The impact of obesity and age at diagnosis on the chronic quality of life and long-term outcomes of psoriasis patients

Abstract

Background: Psoriasis is a chronic inflammatory skin disorder that detracts from quality of life, including elements of physical, psychological, and social functioning. ***Objective:*** The purpose of this study was to (1) investigate whether retrospective questions about chronic quality of life (CQoL) were better predictors of poor socioeconomic and medical outcomes than the current Dermatology Life Quality Index (DLQI) and (2) to evaluate the relative impact of body mass index (BMI) and (3) age at diagnosis on the long-term outcomes and CQoL of psoriasis patients. ***Methods***: 114 subjects were examined and asked to complete a self-administered questionnaire regarding disabilities, relationships, education, as well as medical and economic outcomes. Participants also answered the ten questions used in the Dermatology Life Quality Index (DLQI) modified to ask "over the last week," "over the last year," and "over your lifetime with psoriasis." Survey responses were compared amongst BMI groups (normal, overweight, obese) and age-at-diagnosis quartiles. ***Results***: Greater lifetime DLQI (LT DLQI) correlated with lower satisfaction with treatment (P=0.007), greater concern that psoriasis will worsen (P=0.012), worse perceived general health (P=0.003), younger age at which weight became problematic (P=0.002), greater likelihood of believing psoriasis had caused weight gain (P<0.001), shorter retention of current job (P=0.001), more experiences of discrimination at work (P=0.002) and in social settings (P<0.001) over one's lifetime, and more severe discrimination in social settings over one's lifetime (P=0.002). Greater LT DLQI predicted more packs smoked per day (P=0.005), greater likelihood of believing psoriasis caused smoking (P=0.012), greater likelihood of recreational drug use (P=0.004), greater likelihood of a depression diagnosis (P<0.001), greater likelihood

of having felt depressed (P=0.011), and greater likelihood of believing psoriasis caused depression (P<0.001). Patients with elevated BMI were more likely to rate their general health lower (P<0.001), believe that psoriasis caused their weight gain (P=0.014), experience sleep problems over their lifetime (P=0.016), hide their psoriasis over their lifetime (P=0.010), have their self-confidence affected by their psoriasis over their lifetime (P=0.011), and avoid common activities over their lifetime (P=0.012). Those diagnosed at a younger age were more likely to have a greater LT DLQI (P<0.001), have felt depressed (P=0.003), believe that their psoriasis had caused their depression (P<0.001), experience sleep problems over their lifetime (P=0.004), use recreational drugs (P<0.001), hide their psoriasis over their lifetime (P<0.001), and experience more severe discrimination in social settings over their lifetime (P=0.002). ***Conclusion***: Compared to the standard LW DLQI, LT DLQI was a better predictor of patient outcomes related to weight, discrimination, and depression. While obesity is linked to impaired self-confidence, early-onset psoriasis is associated with depression, social discrimination, and greater LT DLQI. Both BMI and age at diagnosis independently cause a negative effect on sleep quality and recreational drug use.

Table of Contents

Abbreviations

BMI	Body Mass Index
BSA	Body Surface Area
CLCI	Cumulative Life Course Impairment
CQoL	Chronic Quality of Life
DLQI	Dermatology Life Quality Index
HRQoL	Health-Related Quality of Life
LT DLQI	Lifetime Dermatology Life Quality Index
LW DLQI	Last Week's Dermatology Life Quality Index
LY DLQI	Last Year's Dermatology Life Quality Index
NHANES	National Health and Nutrition Examination Survey
OSAS	Obstructive Sleep Apnea Syndrome
PASI	Psoriasis Area and Severity Index
PBI	Patient Benefit Index
SAPASI	Self-Assessed Psoriasis Area and Severity Index

Introduction

Psoriasis is a chronic, inflammatory skin disorder that affects 0.9 to 8.5 percent of the population worldwide.[1] This skin disease is characterized by scaly plaques on the body surface that are frequently accompanied by pain and itching. Numerous studies have demonstrated that in addition to physical discomfort, psoriasis patients suffer from debilitating psychiatric morbidity,[2] stigmatization,[3] embarrassment, and impaired self-esteem[4] as a result of their skin disease. Surprisingly, disease severity has been found to correlate poorly with these negative feelings and correlates only modestly with quality of life for psoriasis patients.[5] To quantify the burden of psoriasis on the medical and psychosocial aspects of patients' lives, various questionnaires, such as the Dermatology Life Quality Index (DLQI),[6] have emerged over recent years as measures of health-related quality of life (HRQoL). By asking questions regarding patients' social interactions, relationships, daily activities, and emotional status, these surveys of HRQoL provide data on the physical and psychosocial functioning of patients at a single point in time.

In their article,[7] Kimball et al. proposed the concept of "cumulative life course impairment" (CLCI), which takes into account the overall physical and psychological damage of coping with psoriasis over a patient's life course, resulting in altered or impaired life potential. The basis for CLCI lies in the complex interactions over time amongst the medical and psychological comorbidities associated with psoriasis as well as the potential moderating effects of coping strategies and external factors. In their recent paper,[8] Warren et al. qualitatively examined the causes and mechanisms of CLCI through a series of case presentations, which provided evidence of the profound

influence of psoriasis on life-changing decisions and demonstrated the ways in which psoriasis can substantially alter the course of patients' lives.

Given the longitudinal impact of psoriasis on the life course of patients, this study investigated the potential life outcomes that are associated with impaired current and chronic quality of life in psoriasis patients. We propose the concept of "Chronic Quality of Life" (CQoL) as the cumulative physical, material, social, psychological, and emotional well-being of an individual over his or her life course after taking into account the long-term impact of chronic conditions like psoriasis. In this study, we explored a plausible measure of skin-related CQoL and its ability to predict long-term impairments that point-in-time measures of HRQoL may fail to reflect. Our findings ultimately highlight the need for a validated measure of CQoL that would provide greater insight and a more nuanced understanding of the physical and psychosocial outcomes of psoriasis patients.

In addition, given the poor correlation between disease severity and quality of life, we set out to identify which factors actually impact the CQoL and long-term outcomes of psoriasis patients. One such factor we explored is obesity. Multiple studies have linked psoriasis to several metabolic disorders, particularly obesity.[9,10] From the results of the 2003-2006 National Health and Nutrition Examination Survey (NHANES), Love et al. estimated the prevalence of abdominal obesity among psoriasis patients in the U.S. to be 63 percent,[11] while in their population-based study in the Untied Kingdom, Langan et al. found a 66% increased odds of being obese in patients with severe psoriasis.[12] Characterized by excess weight resulting from increased energy deposits in the form of fat, obesity is closely associated with numerous chronic

cardio-metabolic diseases[13] and overall higher mortality.[10] In addition to physical health, obesity has been shown to negatively influence psychosocial functioning, leading to depression,[14] impaired self-esteem,[15] and anxiety.[16]

The harmful physical and psychological effects of obesity may further exacerbate the stigma that is already associated with the visible skin lesions characteristic of psoriasis.[17] Since obesity is also a chronic condition, psoriasis patients that endure both the stigma of their skin disorder as well as the burden of obesity may face worse current as well as chronic quality of life. In this study, we examined the relative effect on CQoL of dealing with obesity as an added burden to psoriasis in order to analyze the physical and psychological burdens that interact and accumulate over a patient's lifetime.

In addition to obesity, another factor that may influence the CQoL of psoriasis patients is age at diagnosis. Although psoriasis has two peaks of incidence (ages 20 to 30 years and 50 to 60 years), it may manifest at any age. Psoriasis is estimated to occur in 0.5 to 1 percent of children and 2 to 3 percent of adults in the United States.[18] Since children and adolescents face different emotional and psychological issues than adults,[19] the impact of a highly visible, lifelong disease like psoriasis on long-term life outcomes may vary depending on the age at onset. Although the impairment of quality of life associated with psoriasis has been well documented in both adults[7] and children,[20] the relative effect of age at diagnosis, especially over the patient's longitudinal disease experience, remains unclear.

Several previous studies have found that younger age at onset was associated with greater physical disability[21,22] and that older age at onset was protective against

multiple aspects of social anxiety.[23] However, Jankovic et al. found that HRQoL was significantly more impaired in psoriasis patients with age at onset of 40 years or more,[24] while de Jager et al. found that current quality of life in adulthood was not influenced by age at onset of psoriasis.[25] Our study set out to further investigate the relationship between age at diagnosis and various aspects of the CQoL of psoriasis patients. We explored whether age at diagnosis affects similar or different long-term outcomes compared to obesity.

In summary, this study set out to accomplish three specific aims:

Aim 1*:* To investigate whether our proposed measure of CQoL effectively predicts impairments in lifetime outcomes that point-in-time measures of HRQoL may fail to reflect,

Aim 2: To identify whether obesity impacts the long-term medical, social, psychological, and economic outcomes of psoriasis patients, and

Aim 3: To identify whether age at diagnosis affects the lifetime outcomes of psoriasis patients.

The insight gained through this study may aid healthcare providers in identifying vulnerable patient populations and making more effective treatment decisions that optimize each patient's CQoL.

Methods

Sample

The study sample consisted of 114 subjects of at least 18 years of age who had a previous diagnosis of psoriasis and were able to provide consent to voluntarily complete the survey. Subjects were excluded from the study if they had any medical

conditions that might interfere with their ability to complete the questionnaire. Participants were recruited over 6 months at a New Jersey phototherapy center, the Clinical Unit for Research Trials in Skin in Boston, and the National Psoriasis Foundation's Capitol Hill Day. Of the 125 individuals asked to complete the questionnaire, 114 agreed to participate, giving a response rate of 91%. The variety of recruitment settings as well as the high response rate helped minimize selection bias. The reasons for non-participation included time constraints and reluctance to share private information.

