disability may have significantly impacted employment status among older adults with JIA. Additionally, outcomes may differ significantly between JIA and lupus patients, due to differences in disease manifestations, demographics, and long-term health outcomes.

The primary objective of this study was to compare educational and vocational outcomes among adults with cSLE and adult-onset SLE (aSLE), using data from the University of California, San Francisco (UCSF) Lupus Outcomes Study (LOS). We anticipated that individuals with cSLE would have worse outcomes than those with aSLE, and that these outcomes would be associated with greater disease morbidity and minority race/ethnicity. Better understanding of what modifies vocational attainment will allow us to tailor interventions to maximize vocational and educational outcomes.

PATIENTS AND METHODS

Data Source

The study cohort consisted of 1204 individuals participating in the 2002–2010 interviews of the LOS, an ongoing longitudinal survey of persons with SLE from the United States.

Details regarding eligibility and enrollment of participants have been described elsewhere (18). Briefly, subjects previously enrolled in the UCSF Lupus Genetics Project (19) were invited to enroll in the LOS. The genetics study participants had been recruited from both clinical and community-based sources nationwide: 25% from UCSF-associated clinics, 11% from non-UCSF rheumatology offices, and 64% from various community-based sources (e.g., lupus support groups, conferences, newsletters, websites). All participants had a confirmed diagnosis of SLE according to chart review supervised by a rheumatologist. Subjects participated in annual structured telephone interviews conducted by trained interviewers. The survey included validated items pertaining to demographic and socioeconomic characteristics, SLE disease activity and manifestations, medications, general health, mental health, cognition, employment, health care utilization, and health insurance coverage. Few LOS subjects have been lost to follow-up, with an annual re-interview rate of 93%. The study protocol was approved by the UCSF Committee on Human Research.

Measures

The primary outcomes for this analysis were completion of a four-year college degree and employment status. Subjects were defined as having completed a bachelor's degree if they reported having attained a bachelor's degree or higher in any interview of the LOS, even if they had not yet completed their education at baseline. Subjects were considered to be employed if they reported currently working, currently having a job but not working, or having performed any work for pay or profit in the past week. This definition is consistent with the Current Population Survey, the source of the nation's employment statistics (20). Employment status was classified at each interview. Individuals who were not employed were further classified as looking for work, keeping house, going to school, unable to work, retired, or other.

The primary predictor variable was cSLE, defined as age at diagnosis of less than 18 years. Additional disease-related predictor variables used in the employment analysis assessed disease duration, disease activity, renal damage and physical function, at baseline and all subsequent interviews. Disease activity was defined according to the Systemic Lupus Assessment Questionnaire (SLAQ), a validated self-report measure with possible scores ranging from 0 to 47 and higher scores representing increasing disease activity (21). Measures of renal damage included a history of dialysis or transplant. These self-report measures were validated in this cohort in a prior study via chart review of significant renal outcomes, including a history of biopsy, dialysis, and transplant, with high agreement observed (kappa coefficient > 0.80) between self-reported outcomes and those documented in the medical record (22). They were included here because the SLAQ does not assess renal involvement. The Short Form 36 Scale of Physical Function (SF36-PF), a continuous 0–100 scale, was used to assess physical function, with increasing scores representing a higher level of function (23). Disease-related variables were measured at each observation.

Sociodemographic predictors included age, sex, race/ethnicity, rural or urban residence and U.S. region. Marital status and education were also included as predictors in the employment analysis. Race/ethnicity was categorized as white, African American, Hispanic/Latino, Asian/Pacific Islander, and Other. In the multivariate analyses, race/ethnicity was

dichotomized as white or non-white (including African American, Hispanic/ Latino, Asian/ Pacific Islander, and other). Rural and urban classification was defined according to previously described methodologies (24), and U.S. region was defined as Northeast, Midwest, South or West according to U.S. Census classification. For employment analyses, education was defined as having attained a bachelor's degree or higher at the time of observation. Year of interview was also included as a predictor to account for temporal trends in employment.

Study sample

For the current analyses, we included data from all interviews from participants under age 60 and residing in the United States at the time of interview (N=1018). We excluded observations from subjects over age 60 years at the time of interview in order to maximize age overlap between aSLE and cSLE groups, as all subjects with cSLE were age 60 years old or younger at the time of final follow-up. We excluded subjects who were residing outside the U.S. at the time of interview, as country of residence would be expected to significantly impact employment and education outcomes. An additional 89 (9%) of subjects were dropped for missing responses to key disease activity variables. These subjects were less likely to have attained a bachelor's degree and were more likely to have had dialysis than the retained subjects, but they did not differ in the proportion of childhood-onset disease. The final sample size was 929. For the analysis of educational attainment, we included a single observation for each subject. For the analysis of employment outcomes, which are subject to year-to-year variation, each participant could contribute observations from up to nine interviews, for a total of 4967 observations in the final analysis.

Statistical analysis

Baseline characteristics of the cSLE and aSLE groups were summarized using means, medians, SDs and proportions, and were compared with bivariate statistics (Student's t-test, rank sum and chi-square test), as appropriate.

For the analysis of educational attainment, we used logistic regression to assess the unadjusted and adjusted effect of cSLE, gender, non-white race/ethnicity, baseline age, urban/rural residence and U.S. region on the likelihood of completing a bachelor's degree prior to or during the study. Disease-related covariates were not included in this analysis, as the majority of aSLE subjects are likely to have completed their education prior to onset of SLE.

For the longitudinal analysis of employment status, we calculated adjusted and unadjusted odds ratios for employment across all nine waves of the LOS, using generalized estimating equations to account for multiple observations contributed by the same individual. Childhood-onset SLE, race/ethnicity and gender were included as fixed covariates. Time-varying predictors included year of interview, age, completion of a bachelor's degree, urban/rural residence, U.S. region, history of dialysis, history of renal transplant, SLAQ score and SF36-PF score. To examine longitudinal patterns in cSLE versus aSLE, we added an interaction term for year of interview and childhood-onset disease to the employment model.

In addition, we calculated adjusted and unadjusted odds ratios for continuous employment across all LOS interviews among subjects with two or more interviews contributed.

We conducted several sensitivity analyses. In the models of educational attainment, we excluded 12 participants who were under age 23 at their final interview to account for subjects who may be too young to have completed a four-year college degree. We also replaced age with year of birth to more carefully assess for a cohort effect of year of birth on educational attainment. For the analysis of employment status, we excluded 161 observations during which subjects reported being currently in school, which could decrease the likelihood of being employed. We also excluded 141 observations during which subjects reported being retired, as retired individuals may be receiving a pension and medical benefits that improve their standard of living and access to health care as compared to the non-retired unemployed. Finally, we conducted an analysis comparing only young adult subjects age 25–35. All statistical analyses were performed using STATA software, version 11.0 (StataCorp, College Station, TX.)

RESULTS

Subject demographics

The study included 929 subjects with SLE between the ages of 18 and 60 at baseline and residing in the U.S., including 115 (12%) with cSLE. The characteristics of cSLE and aSLE subgroups at the time of baseline LOS interview are described in Table 1. Subjects with cSLE were on average younger, with more males (12% versus 6%, $p = 0.02$) and fewer white subjects (44% versus 62%, $p < 0.001$).

Disease characteristics and functional status

There were significant differences in clinical characteristics between aSLE and cSLE groups, consistent with previous analyses of the LOS (22). Subjects with cSLE had a longer mean disease duration (15 ± 10 versus 11 ± 8 years,) with disease duration ranging from 0 to 38 years in the aSLE group and 1 to 46 years in the cSLE group. Subjects with cSLE were also more impacted by renal disease, with a greater proportion requiring dialysis (17% versus 7%, $p < 0.001$) or a renal transplant (12% versus 4%, $p < 0.001$) at baseline, as well as prior to last follow-up. However, baseline disease activity as measured by the Systemic Lupus Activity Questionnaire was lower in cSLE subjects (mean SLAQ score 9 versus 13, $p < 0.001$), and physical function was better (mean SF36-PF score 48 versus 39, $p < 0.001$).

Education outcomes

At baseline there was no difference between aSLE and cSLE groups in likelihood of having completed a bachelor's degree, but subjects with cSLE were more likely to currently be enrolled in an educational program (Table 2). At the time of final interview there was a trend towards a difference in educational attainment between groups, with cSLE subjects more likely to have completed a bachelor's degree (50% versus 41%, $p = 0.09$). In adjusted logistic regression analysis, subjects with cSLE were marginally more likely to have completed a bachelor's degree at the time of final interview, but this difference was not statistically significant (OR 1.15, 95% CI 0.72–1.82, Table 3). Non-white subjects and

female subjects were significantly less likely to have completed a bachelor's degree. Younger subjects were significantly more likely to have completed a bachelor's degree, with decreased odds of completing a degree for every increased year of age (OR 0.98, 95% CI 0.97–1.00), which is consistent with nationwide trends (25). Finally, subjects residing in the Northeastern U.S. were significantly more likely to have completed a bachelor's degree as compared to those residing in the South, Midwest, or West, and subjects residing in rural regions were less likely to complete a bachelor's degree.