Ethical Considerations

All subjects who participated in the study consented to voluntarily completing the questionnaire. Participants received a compensation of $50. The protocol and survey instruments for the study were approved by the Institutional Review Board at the Massachusetts General Hospital.

Outcome Measures

Subjects were asked to complete a self-response questionnaire that elicited information regarding gender, current age, age at diagnosis, race and ethnicity, disease severity over the past year (LY comparative severity) and over their lifetime (LT comparative severity) compared to their disease severity today on a scale of -3 (worst) to 3 (best), treatment regimen, satisfaction with current treatment on a scale of -3 (not satisfied) to 3 (very satisfied), level of concern that their psoriasis will worsen on a scale of 0 (not worried) to 4 (very worried), marital status, children, weight, whether psoriasis has caused weight gain on a scale of -3 (disagree) to 3 (agree), smoking history, recreational drug use, perceived general health on a scale of -3 (very poor) to 3

(excellent), chronic conditions, whether psoriasis has caused depression on a scale of -3 (disagree) to 3 (agree), occupation, how psoriasis has influenced career choice on a scale of -3 (worse) to 3 (better), education level, disability, household income, and Medicaid status. A smaller subset of 58 subjects also answered questions regarding religious practices, religiousness, as well as severity and frequency of discrimination in both the workplace and social settings.

In addition, the questionnaire included the ten questions used in the standard Dermatology Life Quality Index (DLQI).[6] However, we modified the standard DLQI questions so that participants were asked to answer each question on a scale of 0 (not at all) to 3 (all the time) for "over the last week," "over the last year," and "over your lifetime with psoriasis." The skin-related CQoL of each patient was quantified by calculating a lifetime DLQI (LT DLQI), which represents the sum of the individual responses to each of the ten DLQI questions for "over your lifetime with psoriasis." Similar calculations were performed to compute last year's DLQI (LY DLQI) and the standard (last week's) DLQI (LW DLQI) for each patient.

Lastly, to measure other social and psychological aspects of CQoL, the questionnaire asked all subjects to answer six questions on a scale of 0 to 3 regarding depression resulting from their psoriasis, their need to hide their psoriasis, impact of psoriasis on their self-confidence, avoidance of common activities because of their psoriasis, inhibition of sexual relationships as a result of their psoriasis, and sleep problems because of their psoriasis. These six questions were answered for "over the last week," "over the last year," and "over your lifetime with psoriasis." Each dependent variable that was surveyed in the questionnaire was placed into one of the following

categories: Patient & Treatment Characteristics, Medical Disability, Depression & Sleep, Economic & Educational Outcomes, Social Anxiety & Substance Abuse, Relationships, Religion, and Discrimination.

The current clinical severity of psoriasis was measured via Body Surface Area (BSA) and Psoriasis Area and Severity Index (PASI)[26] scores. All patients were also asked to complete the Self-Assessed PASI (SAPASI).[27] To detect a minimum meaningful difference of 5 points in the DLQI score, which has been shown to have a standard deviation of 5 amongst psoriasis patients, the power for our sample size was greater than 0.80.[28,29]

Statistical Analyses

For each of the dependent variables surveyed in the questionnaire, a stepwise multiple regression analysis was performed to ascertain which, if any, of the independent variables (PASI, LW DLQI, LY DLQI, LT DLQI) were significant explanatory/predictor variables. Applying the Bonferroni correction for multiple hypothesis testing, we considered only *P*-values less than 0.013 to be significant.

The 114 study subjects were divided into three groups depending on their body mass index (BMI): normal (below 25), overweight (25 to 29.99), and obese (30 or higher). First, we conducted a series of *a priori* analyses. For the continuous dependent variables measured by the questionnaire (BMI, age, age at diagnosis, disease duration, LW DLQI, LY DLQI, LT DLQI, SAPASI, PASI, BSA), mean values were calculated for each BMI group and ANOVA analyses were conducted to compare the three BMI groups. Chi-square tests were conducted for dichotomous variables (receiving treatment, weight is a problem, arthritis, diabetes, coronary artery disease,

irritable bowel disease, depression, ever felt depressed, ever smoked, recreational drugs, disability, undesired unemployment, collected unemployment, Medicaid ever, ever married, currently married, ever divorced, have children). Kruskal-Wallis H tests were conducted for all remaining ordinal variables. Only *P*-values less than 0.05 were considered significant.

For the dependent variables that yielded significant *P*-values, we then conducted a series of *post hoc* analyses. Comparing two BMI groups at a time, we performed Student's *t*-tests, chi-square tests, and Mann Whitney U tests for continuous, dichotomous, and ordinal variables, respectively. Applying the Bonferroni correction for multiple hypothesis testing, we considered only *P*-values less than 0.017 to be significant.

The 114 subjects were then divided into four quartiles depending on their age at diagnosis: first quartile (ages 2-16 years, N=28); second quartile (ages 16-23 years, N=29); third quartile (ages 24-36 years, N=29); and fourth quartile (ages 37-83 years, N=28). One outlier data point with an extreme PASI score of 61.2 was excluded from the first age-at-diagnosis quartile. However, our final results did not change regardless of whether this outlier was included in the analyses. Since the same dependent variables reported in tables 6 and 7 for obesity were tested for age at diagnosis, only the variables found to be significantly different amongst the four age-at-diagnosis quartiles are reported in table 10.

We first conducted a series of *a priori* analyses. For the continuous dependent variables measured by the questionnaire, mean values were calculated for each age-at-diagnosis quartile and ANOVA analyses were conducted to compare the four groups.

Chi-square tests were conducted for dichotomous variables. Kruskal-Wallis H tests were conducted for all remaining ordinal variables. Only *P*-values less than 0.05 were considered significant. For the dependent variables that yielded significant *P*-values, we then conducted a series of *post hoc* analyses. Comparing two age-at-diagnosis quartiles at a time, we performed Student's *t*-tests, chi-square tests, and Mann Whitney U tests for continuous, dichotomous, and ordinal variables, respectively. Applying the Bonferroni correction for multiple hypothesis testing, we considered only *P*-values less than 0.008 to be significant.

Given that age and disease duration differed significantly amongst the four age-at-diagnosis quartiles, regression analyses were conducted to distinguish their contributing effects. For each of the dependent variables surveyed in the questionnaire, a stepwise multiple regression analysis was performed to ascertain which, if any, of the independent variables (age at diagnosis, current age, disease duration, PASI, LY comparative severity, and LT comparative severity) were significant explanatory/predictor variables. Applying the Bonferroni correction for multiple hypothesis testing, we considered only *P*-values less than 0.008 to be significant.

Results

Patient Characteristics

Table 1 displays the mean and median values of the various patient and disease characteristics surveyed in the questionnaire. Of those surveyed, the mean age at diagnosis was 27 years, mean current age was 47 years, mean disease duration was 21 years, and mean BMI was 28.4. The interquartile range (IQR) for current age was 23 years. Sixty-nine (61%) subjects were male, 104 (91%) were white, and 75 (66%)

were currently married or married at least once in the past. Most participants attained at least a college level of education (75%) and were employed at the time (78%). Thirty-nine (34%) had received a previous diagnosis of arthritis, 27 (24%) were diagnosed with depression, and 7 (6%) had diabetes. The mean BSA, PASI, and SAPASI scores for the patient sample were 13.3, 10.1, and 12.6, respectively.

Aim 1

Treatment & Medical Outcomes

Tables 2, 3, and 4 outline the results of the multiple regression analyses, which evaluated PASI, LW DLQI, LY DLQI, and LT DLQI as predictors of the surveyed medical, social, and psychological variables. Greater LW DLQI was associated with a lower likelihood of currently receiving treatment ($P<0.001$), lower likelihood of satisfaction with the current treatment ($P<0.001$), greater likelihood of worrying that one's psoriasis will get worse ($P=0.002$), and worse rating of one's psoriasis while on topical medications compared to one's psoriasis today ($P<0.001$). Greater LY DLQI was associated with a lower likelihood of currently receiving treatment ($P=0.004$), lower likelihood of using biologics ($P=0.008$), and worse rating of one's psoriasis while on light treatment compared to one's psoriasis today ($P=0.008$). Those with greater LT DLQI were less likely to be satisfied with their current treatment ($P=0.007$); more likely to worry that their psoriasis will worsen ($P=0.012$); less likely to have used oral medications ($P<0.001$) and biologics ($P<0.001$); and more likely to rate their psoriasis while on oral medications ($P=0.004$), topical medications ($P<0.001$), and light treatment ($P=0.005$) as worse than their psoriasis today.

For aspects of medical disability, only LT DLQI was found to be a significant predictor of the surveyed outcomes. Greater LT DLQI was associated with a worse rating of perceived general health (P=0.003), younger age at which weight became a problem (P=0.002), and greater likelihood of believing that psoriasis had caused weight gain (P<0.001).