Since subjects who were younger than 23 years of age at final interview were unlikely to have had the opportunity to complete a bachelor's degree, we conducted a sensitivity analysis to assess whether the effect of cSLE on educational attainment was influenced by these younger subjects. When all subjects younger than age 23 at final interview were dropped from the analysis (N=12) there was still no significant difference in educational attainment between cSLE and aSLE groups in adjusted analysis. Since subjects were interviewed over a period of 8 years, we replaced age with year of birth in the adjusted model in order to assess for cohort effect of year of birth on educational attainment. As expected, year of birth was a significant predictor of educational attainment (OR 1.02, 95% CI 1.00–1.03), but the effect of cSLE on educational attainment remained non-significant (OR 1.10, 95% CI 0.69–1.73).

Employment outcomes

There was no difference in baseline employment status between groups in bivariate analysis, and at final LOS interview all subjects reported some history of employment. However, unemployed subjects with cSLE were significantly less likely to report being unable to work (15% versus 36%, $p < 0.001$, Table 4).

In longitudinal multivariate analysis, subjects with cSLE were significantly less likely to be employed as compared to those with aSLE (OR 0.62, 95% CI 0.42–0.91, Table 5). Younger age, Caucasian ethnicity, completion of a bachelor's degree, lower disease activity score (SLAQ) and higher physical function score (SF36-PF) were all statistically significant predictors of employment in adjusted analysis. Subjects with a history of dialysis were significantly less likely to be employed. Females were less likely than males to be employed in both unadjusted and adjusted analysis; however this finding did not reach statistical significance. The odds ratio for employment declined slightly with each interview year, although this did not reach statistical significance in the multivariate model. However, there was no significant interaction between year and cSLE ($p=0.5$, data not shown), indicating that the time trends for employment in cSLE and aSLE did not differ.

To evaluate the odds of continuous employment during all LOS interviews, we analyzed data for individuals in our cohort with two or more assessments of employment (N=924, Table 6). Individuals with cSLE were significantly less likely to be continuously employed than those with aSLE (OR 0.58, 95% CI 0.35–0.98). Subjects with worse physical function at baseline, greater SLE activity at baseline, and need for dialysis during the follow-up period were also less likely to be continuously employed, whereas individuals with a college degree were more likely to be continuously employed.

We hypothesized that a lower employment rate among subjects with cSLE could be due to the fact that many of these subjects were still completing their education and had not yet entered the workforce. Therefore, we removed 161 observations during which subjects reporting currently being in school. In this sensitivity analysis, cSLE remained an independent predictor of not being employed, though statistical significance was not achieved (OR 0.72, 95% CI 0.49–1.06). In this analysis, cSLE remained a significant independent predictor of not being employed (OR 0.66, 95% CI 0.45–0.97). Finally, when observations of retired subjects and those who were currently in school were simultaneously dropped from the analysis, cSLE was again an independent (though not statistically significant) predictor of not being employed (OR 0.77, 95% CI 0.52–1.14).

Since subjects with cSLE in the LOS are on average younger, with less time to have become established in the work force, we hypothesized that their employment status may have been disproportionately affected by the recent recession. A May 2010 report by the U.S. Congress Joint Economic Committee, near the end of our follow-up period, placed unemployment among young adults at a record 19.6% (26). Therefore, we conducted an additional sensitivity analysis comparing only young adult subjects age 25–35, with the resulting dataset containing 763 observations of 211 subjects. Again, the odds ratio for employment among individuals with cSLE remained stable, though statistical significance was not achieved with this smaller sample (OR 0.64, 95% CI 0.37–1.13).

DISCUSSION

SLE is a potentially life-threatening chronic illness with a waxing and waning course for which there is no cure. Nonetheless, due to advances in pediatric health care, the majority of individuals diagnosed with SLE in childhood now survive to adulthood. These adults face ongoing complications of chronic disease and its treatment, which may limit their ability to reach important social, educational and vocational goals. Employment outcomes are particularly important for adults in the United States, where employer-based health insurance remains the most prevalent means for financing health care among non-disabled adults (27). The aim of this study was to assess the effect of childhood-onset SLE on educational and workforce success as compared to subjects with aSLE.

The present study suggests that, among individuals with SLE, childhood-onset disease is an independent predictor of not being employed, regardless of demographic and disease characteristics. However, individuals with cSLE are equally likely to complete college as compared to their peers with aSLE. Differences in employment between groups persisted even when subjects who were currently completing educational programs were removed from the analysis, and when only young adults with aSLE and cSLE were compared. In addition, given the long disease duration of individuals with childhood-onset SLE in the LOS (mean 14.7 years), the patients with most severe disease may not have survived to entry in the study, creating a survivor effect that would bias our pediatric sample towards individuals with less severe disease. The finding that subjects with cSLE in the LOS have lower disease activity scores and better physical function scores as compared to subjects with aSLE supports the hypothesis that individuals surviving to adulthood with cSLE may

have better overall functional status as compared to those with aSLE, in spite of the finding that they are less likely to be employed.

This is the first large, prospective, longitudinal study to characterize long-term educational and vocational outcomes among adults with cSLE. Previous studies of the LOS have shown that individuals with SLE experience higher rates of work loss and lower rates of work entry as compared to the general population (28), and are more likely to exit employment completely than to scale back to part-time employment (18). These differences may be exacerbated among individuals with pediatric-onset disease, independent of disease manifestations. Lower rates of employment among individuals with childhood-onset chronic illness, as compared to those with adult onset chronic illness or healthy peers, have also been documented in recent large studies (8, 9). It is possible that individuals with cSLE are less likely to enter the workforce due to complications of their illness, whereas individuals who were successfully employed prior to onset of SLE are more likely to return to the workforce. This is supported by our observation in bivariate analysis that subjects with cSLE were significantly less likely to have ever been employed at the end of study follow-up as compared to subjects with aSLE.

The greater success of individuals with cSLE in completing college as compared to attaining employment is noteworthy. Good educational outcomes in the cSLE group are unlikely to be due to cohort effect, since controlling for year of birth instead of age did not have any substantial effect on educational outcomes in cSLE. Programs currently in place to support students with special health care needs, such as Section 504 of the Individuals with Disabilities Act and the Individuals with Disabilities Education Act, may provide sufficient support for individuals with cSLE to succeed in their educational endeavors at a level comparable to their healthy peers. However, available programs may not provide adequate preparation for work entry for individuals with cSLE. Preliminary data suggests that programs providing vocational training for students with JIA and other chronic illnesses may increase work entry (29). In addition, the workplace may not provide individuals with cSLE the necessary flexibility to succeed, possibly due to lack of adequate time off during disease flares or inability to meet physical demands of the job. Additional vocational training and workplace support for adults with childhood-onset chronic illness may be important to maximize the productivity of these individuals and allow them to secure critical health insurance coverage.

This study has important limitations. First, the LOS is not a prospective inception cohort study, and therefore may be susceptible to selection bias. Subjects with cSLE in our cohort have higher physical function scores and lower disease activity scores as compared to those with aSLE, in spite of the fact that individuals with cSLE are known to be at greater risk for long-term disease damage and mortality (30–33). This suggests that, as compared to all individuals with cSLE, subjects with cSLE in the LOS may be biased towards those with less severe disease. However, the LOS is ideal for studying the late outcomes of a rare, chronic disorder. Second, since this study relies on subject self-reported outcomes, inaccuracies in reporting may occur. This limitation has been addressed in part by validating a subset of the self-reported outcomes through chart review.

In conclusion, while adults with cSLE are as likely to complete a bachelor's degree as those with aSLE, they are less likely to be employed, independent of demographic and disease characteristics. There is a clear need to provide comprehensive support for children with cSLE and other chronic rheumatic conditions as they enter adulthood, particularly interventions to support vocational readiness. Factors preventing adults with cSLE from succeeding in the workplace merit further study, and can inform the development of successful vocational training programs. This study highlights the differences in vocational outcomes between aSLE and cSLE, and suggests that interventions beyond traditional school-based programs are warranted.