Social Outcomes

In the social realm, greater LW DLQI was associated with a greater likelihood of psoriasis inhibiting sexual relationships last year (P<0.001) and more experiences of discrimination at work last year (P<0.001). Greater LY DLQI was predictive of a greater likelihood of psoriasis inhibiting sexual relationships last year (P=0.007), more hours of working overtime (P=0.004), greater likelihood of collecting unemployment (P=0.010), and more experiences of discrimination in social settings last year (P<0.001). Greater LT DLQI was associated with shorter retention of one's current job (P=0.001), more experiences of discrimination at work (P=0.002) and in social settings (P<0.001) over one's lifetime, and more severe discrimination in social settings over one's lifetime (P=0.002).

Psychological Outcomes

For psychological variables, greater LW DLQI was predictive of more packs smoked per day (P<0.001), greater likelihood of believing that psoriasis had caused one to smoke (P=0.001), and greater likelihood of recreational drug use (P=0.007). Greater LY DLQI was associated with a greater likelihood of having thought about suicide (P=0.005). Greater LT DLQI was predictive of more packs smoked per day (P=0.005), greater likelihood of believing psoriasis had caused smoking (P=0.012), greater

likelihood of recreational drug use (P=0.004), greater likelihood of a diagnosis of depression (P<0.001), greater likelihood of having felt depressed in the past (P=0.011), and greater likelihood of believing that psoriasis had caused depression (P<0.001).

Aim 2

Table 5 displays the mean values of the various patient and disease characteristics surveyed in the questionnaire for each BMI group and summarizes the results of the ANOVA analyses that were conducted to find differences amongst the three BMI groups. There were no significant differences in any of these three measures of current disease severity, age at diagnosis, or gender distribution amongst the BMI groups. There was also no significant difference in LY or LT comparative severity amongst the three BMI groups.

Kruskal-Wallis H tests were conducted to find differences in the surveyed ordinal variables amongst the three BMI groups (Table 6). Individuals with higher BMIs were more likely to rate their general health lower (P<0.001) and less likely to disagree that their psoriasis had caused them to gain weight (P=0.014). Analyzing the past week or past year resulted in a lack of a significant effect of BMI on sleep problems amongst psoriasis patients. However, over a patient's lifetime, an association was found between BMI and sleep problems. Patients with higher BMIs were more likely to experience interference with their sleep as a result of their psoriasis (P=0.016).

BMI was also found to influence various aspects of social anxiety amongst psoriasis patients. Elevated BMI was associated with a greater need to hide one's psoriasis last year (P=0.047) and over one's lifetime (P=0.010), greater likelihood that psoriasis had affected one's self-confidence last year (P=0.034) and over one's lifetime

(P=0.011), and greater likelihood of avoiding common activities like swimming and sports over one's lifetime (P=0.012).

Table 7 outlines the results of the chi-square and Kruskal-Wallis H tests for the surveyed dichotomous and ordinal variables, respectively. There was a significant difference in the distribution of those who believed that their weight was a problem such that these individuals tended to have elevated BMIs (P<0.001). We also found a significant difference in the distribution of those who had used recreational drugs in the past such that these individuals tended to have normal BMIs (P=0.012).

The results of our *post hoc* analyses allowed us to determine which two BMI groups had significant differences between them (Table 8). Compared to normal individuals, overweight individuals were more likely to perceive their general health as worse (P=0.011), hide their psoriasis over their lifetime (P=0.012), and view weight as a problem (P=0.001). Compared to normal patients, obese patients were more likely to perceive their general health as worse (P<0.001), believe that their psoriasis caused their weight gain (P=0.015), view their weight as a problem (P<0.001), experience sleep problems as a result of their psoriasis over their lifetime (P=0.010), hide their psoriasis over their lifetime (P=0.002), have their self-confidence affected by their psoriasis over their lifetime (P=0.006), avoid common activities because of their psoriasis over their lifetime (P=0.011), and use recreational drugs (P=0.012). Finally, compared to overweight individuals, obese individuals were more likely to perceive their general health as worse (P=0.007), believe that their psoriasis caused their weight gain (P=0.016), and view their weight as a problem (P=0.002).

Aim 3

Tables 9 and 10 contain the mean values of the variables surveyed in the questionnaire for each age-at-diagnosis quartile and summarize the results of the ANOVA analyses and Kruskal-Wallis H tests that were conducted to find differences amongst the four age-at-diagnosis quartiles. Individuals diagnosed with psoriasis at a later age were more likely to be older ($P<0.001$) and have shorter disease duration ($P<0.001$) (Table 9). Patients with earlier disease onset were more likely to have an earlier age at diagnosis of arthritis ($P=0.049$), believe that their psoriasis had caused their depression ($P<0.001$), experience sleep problems because of their psoriasis over their lifetime ($P=0.038$), have had their current job for a shorter period of time ($P=0.033$), and feel the need to hide their psoriasis over their lifetime ($P=0.002$) (Table 10). Although the LW DLQI and LY DLQI did not differ substantially amongst the four quartiles, LT DLQI did differ significantly: those diagnosed at an earlier age tended to have a greater LT DLQI ($P<0.001$) (Table 9).

Table 10 also outlines the results of the chi-square and Kruskal-Wallis H tests that were conducted for the dichotomous and ordinal variables, respectively, surveyed in the questionnaire. There was a significant increase in the number of individuals diagnosed with arthritis ($P=0.007$), high cholesterol ($P=0.018$), and hypertension ($P=0.007$) amongst patients with late-onset psoriasis. We found that individuals who had used recreational drugs in the past tended to have a younger age at diagnosis of psoriasis ($P=0.007$).

The results of our *post hoc* analyses allowed us to determine which two age-at-diagnosis quartiles had significant differences between them (Table 11). Compared to the third quartile, the first quartile was more likely to be younger ($P=0.004$), have longer

disease duration (P=0.002), have a greater LT DLQI (P=0.005), and lack a diagnosis of arthritis (P=0.003). Compared to the fourth quartile, those in the second quartile were more likely to be younger (P<0.001), have longer disease duration (P<0.001), have a greater LT DLQI (P=0.003), believe that their psoriasis had caused their depression (P=0.002), experience sleep problems because of their psoriasis over their lifetime (P=0.003), lack a diagnosis of arthritis (P=0.003), and have used recreational drugs (P=0.001). As expected, a comparison of the two most extreme quartiles yielded the greatest number of significant differences. Compared to the fourth quartile, those in the first quartile were more likely to be younger (P<0.001), have longer disease duration (P<0.001), have a greater LT DLQI (P<0.001), have a younger age at diagnosis of arthritis (P=0.005), believe that their psoriasis had their caused depression (P<0.001), hide their psoriasis over their lifetime (P=0.005), have sleep problems because of their psoriasis over their lifetime (P=0.007), lack high cholesterol (P=0.002) and hypertension (P=0.004), lack a diagnosis of arthritis (P=0.002), and have used recreational drugs (P=0.003). Not surprisingly, a comparison of the closer quartiles yielded fewer significant differences. The second quartile was less likely to have a diagnosis of arthritis (P=0.004) than the third quartile, while the third quartile was more likely to be younger (P<0.001), have longer disease duration (P=0.004), and have used recreational drugs (P=0.002) than the fourth quartile.

Table 12 contains the results of the stepwise multiple regression analyses comparing the likelihood that age at diagnosis, current age, disease duration, PASI, LY comparative severity, and/or LT comparative severity were predictors of the surveyed dependent variables. Elevated PASI was a significant predictor of greater LW DLQI

(P=0.001) and greater LY DLQI (P=0.003), while younger age at diagnosis was associated with greater LT DLQI (P<0.001). Younger age at diagnosis was also a significant predictor of a lower likelihood of a diagnosis of coronary artery disease (P<0.001) and hypertension (P<0.001). Those diagnosed at a younger age were more likely to have felt depressed (P=0.003), believe that their psoriasis had caused their depression (P<0.001), experience sleep problems over their lifetime (P=0.004), use recreational drugs (P<0.001), hide their psoriasis over their lifetime (P<0.001), and experience more severe discrimination in social settings over their lifetime (P=0.002).

Not surprisingly, old age was a predictor for several medical conditions, including a greater likelihood of having high cholesterol (P=0.005), older age at which weight became a problem (P<0.001), and later age at diagnosis of arthritis (P<0.001). In addition to explaining these co-morbidities, old age was associated with a lower likelihood of believing that psoriasis had caused depression (P<0.001), greater likelihood of current employment (P=0.001), longer retention of one's current job (P<0.001), fewer hours worked per week (P=0.008), and greater likelihood of having collected unemployment (P=0.004). Older age was also associated with various factors related to relationships, including a greater likelihood of having married (P<0.001), younger age at first marriage (P=0.003), greater likelihood of having divorced (P=0.002), greater likelihood of having children (P<0.001), and having more children (P<0.001). For social aspects, older individuals were less likely to have their self-confidence influenced by their psoriasis last year (P=0.003) and less likely to have experienced discrimination in social settings over their lifetime (P=0.002).

Elevated PASI was associated with a greater likelihood of experiencing discrimination at work last year (P=0.002), while worse LT comparative severity was predictive of worse perceived general health (P=0.001), greater likelihood of believing one's psoriasis had caused one to gain weight (P=0.001), greater likelihood of believing one's psoriasis had caused one to smoke (P=0.007), and experiencing more severe discrimination at work over one's lifetime (P=0.006).

Discussion

Aim 1

Our study explored the life outcomes that correlated with current and long-term measures of patients' skin-related quality of life and provided a comparison of each measure's ability to explain various medical and psychosocial outcomes. Disease severity, most frequently measured with PASI, has been shown to correlate poorly with quality of life.[30,31] This was supported in our study, which showed that PASI was not a significant predictor of any of the surveyed variables, except one (belief that psoriasis had caused one to smoke).

Three different DLQI measures were used to assess skin-related quality of life, ranging in scope from over the last week, over the last year, and over the patient's lifetime with psoriasis. For aspects of treatment regimen, patients with a greater LW DLQI were less likely to be currently receiving treatment for their psoriasis. This finding is supported by multiple studies that have reported that various forms of psoriasis therapy effectively reduce DLQI.[32,33] A recent study reported that a correlation existed between DLQI and the Patient Benefit Index (PBI), which assesses patient satisfaction with treatment.[34] This finding was corroborated by our study, which showed that lower

patient satisfaction with the current treatment was associated with greater LW DLQI and LT DLQI. Our study suggests that independent of current disease severity, patients with worse current and chronic skin-related quality of life tend to be less satisfied with their psoriasis therapy, emphasizing the importance of measures of quality of life as predictors of patients' treatment experience.

For medical disabilities, LW DLQI was not a significant predictor of any of the surveyed variables. However, LT DLQI was associated with several variables, especially those related to weight. Our study suggests that psoriasis patients with worse skin-related CQoL are at risk of worse overall perceived health and developing weight problems at a younger age.

For surveyed variables regarding discrimination, we found that LW DLQI was associated with only one variable (frequency of discrimination at work last year), while LT DLQI was correlated with three: frequency of discrimination at work over one's lifetime, frequency of discrimination in social settings over one's lifetime, and severity of discrimination in social settings over one's lifetime. Psoriasis patients have been shown to face substantial social stigmatization and alienation, which lead to feelings of guilt and shame as well as anticipation of rejection.[35] In their recent article,[35] Hrehorów et al. found that the level of stigmatization experienced by psoriasis patients correlated significantly with quality of life. Given the close relationship between discrimination and psoriasis, our study suggests that those with worse CQoL as a result of their skin disease are more vulnerable to discrimination and its deleterious consequences both at work and in social settings over their lifetime with psoriasis.

In the domain of substance abuse, we found that elevated LW DLQI and LT DLQI were both associated with greater number of packs smoked per day and a greater likelihood of recreational drug use. Several studies have demonstrated a positive correlation between psoriasis and smoking, which has been shown to be associated with not only disease onset and treatment outcomes but also chronicity of disease and remission rates.[36] The connection between smoking and psoriasis lies in the inflammatory mediators induced by smoking that contribute to pathogenic processes in psoriasis patients.[37] Our study showed that greater impairment of current and chronic skin-related quality of life is predictive of past substance abuse, including cigarettes and recreational drugs.

For outcomes related to depression, we found that LW DLQI was not associated with any of the variables, whereas LT DLQI was a significant predictor for a greater likelihood of being diagnosed with depression, having felt depressed, and believing that psoriasis had caused depression. Although PASI is generally accepted to be an unreliable predictor of depression risk, factors associated with depression in psoriasis patients have been shown to surround quality of life issues.[36] Pruritus in psoriasis patients is a common symptom associated with depression.[37] In addition, lack of social support[38] and perception of social stigmatization secondary to the visibility of psoriatic skin lesions[39] were found to be important predictors of depression. Our findings suggest that current skin-related quality of life may not reflect the risk of depression, but impairment of a patient's CQoL is predictive of a higher chance of experiencing depression and attributing this depression to psoriasis.

Overall, our regression analyses showed that a greater number of the surveyed dependent variables were associated with LT DLQI (20 variables) than with LY DLQI (8 variables) or LW DLQI (9 variables). This finding supports the idea that compared to LW or LY DLQI, LT DLQI may more effectively predict the long-term physical and psychosocial outcomes of psoriasis patients. Furthermore, we observed a fair degree of overlap (6 variables) between LT DLQI and LT DLQI such that three-fourths of the outcomes predicted by LW DLQI were also predicted by LT DLQI. This reasonable degree of overlap becomes especially evident when comparing it to the minimal overlap between LY DLQI and LW DLQI (2 variables) and between LY DLQI and LT DLQI (2 variables). The greater amount of overlap in dependent variables that are associated with both LW DLQI and LT DLQI suggests that LT DLQI may be a plausible measure of skin-related CQoL.

Aim 2

Both obesity and psoriasis detract from the physical and psychosocial well-being of patients[40,41] and may magnify the contribution of each to adverse life outcomes. Importantly, we did not find severity differences across the BMI groups. Not surprisingly, we found that elevated BMI was associated with lower ratings of general health, but we were unable to detect significant differences amongst the three BMI groups in medical co-morbidities, including arthritis, diabetes, coronary artery disease, and irritable bowel disease. A larger sample size may be needed to detect the elevated risk of medical co-morbidities known to correlate with obesity[14] as there was a generally higher prevalence of these co-morbidities in the heavier populations in our study, especially arthritis and depression.

However, we found that higher BMI was predictive of a greater likelihood of reporting psoriasis as a cause of sleep interference, especially over the patient's lifetime. Our findings were consistent with recent findings that elevated BMI amongst psoriasis patients is associated with sleep apnea, which likely contributes to sleep problems.[42] The significance of BMI as a predictor of sleep interference increased with a more longitudinal view of the patient's disease experience, suggesting that obesity may not affect immediate sleep quality but becomes increasingly pronounced when evaluating chronic sleep quality. The consequences of long-term sleep problems and the resulting impairment of CQoL are profound: sleep apnea has been linked to numerous metabolic and cardiovascular comorbidities, including hypertension, congestive heart failure, and type 2 diabetes.[43] Besides sleep apnea, other possible explanations exist, including more long-term perception of or sensitivity to pruritus among obese psoriasis patients.

The influence of BMI on the life outcomes of psoriasis patients was also evident in self-reported substance abuse. We found that patients with an elevated BMI were less likely to have used recreational drugs. This finding is supported by recent studies reporting that food and drugs compete for the same brain reward sites and consequently, that higher BMI is actually associated with lower drug use.[44,45]

Although our measures of DLQI did not differ substantially amongst the three BMI groups, a finding that was not surprising given that the DLQI asks skin-specific questions, obesity did have a significant effect on various aspects of social anxiety. Obese patients were more likely to hide their psoriasis, feel that their psoriasis affected their self-confidence, and avoid common activities because of their psoriasis, especially

when considering the patient's lifetime with the disease. Obesity has been shown to negatively affect self-esteem[16] and promote anxiety,[17] and our study suggests that these harmful effects of obesity on psychological functioning are cumulative over a patient's lifetime. Obesity appears to exacerbate the social burden of psoriasis, resulting in decreased self-confidence, greater concealment of one's disease, and reduced social participation.

Aim 3

This study supports the concept that numerous poor long-term outcomes may be associated with an earlier age at diagnosis of psoriasis. The results of the regression analyses help distinguish the contributions of age at diagnosis, current age, disease duration, PASI, LY comparative severity, and LT comparative severity to the differences in quality of life and long-term outcomes observed amongst the four age-at-diagnosis quartiles. Although a higher PASI score contributed to higher LW DLQI and LY DLQI, PASI was not a significant predictor of LT DLQI. Instead, younger age at diagnosis was associated with elevated LT DLQI. These findings suggest that while disease severity may influence immediate or short-term skin-related quality of life, age at diagnosis is more likely to be an important factor in determining quality of life in the long run. The reason for the varied findings of recent studies regarding the effect of age at diagnosis on psoriasis patients may be partially attributed to the fact that the impact of age at onset depends on the length of disease experience surveyed. Our study suggests that the longer the time period assessed, the more likely a significant correlation between age at diagnosis and quality of life will be found. This is in contrast to BMI, which was not associated with LT DLQI.

Current age was the explanatory factor for several of the differences in medical comorbidities seen amongst the age-at-diagnosis quartiles, including arthritis and high cholesterol (Table 12). This finding was not surprising given that increasing age is known to be an important risk factor for these comorbidities.[46–48] Independent of current age, disease duration, and disease severity, later age at diagnosis of psoriasis was associated with coronary artery disease and hypertension. Psoriasis has been shown to correlate with elevated levels of homocysteine and the hormone leptin, which are thought to contribute to the increased risk of atherosclerotic disease and inflammatory processes in psoriasis patients.[49–51] Our study is consistent with other research suggesting that a diagnosis of psoriasis in older adults may exacerbate the already elevated absolute risk of cardiovascular disease with age.[52,53]

Our regression analyses also revealed that age at diagnosis was a significant explanatory factor for the greater likelihood of having felt depressed and attributing this depression to psoriasis as well as the elevated recreational drug use seen amongst those diagnosed with psoriasis at a younger age. Psoriasis has been shown to be associated with depression and substance abuse,[54] and adolescence represents a high-risk period for development of both depressive and substance abuse disorders.[55] This was supported by our results, which showed that younger current age was associated with greater likelihood of believing psoriasis had caused depression. Moreover, Corcos et al. found that young people used marijuana to deal with their depression.[56] The psychological and social burdens of a chronic disease like psoriasis may become a greater risk factor for the development of substance abuse as a means to cope with their disease amongst patients diagnosed at a younger age. Another possible

explanation for the association between drug use and age at onset is that recreational drugs have been shown to be a mild trigger of juvenile psoriasis,[57] suggesting that those who had used recreational drugs were more likely to develop psoriasis earlier on in life. We had found that patients with an elevated BMI were less likely to have used recreational drugs, possibly due to the finding that food and drugs compete for similar brain reward sites. Together, these findings of our study suggest that the psoriasis patients at the greatest risk for recreational drug use are those with a normal BMI and younger age at diagnosis.