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SIGNIFICANCE AND INNOVATIONS

- This is the first large, prospective study to assess long-term educational and vocational outcomes among adults with childhood-onset systemic lupus erythematosus (cSLE).
- This study found that while adults with cSLE are as likely to complete a bachelor's degree as those with adult-onset systemic lupus erythematosus (aSLE), they are less likely to be employed, independent of demographic and disease characteristics.
- These findings suggest that current programs may be successful in helping children and young adults with lupus to succeed in the educational arena, but additional supports may be needed to promote vocational success in adulthood.

Table 1

Subject characteristics at baseline by age at SLE diagnosis in the Lupus Outcomes Study.

Variable	cSLE (N = 115)	aSLE (N = 814)	*P*
	N (%) unless noted		
Demographics			
Age in years, *mean ± SD*	29 ± 10	44 ± 9	<0.001
Female	101 (88)	762 (94)	0.02
Ethnicity			<0.001
White	51 (44)	507 (62)	
Latino	21 (18)	74 (9)	
African American	11 (10)	97 (12)	
Asian	21 (18)	83 (10)	
Other	11 (10)	53 (7)	
Rural residence	11 (10)	72 (9)	NS
US Region			NS
Northeast	9 (8)	38 (5)	
Midwest	6 (5)	63 (8)	
South	4 (3)	67 (8)	
West	96 (83)	646 (79)	
Married	43 (37)	491 (60)	<0.001
SLE characteristics			
Age at diagnosis in years, *median (range)*	15 (2–17)	32 (18–58)	<0.001
Disease duration in years, *mean ± SD*	15 ± 10	11 ± 8	<0.001
History of dialysis	20 (17)	54 (7)	<0.001
History of renal transplant	14 (12)	33 (4)	<0.001
Disease activity			
SLAQ[+], *mean ± SD*	9 ± 8	13 ± 8	<0.001
General health status			
SF36 PF[^], *mean ± SD*	48 ± 10	39 ± 13	<0.001

[+] SLAQ = Systemic Lupus Activity Questionnaire, possible range 0–47

[^] SF36-PF = SF-36 Scale of Physical Functioning, possible range 0–100.

Table 2

Bivariate analysis of education at baseline by age at SLE diagnosis.

Variable	cSLE (N = 115)	aSLE (N = 814)	*P*
	N (%)		
Highest level of education attained			0.03
Did not complete high school	7 (6)	29 (4)	
High school degree	25 (22)	105 (13)	
Some college/trade school	33 (29)	200 (25)	
Associate or Trade degree	14 (12)	150 (18)	
Bachelor's degree	24 (21)	208 (26)	
Post-graduate degree	12 (10)	122 (15)	
Currently in school	23 (20)	20 (2)	<0.001

Table 3

Odds ratios for completing a bachelor's degree among subjects age 18–60 with SLE*.

Variable	Unadjusted OR for completing a bachelor's degree (95% CI)	Adjusted OR for completing a bachelor's degree (95% CI)#
Childhood-onset SLE	1.40 (0.95–2.07)	1.15 (0.72–1.82)
Female	**0.59 (0.36–0.97)**	**0.59 (0.35–0.98)**
Age †	**0.99 (0.97–1.00)**	**0.98 (0.97–1.00)**
Nonwhite ethnicity	**0.71 (0.54–0.92)**	**0.63 (0.47–0.84)**
Rural residence	**0.46 (0.28–0.77)**	**0.45 (0.27–0.75)**
U.S. Region		
West	Referent	Referent
Northeast	**4.29 (2.19–8.41)**	**3.85 (1.95–7.60)**
Midwest	1.2 (0.73–1.97)	1.2 (0.73–2.04)
South	0.90 (0.55–1.49)	0.86 (0.51–1.45)

*OR = odds ratio; 95% CI = 95% confidence interval

#Adjusted for cSLE, gender, age and ethnicity.

†OR reported per year increase in age.

Table 4

Bivariate analysis of baseline employment status by age at SLE diagnosis.