Our analyses also indicated that age at diagnosis was associated with poor lifetime sleep quality independent of BMI. Elevated BMI was found to be associated with impaired lifetime sleep quality, and now we see that younger age at diagnosis is a further exacerbating factor. A recent study found that a significantly higher frequency of obstructive sleep apnea syndrome (OSAS) exists among patients with psoriasis compared to the general population.[58] Our study suggests that earlier disease onset may be a precipitating factor whose cumulative effects contribute to the lifetime risk of developing OSAS or other sleep problems. The implications of sleep interference, especially early on in life, are profound because OSAS has been shown to correlate with substantial impairments in quality of life,[59] including metabolic and cardiovascular comorbidities[43] as well as behavioral, cognitive, and emotional difficulties in children.[59,60]

In the social domain of CQoL, we found that age at diagnosis was a significant explanatory factor for the greater tendency of those with early-onset disease to hide their psoriasis over their lifetime and experience more severe discrimination in social settings over their lifetime independent of BMI. These results corroborated those of

Ginsburg et al., who reported that younger age at onset of psoriasis was associated with anticipating rejection, feeling sensitive to opinions of others, feeling guilt and shame, and secretiveness.[24] The influence of juvenile psoriasis, especially on recreational and social activities, is significant and impairs social development, which is one of the developmental milestones in a child.[25] The lasting impact of the burden of childhood psoriasis manifests over a patient's lifetime and negatively affects the long-term social functioning of patients by contributing to their social withdrawal and increased severity of discrimination.

As we begin to sort out the different causes of impairment in this population, it appears that obesity is linked to impaired self-confidence, while age at diagnosis is associated with depression, social discrimination, and LT DLQI. In areas of overlap, such as sleep quality and recreational drug use, which were affected by both BMI and age at diagnosis, we see that both factors cause impairments independently of each other.

Limitations

One limitation of our study was the nature of the sample of subjects. Our sample may not be representative of the general population with psoriasis. Three-quarters of our patients received a college degree, and the majority was Caucasian. Individuals of varying education levels and race may cope with obesity and the chronic effects of their skin disease differently. Ideally, we would have liked to analyze multiple PASI scores taken throughout a patient's lifetime with psoriasis, but our measure of lifetime disease severity was limited to the patient's self-rating. In addition, the use of the standard DLQI questions for "over the past year" and "over your lifetime with psoriasis" has not been

previously validated. Finally, the effects of BMI found in our study may be explained by recall bias and/or a separate confounding factor that was not surveyed in our questionnaire.

Conclusions and Future Work

Aim 1

Our study demonstrates the predictive advantage that a cumulative measure of disease-related quality of life may confer. We found that compared to the standard LW DLQI, LT DLQI was a better explanatory variable for patient outcomes related to weight, discrimination, and depression. A measure of a patient's CQoL may provide a deeper understanding of the true effect of psoriasis, aid in the identification of patients more susceptible to this influence, and support treatment decisions that maximize CQoL and thereby optimize patients' life outcomes. Future studies are needed to develop a validated measure of CQoL in psoriasis patients.

Aim 2

Our study supports the long-term consequences of obesity on the quality of life of psoriasis patients. Given the high prevalence of obesity amongst individuals with psoriasis, our findings emphasize the importance of the independent effects of obesity on both physical and socioeconomic outcomes.

Aim 3

In summary, our study emphasized the importance of a patient's life stage in shaping their disease experience. Our findings suggest that age at diagnosis may have a relatively small effect on a patient's day-to-day life, but over time, there may be a cumulative, profound impact on long-term outcomes. By understanding the impact of a

patient's lifetime disease experience on his or her long-term outcomes, health care providers may better optimize patients' treatment plans and coordination of care to ultimately alter their patients' life course.

References

1. Parisi, R., Symmons, D. P. M., Griffiths, C. E. M. & Ashcroft, D. M. Global epidemiology of psoriasis: a systematic review of incidence and prevalence. *J. Invest. Dermatol.* **133,** 377–85 (2013).

2. Picardi, a, Abeni, D., Melchi, C. F., Puddu, P. & Pasquini, P. Psychiatric morbidity in dermatological outpatients: an issue to be recognized. *Br. J. Dermatol.* **143,** 983–91 (2000).

3. Vardy, D. *et al.* Experiences of stigmatization play a role in mediating the impact of disease severity on quality of life in psoriasis patients. *Br. J. Dermatol.* **147,** 736–42 (2002).

4. Anderson, R. T. & Rajagopalan, R. Development and validation of a quality of life instrument for cutaneous diseases. *J. Am. Acad. Dermatol.* **37,** 41–50 (1997).

5. Fortune, D. G., Richards, H. L., Griffiths, C. E. M. & Main, C. J. Psychological stress, distress and disability in patients with psoriasis: consensus and variation in the contribution of illness perceptions, coping and alexithymia. *Br. J. Clin. Psychol.* **41,** 157–74 (2002).

6. Finlay, a Y. & Khan, G. K. Dermatology Life Quality Index (DLQI)--a simple practical measure for routine clinical use. *Clin. Exp. Dermatol.* **19,** 210–6 (1994).

7. Kimball, a B. *et al.* Psoriasis: is the impairment to a patient's life cumulative? *J. Eur. Acad. Dermatol. Venereol.* **24,** 989–1004 (2010).

8. Langan, S. M. *et al.* STROBE and reporting observational studies in dermatology. *Br. J. Dermatol.* **164,** 1–3 (2011).

9. Herron, M. D. *et al.* From the archives journals. *JAMA* **295,** 208–210 (2006).

10. Farías, M. M., Serrano, V. & de la Cruz, C. [Psoriasis and obesity: a review and practical recommendations]. *Actas Dermosifiliogr.* **102,** 505–9 (2011).

11. Love, T. J., Qureshi, A. a, Karlson, E. W., Gelfand, J. M. & Choi, H. K. Prevalence of the metabolic syndrome in psoriasis: results from the National Health and Nutrition Examination Survey, 2003-2006. *Arch. Dermatol.* **147,** 419–24 (2011).

12. Langan, S. M. *et al.* Prevalence of metabolic syndrome in patients with psoriasis: a population-based study in the United Kingdom. *J. Invest. Dermatol.* **132,** 556–62 (2012).

13. Kral, J. G., Kava, R. a, Catalano, P. M. & Moore, B. J. Severe Obesity: The Neglected Epidemic. *Obes. Facts* **5,** 254–269 (2012).

14. Mustillo, S. a, Hendrix, K. L. & Schafer, M. H. Trajectories of body mass and self-concept in black and white girls: the lingering effects of stigma. *J. Health Soc. Behav.* **53,** 2–16 (2012).

15. Wang, F., Wild, T. C., Kipp, W., Kuhle, S. & Veugelers, P. J. The influence of childhood obesity on the development of self-esteem. *Health Rep.* **20,** 21–7 (2009).

16. Rosen-Reynoso, M., Alegría, M., Chen, C., Laderman, M. & Roberts, R. The relationship between obesity and psychiatric disorders across ethnic and racial minority groups in the United States. *Eat. Behav.* **12,** 1–8 (2011).

17. Sampogna, F., Tabolli, S. & Abeni, D. Living with psoriasis: prevalence of shame, anger, worry, and problems in daily activities and social life. *Acta Derm. Venereol.* **92,** 299–303 (2012).

18. Kurd, S. K. & Gelfand, J. M. The prevalence of previously diagnosed and undiagnosed psoriasis in US adults: results from NHANES 2003-2004. *J. Am. Acad. Dermatol.* **60,** 218–24 (2009).

19. Kiff, C. J. & Mason, W. A. NIH Public Access. *J Res Adolesc* **22,** 284–300 (2012).

20. Oostveen, a M. *et al.* The influence of treatments in daily clinical practice on the Children's Dermatology Life Quality Index in juvenile psoriasis: a longitudinal study from the Child-CAPTURE patient registry. *Br. J. Dermatol.* **167,** 145–9 (2012).

21. Fortune, D. G., Richards, H. L. & Griffiths, C. E. M. Psychologic Factors in Psoriasis: Consequences, Mechanisms, and Interventions. *Dermatol Clin* **23,** 681–94 (2005).

22. Jaheersha, P., Najeeba, R. & Nandan, G. Determinants of Quality of Life in Psoriasis Patients: A Cluster Analysis of 50 Patients. *Indian J Dermatol* **56,** 689–693 (2011).

23. Ginsburg, I. & Link, B. Psychosocial consequences of rejection and stigma feelings in psoriasis patients. *Int J Dermatol* **32,** 587–91 (1993).

24. Jankovic, S. *et al.* Health-related quality of life in patients with psoriasis. *J Cutan Med Surg* **15,** 29–36 (2011).

25. De Jager, M. E. a, de Jong, E. M. G. J., van de Kerkhof, P. C. M., Evers, a W. M. & Seyger, M. M. B. An intrapatient comparison of quality of life in psoriasis in childhood and adulthood. *J. Eur. Acad. Dermatol. Venereol.* **25,** 828–31 (2011).

26. Fredriksson, T. & Pettersson, U. Severe psoriasis-oral therapy with a new retinoid. *Dermatologica* **157,** 238–44 (1978).

27. Fleischer, A. J., Feldman, S. & Dekle, C. The SAPASI is valid and responsive to disease severity changes in a multi-center clinical trial. *J Dermatol* **26,** 210–5 (1999).

28. Shikiar, R., Willian, M. K., Okun, M. M., Thompson, C. S. & Revicki, D. a. The validity and responsiveness of three quality of life measures in the assessment of psoriasis patients: results of a phase II study. *Health Qual. Life Outcomes* **4,** 71 (2006).

29. Nijsten, T. *et al.* Cross-cultural inequivalence of dermatology-specific health-related quality of life instruments in psoriasis patients. *J. Invest. Dermatol.* **127,** 2315–22 (2007).

30. Weiss, S. C. *et al.* Quantifying the harmful effect of psoriasis on health-related quality of life. *J. Am. Acad. Dermatol.* **47,** 512–518 (2002).

31. Kimball, A. B., Jacobson, C., Weiss, S., Vreeland, M. G. & Wu, Y. The psychosocial burden of psoriasis. *Am. J. Clin. Dermatol.* **6,** 383–92 (2005).

32. Basra, M. K. A. & Hussain, S. Application of the dermatology life quality index in clinical trials of biologics for psoriasis. *Chin. J. Integr. Med.* **18,** 179–85 (2012).

33. Touw, C. R. *et al.* Quality of life and clinical outcome in psoriasis patients using intermittent cyclosporin. *Br. J. Dermatol.* **144,** 967–72 (2001).

34. Krenzer, S., Radtke, M., Schmitt-Rau, K. & Augustin, M. Characterization of patient-reported outcomes in moderate to severe psoriasis. *Dermatology* **223,** 80–6 (2011).

35. Hrehorów, E., Salomon, J., Matusiak, L., Reich, A. & Szepietowski, J. C. Patients with psoriasis feel stigmatized. *Acta Derm. Venereol.* **92,** 67–72 (2012).

36. Hayes, J. & Koo, J. Psoriasis: depression, anxiety, smoking, and drinking habits. *Dermatol. Ther.* **23,** 174–80 (2010).

37. Gupta, M. a & Gupta, a K. Depression modulates pruritus perception. A study of pruritus in psoriasis, atopic dermatitis and chronic idiopathic urticaria. *Ann. N. Y. Acad. Sci.* **885,** 394–5 (1999).

38. Hawro, T., Miniszewska, J., Chodkiewicz, J., Sysa-Jedrzejowska, A. & Zalewska, A. Anxiety, depression and social support in patient with psoriasis. *Przegl Lek* **64,** 568–71 (2007).

39. Gupta, M., Gupta, A. & Watteel, G. Perceived deprivation of social touch in psoriasis is associated with greater psychological morbidity: an index of the stigma experience in dermatologic disorders. *Cutis* **61,** 339–42 (1998).

40. Kolotkin, R. L., Meter, K. & Williams, G. R. Quality of life and obesity. *Obes. Rev.* **2,** 219–29 (2001).

41. Daudén, E. *et al.* Integrated Approach to Comorbidity in Patients With Psoriasis. *Actas Dermosifiliogr.* **103,** 1–64 (2012).

42. Papadavid, E. *et al.* Sleep apnea as a comorbidity in obese psoriasis patients: a cross-sectional study. Do psoriasis characteristics and metabolic parameters play a role? *J. Eur. Acad. Dermatol. Venereol.* **27,** 820–6 (2013).

43. Samson, P., Casey, K. R., Knepler, J. & Panos, R. J. Clinical characteristics, comorbidities, and response to treatment of veterans with obstructive sleep apnea, Cincinnati Veterans Affairs Medical Center, 2005-2007. *Prev. Chronic Dis.* **9,** E46 (2012).

44. Barry, D. & Petry, N. M. Associations between body mass index and substance use disorders differ by gender: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Addict. Behav.* **34,** 51–60 (2009).

45. Blüml, V. *et al.* Relationship between substance use and body mass index in young males. *Am. J. Addict.* **21,** 72–7 (2011).

46. CDC. Morbidity and Mortality Weekly Report Prevalence of Doctor-Diagnosed Arthritis and Arthritis-Attributable Activity Limitation — United States , 2007 – 2009. *MMWR Morb Mortal Wkly Rep* **59,** 1261–5 (2010).

47. Gertler, M. M., Garn, S. M. & Bland, E. F. Age, Serum Cholesterol and Coronary Artery Disease. *Circulation* **2,** 517–522 (1950).

48. Wang, W. *et al.* A longitudinal study of hypertension risk factors and their relation to cardiovascular disease: the Strong Heart Study. *Hypertension* **47,** 403–9 (2006).

49. Chen, Y.-J. *et al.* Psoriasis independently associated with hyperleptinemia contributing to metabolic syndrome. *Arch. Dermatol.* **144,** 1571–5 (2008).

50. Malerba, M. *et al.* Plasma homocysteine and folate levels in patients with chronic plaque psoriasis. *Br. J. Dermatol.* **155,** 1165–9 (2006).

51. Brockbank, J. & Gladman, D. Diagnosis and management of psoriatic arthritis. *Drugs* **62,** 2447–57 (2002).

52. Seavey, W., Kurata, J. & Cohen, R. Risk factors for self-reported arthritis in a 20 year followup of the Alameda County Study Cohort. *J Rheumatol* **30,** 2103–11 (2003).

53. Wilson, P. & Kannel, W. Hypercholesterolemia and coronary risk in the elderly: the Framingham Study. *Am J Geriatr Cardiol* **2,** 56 (1993).

54. Farley, E. & Menter, A. Psoriasis: comorbidities and associations. *G Ital Dermatol Venereol* **146,** 9–15 (2011).

55. Rao, U. Links between depression and substance abuse in adolescents: neurobiological mechanisms. *Am. J. Prev. Med.* **31,** S161–74 (2006).

56. Corcos, M., Phan, O., Nezelof, S. & Jeammet, P. Psychopathology of the cannabis user teenager. *Rev Prat* **55,** 35–40 (2005).

57. Sticherling, M. Children and adolescents with psoriasis. What therapy is recommended? *Hautarzt* **63,** 192–201 (2012).

58. Karaca, S. *et al.* Might psoriasis be a risk factor for obstructive sleep apnea syndrome? *Sleep Breath.* **17,** 275–80 (2013).

59. Landau, Y. E. *et al.* Impaired behavioral and neurocognitive function in preschool children with obstructive sleep apnea. *Pediatr. Pulmonol.* **47,** 180–8 (2012).

60. Tran, K. D., Nguyen, C. D., Weedon, J. & Goldstein, N. a. Child behavior and quality of life in pediatric obstructive sleep apnea. *Arch. Otolaryngol. Head. Neck Surg.* **131,** 52–7 (2005).

Tables

Table 1. Mean and median values of various patient and disease characteristics for the 114 surveyed participants.

	Mean	Median
Age	47.6	46.0
Age at diagnosis	27	23
Disease duration	20.6	18.0
BMI	28.2	26.9
PASI	10.1	7.9
SAPASI	12.6	7.0
BSA	13.3	9.0
LY comparative severity	-0.14	0
LT comparative severity	-0.65	-1.00
LW DLQI	8.9	7.0
LY DLQI	11.3	11.0
LT DLQI	15.1	15.0

Table 2. P-values for PASI, LW DLQI, LY DLWI, and LT DLQI as predictors of surveyed medical variables.*

		PASI	LW DLQI	LY DLQI	LT DLQI
Patient & Treatment Characteristics	**BMI**	0.91	0.037	0.16	0.16
	Receiving treatment	0.98	**<0.001**	**0.004**	0.85
	Satisfied with treatment	0.073	**<0.001**	0.81	**0.007**
	Worried	0.63	**0.002**	0.49	**0.012**
	Oral meds	0.25	0.022	0.99	**<0.001**
	Psoriasis on oral meds compared to psoriasis today	0.43	0.75	0.93	**0.004**
	Biologics	0.98	0.36	**0.008**	**<0.001**
	Psoriasis on biologics compared to psoriasis today	0.44	0.12	0.91	0.62
	Topical meds	0.71	0.50	0.55	0.43
	Psoriasis on topical meds compared to psoriasis today	0.33	**<0.001**	0.69	**<0.001**
	Light treatment	0.53	0.69	0.95	0.066
	Psoriasis on light compared to psoriasis today	0.94	0.80	**0.008**	**0.005**
Medical Disability	**Perceived general health**	0.24	0.15	0.26	**0.003**
	Weight is a problem	0.71	0.098	0.26	0.034
	Age weight became problem	0.42	0.84	0.73	**0.002**
	Lbs. want to lose	0.86	0.12	0.30	0.13
	Psoriasis caused weight gain	0.78	0.21	0.13	**<0.001**
	Arthritis	0.27	0.78	0.69	0.88
	Age arthritis diagnosed	0.25	0.74	0.46	0.11
	Diabetes	0.90	0.52	0.69	0.46
	Coronary artery disease	0.54	0.38	0.74	0.055
	High cholesterol	0.87	0.63	0.79	0.39
	Hypertension	0.069	0.28	0.31	0.64
	Heart attack	0.53	0.45	0.16	0.069
	Irritable bowel disease	0.51	0.65	0.67	0.076

* To correct for multiple hypothesis testing, only *P*-values <0.013 were considered significant.