Variable	cSLE (N = 115)	aSLE (N = 814)	*P*
	N (%)		
Employed	58 (50)	417 (51)	NS
Looking for work	8 (7)	18 (2)	**0.004**
Keeping house	7 (6)	41 (5)	NS
Going to school	23 (20)	20 (2)	**<0.001**
Unable to work	17 (15)	295 (36)	**<0.001**
Retired	0 (0)	18 (2)	NS
Other	2 (2)	4 (0.5)	NS
No response	0 (0)	1 (0.1)	NS

Table 5

Odds ratios for being employed among subjects age 18–60 with SLE*

Variable	Unadjusted OR for being employed (95% CI)	Adjusted OR for being employed (95% CI)#
Childhood-onset SLE	1.19 (0.86–1.63)	0.62 (0.42–0.91)
Female	**0.62 (0.39–0.97)**	0.80 (0.52–1.23)
Age †	**0.97 (0.97–0.98)**	**0.97 (0.96–0.98)**
Nonwhite ethnicity	**0.77 (0.61–0.97)**	**0.72 (0.56–0.92)**
Rural residence	0.79 (0.57–1.09)	0.88 (0.64–1.21)
U.S. Region		
West	Referent	Referent
Northeast	1.09 (0.63–1.88)	0.86 (0.48–1.55)
Midwest	1.21 (0.76–1.90)	1.31 (0.82–2.10)
South	0.85 (0.61–1.18)	0.86 (0.60–1.24)
Married	1.05 (0.95–1.15)	1.05 (0.93–1.19)
Education ¶	**1.90 (1.59–2.27)**	**1.84 (1.51–2.24)**
Interview year	**0.98 (0.96–0.99)**	0.98 (0.96–1.01)
Dialysis	**0.75 (0.63–0.89)**	**0.74 (0.56–0.96)**
Transplant	0.85 (0.69–1.05)	1.01 (0.70–1.46)
Disease activity (SLAQ)+	**0.96 (0.95–0.97)**	**0.98 (0.97–0.99)**
Physical function (SF36-PF)^	**1.04 (1.03–1.04)**	**1.03 (1.03–1.04)**

** OR = odds ratio; 95% CI = 95% confidence interval; SLAQ = Systemic Lupus Activity Questionnaire; SF36-PF = SF-36 Scale of Physical Functioning.

Adjusted for cSLE, gender, age, ethnicity, education, interview year, history of dialysis, history of renal transplant, SLAQ score, SF36-PF score.

† OR reported per year increase in age.

+ OR reported per unit increase in SLAQ score, possible range 0–47.

^ OR reported per unit increase in SF36-PF score, possible range 0–100.

¶ Completion of bachelor's degree.

Table 6

Odds ratios for continuous employment across all LOS interviews among subjects age 18–60 with SLE*

Variable	Unadjusted OR for continuous employment (95% CI)	Adjusted OR for continuous employment (95% CI)#
Childhood-onset SLE	0.97 (0.64–1.48)	0.58 (0.35–0.98)
Female	**0.59 (0.35–0.98)**	0.85 (0.48–1.49)
Age †	**0.98 (0.97–1.00)**	0.99 (0.97–1.01)
Nonwhite ethnicity	**0.73 (0.55–0.97)**	0.82 (0.59–1.15)
Rural residence	0.69 (0.42–1.15)	0.91 (0.51–1.62)
U.S. Region		
West	Referent	Referent
Northeast	1.28 (0.70–2.35)	0.87 (0.44–1.72)
Midwest	1.10 (0.65–1.84)	1.05 (0.58–1.88)
South	1.26 (0.76–2.09)	1.32 (0.74–2.34)
Married	1.10 (0.83–1.45)	0.97 (0.70–1.34)
Education ¶	**2.63 (1.98–3.48)**	**1.76 (1.28–2.41)**
Dialysis	**0.58 (0.35–0.97)**	**0.36 (0.15–0.86)**
Transplant	1.04 (0.61–1.76)	1.57 (0.62–3.97)
Disease activity (SLAQ)+	**0.91 (0.89–0.93)**	**0.96 (0.93–0.98)**
Physical function (SF36-PF)^	**1.07 (1.06–1.09)**	**1.05 (1.03–1.07)**

** OR = odds ratio; 95% CI = 95% confidence interval; SLAQ = Systemic Lupus Activity Questionnaire; SF36-PF = SF-36 Scale of Physical Functioning.

Adjusted for cSLE, gender, age, ethnicity, baseline education, history of dialysis, history of renal transplant, baseline SLAQ score, baseline SF36-PF score.

† OR reported per year increase in age.

+ Baseline score; OR reported per unit increase in SLAQ score, possible range 0–47.

^ Baseline score; OR reported per unit increase in SF36-PF score, possible range 0–100.

¶ Completion of bachelor's degree prior to baseline interview.