Table 3. P-values for PASI, LW DLQI, LY DLWI, and LT DLQI as predictors of surveyed social variables.*

		PASI	LW DLQI	LY DLQI	LT DLQI
Relationships	**Ever married**	0.22	0.52	0.51	0.15
	Age first married	0.75	0.69	0.95	0.72
	Currently married	0.56	0.26	0.96	0.11
	Ever divorced	0.47	0.49	0.050	0.54
	Have children	0.84	0.20	0.96	0.10
	No. of children	0.82	0.054	0.47	0.027
	Psoriasis influenced no. of children	0.72	0.15	0.040	0.071
	Sexual relationships LW	0.11	0.14	0.34	0.46
	Sexual relationships LY	0.65	**<0.001**	**0.007**	0.23
	Sexual relationships LT	0.79	0.042	0.30	0.58
Economic & Educational Outcomes	**Employed**	0.71	0.58	0.50	0.32
	How long current job	0.43	0.034	0.50	**0.001**
	Work hours/week	0.42	0.94	0.86	0.38
	Overtime hours/week	0.023	0.88	**0.004**	0.96
	Psoriasis influenced career choice	0.32	0.76	0.44	0.44
	Disability	0.48	0.64	0.41	0.40
	Undesired unemployment	0.88	0.89	0.29	0.40
	Collected unemployment	0.22	0.91	**0.010**	0.88
	Patient education	0.39	0.57	0.83	0.34
	Mother education	0.43	0.58	0.15	0.20
	Father education	0.65	0.28	0.78	0.48
	Household income	0.32	0.97	0.94	0.96
	Medicaid ever	0.31	0.11	0.41	0.38
	Work less	0.16	0.34	0.55	0.020
Discrimination**	**Discrimination work LY**	0.55	**<0.001**	0.41	0.10
	Discrimination severity work LY	0.82	0.51	0.34	0.48
	Discrimination work LT	0.49	0.78	0.36	**0.002**
	Discrimination severity work LT	0.23	0.55	0.71	0.030
	Discrimination social LY	0.78	0.16	**<0.001**	0.22
	Discrimination severity social LY	0.45	0.58	0.031	0.61
	Discrimination social LT	0.80	0.62	0.63	**<0.001**
	Discrimination severity social LT	0.85	0.089	0.59	**0.002**
	Interaction with people	0.63	0.69	0.15	0.38

* To correct for multiple hypothesis testing, only *P*-values <0.013 were considered significant.
** Results are based on the responses of a smaller subset of 58 subjects.

Table 4. P-values for PASI, LW DLQI, LY DLWI, and LT DLQI as predictors of surveyed psychological variables.*

		PASI	LW DLQI	LY DLQI	LT DLQI
Social Anxiety & Substance Abuse	**Ever smoked**	0.093	0.53	0.33	0.051
	What age smoked	0.81	0.91	0.48	0.45
	Packs per day	0.74	**<0.001**	0.037	**0.005**
	Psoriasis caused smoking	**0.006**	**0.001**	0.83	**0.012**
	Recreational drugs	0.89	**0.007**	0.63	**0.004**
	Psoriasis caused drug use	0.91	0.29	0.081	0.032
	Hide psoriasis LW	0.23	0.94	0.60	0.19
	Hide psoriasis LY	0.16	0.73	0.85	0.21
	Hide psoriasis LT	0.10	0.76	0.41	0.35
	Self-confidence LW	0.51	0.60	0.76	0.58
	Self-confidence LY	0.75	0.65	0.33	0.48
	Self-confidence LT	0.74	0.73	0.77	0.60
	Avoid activities LW	0.64	0.45	0.62	0.91
	Avoid activities LY	0.86	0.11	0.35	0.81
	Avoid activities LT	0.68	0.10	0.11	0.82
Sleep & Depression	**Depression diagnosis**	0.22	0.59	0.74	**<0.001**
	Ever felt depressed	0.87	0.38	0.74	**0.011**
	Psoriasis caused dep.	0.61	0.52	0.55	**<0.001**
	Thought about suicide	0.80	0.39	**0.005**	0.24
	Depression LW	0.19	0.90	0.61	0.31
	Depression LY	0.63	0.63	0.95	0.43
	Depression LT	0.46	0.50	0.43	0.87
	Sleep LW	0.94	0.79	0.65	0.18
	Sleep LY	0.79	0.68	0.59	0.30
	Sleep LT	0.54	0.43	0.70	0.073
Religion**	**Religious services LY**	0.80	0.81	0.015	0.58
	Religious services LT	0.89	0.018	0.40	0.40
	How religious LY	0.23	0.053	0.45	0.59
	How religious LT	0.57	0.16	0.33	0.58
	Prayed LY	0.46	0.26	0.53	0.51
	Prayed LT	0.71	0.22	0.30	0.28
	Importance of God LY	0.22	0.088	0.95	0.95
	Importance of God LT	0.32	0.031	0.87	0.57
	Psoriasis affected religiousness	0.90	0.049	0.073	0.76

* To correct for multiple hypothesis testing, only *P*-values <0.013 were considered significant.
** Results are based on the responses of a smaller subset of 58 subjects.

Table 5. Patient & disease characteristics: mean values for each BMI group and *P*-values for differences amongst the three BMI groups.

		Mean			*P*-value
		Normal (N=36)	**Overweight (N=44)**	**Obese (N=34)**	
Patient & Disease Characteristics	**BMI**	23	27.3	35.7	**<0.001**
	Age	49.9	46	47.3	0.48
	Age at diagnosis	27.9	25.4	27.4	0.75
	Disease duration	22.0	20.8	21.0	0.93
	LW DLQI	9.1	8.3	9.1	0.87
	LY DLQI	11.2	10.4	11.7	0.78
	LT DLQI	15.3	15.2	14.8	0.95
	SAPASI	14.7	10.2	13.7	0.42
	PASI	9.7	9.7	11.2	0.75
	BSA	11.9	13.0	15.4	0.67

Table 6. Mean values of dependent variables for each BMI group and *P*-values for differences amongst the three BMI groups.

		Mean			*P*-value
		Normal (N=36)	Overweight (N=44)	Obese (N=34)	
Medical Disability	**Perceived general health**	1.9	1.5	0.82	**<0.001**
	Psoriasis caused wt. gain	-1.6	-1.5	-0.059	**0.014**
	LY comparative severity	-0.20	-0.25	-0.031	0.89
	LT comparative severity	-0.82	-0.34	-0.88	0.49
Depression & Sleep	**Psoriasis caused dep.**	0.40	0.091	0.68	0.49
	Depressed LW	0.88	0.95	0.50	0.19
	Depressed LY	1.0	1.0	0.91	0.70
	Depressed LT	1.5	1.7	1.4	0.66
	Sleep LW	0.85	0.73	0.62	0.54
	Sleep LY	0.91	0.66	0.70	0.34
	Sleep LT	0.69	1.1	1.4	**0.016**
Social Anxiety	**Hide psoriasis LW**	0.78	1.2	1.3	0.41
	Hide psoriasis LY	1.2	1.6	1.9	**0.047**
	Hide psoriasis LT	1.5	2.2	2.4	**0.010**
	Self-confidence LW	0.78	0.81	1.1	0.25
	Self-confidence LY	0.97	1.1	1.6	**0.034**
	Self-confidence LT	1.2	1.6	1.8	**0.011**
	Avoid activities LW	0.82	1.0	0.73	0.55
	Avoid activities LY	1.1	1.3	1.1	0.52
	Avoid activities LT	1.2	1.4	1.8	**0.012**
Economic Outcomes	**Career choice**	0.16	-0.12	-0.097	0.43
	Work less	-1.3	-1.5	-1.1	0.84
Relationships	**Sexual rel. LW**	0.50	0.67	0.16	0.057
	Sexual rel. LY	0.59	0.88	0.52	0.13
	Sexual rel. LT	1.2	1.3	1.1	0.56

Table 7. Distribution of subjects and *P*-values for differences amongst the three BMI groups.

			Normal	Overweight	Obese	*P*-Value
Medical Disability	**Receiving treatment**	Yes	94%	91%	88%	0.65
	Weight is problem	Yes	17%	50%	85%	**<0.001**
	Arthritis	Yes	28%	35%	45%	0.27
	Diabetes	Yes	6%	5%	9%	0.73
	Coronary artery disease	Yes	3%	2%	6%	0.66
	Irritable bowel disease	Yes	9%	9%	9%	1.0
Depression	**Depression**	Yes	18%	24%	31%	0.43
	Ever felt depressed	Yes	46%	55%	65%	0.53
Substance Abuse	**Ever smoked**	Yes	8%	25%	15%	0.13
	Recreational drugs	Yes	50%	33%	18%	**0.012**
Economic & Educational Outcomes	**Disability**	Yes	14%	12%	20%	0.77
	Undesired unemployment	Yes	14%	30%	26%	0.24
	Collected unemployment	Yes	31%	34%	32%	0.95
	Medicaid ever	Yes	8%	7%	6%	0.93
	Patient education	High school incomplete High school College Graduate	3% 17% 44% 36%	0% 18% 39% 43%	0% 38% 32% 29%	0.10
	Mother education	High school incomplete High school College Graduate	13% 53% 17% 17%	16% 51% 23% 9%	12% 68% 18% 3%	0.87
	Father education	High school incomplete High school College Graduate	8% 44% 25% 22%	16% 35% 21% 28%	24% 38% 29% 9%	0.25
	Household income	<$25,000 $25,000 - $45,000 $45,000 - $65,000 $65,000 - $85,000 >$85,000	6% 16% 13% 13% 53%	10% 14% 7% 14% 55%	0% 23% 13% 16% 48%	0.35
Relationships	**Ever married**	Yes	69%	61%	68%	0.72
	Currently married	Yes	53%	65%	72%	0.31
	Ever divorced	Yes	36%	24%	10%	0.11
	Have children	Yes	50%	59%	61%	0.62

Table 8. Mean values for each BMI group and *P*-values of *post hoc* analyses comparing two BMI groups at a time.*

	Mean		*P*-value	Mean		*P*-value	Mean		*P*-value
	Normal (N=36)	Overweight (N=44)		Normal (N=36)	Obese (N=34)		Overweight (N=44)	Obese (N=34)	
Perceived general health	1.9	1.5	**0.011**	1.9	0.82	**<0.001**	1.5	0.82	**0.007**
Psoriasis caused wt. gain	-1.6	-1.5	0.36	-1.6	-0.059	**0.015**	-1.5	-0.059	**0.016**
Sleep LT	0.69	1.1	0.019	0.69	1.4	**0.010**	1.1	1.4	0.11
Hide psoriasis LY	1.2	1.6	0.18	1.2	1.9	0.020	1.6	1.9	0.23
Hide psoriasis LT	1.5	2.2	**0.012**	1.5	2.4	**0.002**	2.2	2.4	0.14
Self-confidence LY	0.97	1.1	0.22	0.97	1.6	0.018	1.1	1.6	0.12
Self-confidence LT	1.2	1.6	0.13	1.2	1.8	**0.006**	1.6	1.8	0.33
Avoid activities LT	1.2	1.4	0.27	1.2	1.8	**0.011**	1.4	1.8	0.13
Weight is problem (% yes)	0.17	0.5	**0.001**	0.17	0.85	**<0.001**	0.5	0.85	**0.002**
Recreational drugs (% yes)	0.5	0.33	0.13	0.5	0.18	**0.012**	0.33	0.18	0.13

* To account for multiple hypothesis testing, only P-values <0.017 were considered significant.

Table 9. Patient and disease characteristics: mean values for each age-at-diagnosis quartile and *P*-values for differences amongst the four groups.

		Mean				*P*-value
		1st (N=28) Mean	2nd (N=29) Mean	3rd (N=29) Mean	4th (N=28) Mean	
Patient & Disease Characteristics	**Age at diagnosis**	10.1	20.0	29.0	49.5	**<0.001**
	Age	39.4	42.5	48.7	59.9	**<0.001**
	Disease duration	29.3	22.5	19.7	10.4	**<0.001**
	SAPASI	13.9	10.9	12.9	12.2	0.77
	PASI	11.7	8.62	10.1	8.5	0.31
	BSA	13.8	11.9	13.4	12.1	0.92
	LW DLQI	9.82	9.14	7.62	8.68	0.76
	LY DLQI	11.7	11.6	10.4	11.4	0.94
	LT DLQI	19.2	16.9	13.4	10.7	**<0.001**
	BMI	27.7	29.3	27.8	28.4	0.68
	LY comp. severity	0.46	-0.38	0.18	-0.75	0.11
	LT comp. severity	-0.89	-0.45	-0.29	-0.89	0.65
	Satisfied w/ treatment	1.2	0.72	0.56	0.90	0.57
	Worried	2.7	2.6	2.3	2.0	0.17

Table 10. Mean values of significant dependent variables for each age-at-diagnosis quartile and *P*-values for differences amongst the four groups.

		Mean				*P*-value
		1st (N=28)	2nd (N=29)	3rd (N=29)	4th (N=28)	
Age at diagnosis of arthritis		29.3	39.4	38.6	49.4	**0.049**
Psoriasis caused depression		1.3	0.72	0.34	-1.1	**<0.001**
Sleep LT		1.3	1.4	0.76	0.69	**0.047**
How long current job		8.8	7.7	12.4	16.7	**0.033**
Hide psoriasis LT		2.4	2.3	1.9	1.5	**0.002**
Arthritis	Yes	22%	25%	59%	62%	**0.007**
High cholesterol	Yes	0%	33%	21%	50%	**0.018**
Hypertension	Yes	0%	8%	8%	43%	**0.007**
Recreational drugs	Yes	44%	51%	48%	7.1%	**0.007**
Mother education	High school incomplete	11%	11%	14%	21%	**0.022**
	High school	33%	61%	57%	71%	
	College	44%	18%	14%	4%	
	Graduate	11%	11%	14%	4%	

able11. Mean values for each age-at-diagnosis quartile and *P*-values of *post hoc* analyses comparing two groups at a time.*

		Mean		*P*-value	Mean		*P*-value	Mean		*P*-value	Mean		*P*-value	Mean		*P*-value	Mean		*P*-value
		1st (N=28)	2nd (N=29)		1st (N=28)	3rd (N=29)		1st (N=28)	4th (N=28)		2nd (N=29)	3rd (N=29)		2nd (N=29)	4th (N=28)		3rd (N=29)	4th (N=28)	
ge		39.4	42.5	0.33	39.4	48.7	**0.004**	39.4	59.9	**<0.001**	42.5	48.7	0.050	42.5	59.9	**<0.001**	48.7	59.9	**<0.001**
isease duration		29.3	22.5	0.030	29.3	19.7	**0.002**	29.3	10.4	**<0.001**	22.5	19.7	0.36	22.5	10.4	**<0.001**	19.7	10.4	**0.004**
T DLQI		19.2	16.9	0.26	19.2	13.4	**0.005**	19.2	10.7	**<0.001**	16.9	13.4	0.089	16.9	10.7	**0.003**	13.4	10.7	0.19
ge at diagnosis of rthritis		29.3	39.4	0.17	29.3	38.6	0.15	29.3	49.4	**0.005**	39.4	38.6	0.90	39.4	49.4	0.13	38.6	49.4	0.055
soriasis caused epression		1.3	0.72	0.21	1.3	0.34	0.047	1.3	-1.1	**<0.001**	0.72	0.34	0.40	0.72	-1.1	**0.002**	0.34	-1.1	0.021
ow long current job		8.8	7.7	0.50	8.8	12.4	0.23	8.8	16.7	0.043	7.7	12.4	0.046	7.7	16.7	0.011	12.4	16.7	0.33
ide psoriasis LT		2.4	2.2	0.77	2.4	1.9	0.12	2.4	1.4	**0.005**	2.2	1.9	0.31	2.2	1.4	0.009	1.9	1.4	0.19
leep LT		1.3	1.4	0.76	1.3	0.76	0.093	1.3	0.69	**0.007**	1.4	0.76	0.035	1.4	0.69	**0.003**	0.76	0.69	0.80
rthritis (% yes)		22%	25%	0.81	22%	59%	**0.003**	22%	62%	**0.002**	25%	59%	**0.004**	25%	62%	**0.003**	59%	62%	0.64
igh cholesterol (% yes)		0%	33%	0.015	0%	21%	0.058	0%	50%	**0.002**	33%	21%	0.50	33%	50%	0.39	21%	50%	0.11
ypertension (% yes)		0%	8%	0.25	0%	8%	0.27	0%	43%	**0.004**	8%	8%	0.95	8%	43%	0.048	8%	43%	0.037
ecreational drugs (% yes)		44%	51%	0.68	44%	48%	0.97	44%	7.1%	**0.003**	51%	48%	0.77	51%	7.1%	**0.001**	48%	7.1%	**0.002**
lother ducation	High school incomplete	11%	11%	0.15	11%	14%	0.10	11%	21%	**0.002**	11%	14%	0.93	11%	21%	0.18	14%	21%	0.22
	High school	33%	61%		33%	57%		33%	71%		61%	57%		61%	71%		57%	71%	
	College	44%	18%		44%	14%		44%	4%		18%	14%		18%	4%		14%	4%	
	Graduate	11%	11%		11%	14%		11%	4%		11%	14%		11%	4%		14%	4%	

To account for multiple hypothesis testing, only P-values <0.008 were considered significant.

Table 12. *P*-values for age at diagnosis, current age, disease duration, PASI, LY comparative severity, and LT comparative severity as predictors of surveyed dependent variables.*

		Age at Diagnosis	Age	Disease Duration	PASI	LY Comp. Severity	LT Comp. Severity
Patient & Disease Characteristics	**LW DLQI**	0.96	0.75	0.70	**0.001**	0.12	0.42
	LY DLQI	0.80	0.095	0.16	**0.003**	0.025	0.81
	LT DLQI	**<0.001**	0.24	0.24	0.16	0.15	0.023
	BMI	1.0	0.63	0.62	0.59	0.29	0.28
	Receiving treatment	0.34	0.33	0.93	0.52	0.74	0.47
	Satisfied w/ treatment	0.51	0.40	0.10	0.008	0.48	0.22
	Worried	0.33	0.013	0.33	0.52	0.32	0.41
Medical Disability	**Perceived general health**	0.85	0.23	0.33	0.012	0.42	**0.001**
	Weight is a problem	0.85	0.28	0.18	0.71	0.71	0.019
	Age weight became a problem	0.59	**<0.001**	0.59	0.62	0.33	0.68
	Lbs. want to lose	0.69	0.25	0.13	0.70	0.52	0.13
	Psoriasis caused weight gain	0.37	0.90	0.40	0.24	0.11	**0.001**
	Arthritis diagnosis	0.036	0.10	0.47	0.49	0.99	0.34
	Arthritis diagnosis age	0.52	**<0.001**	0.52	0.62	0.49	0.43
	Diabetes diagnosis	0.082	0.11	0.73	0.79	0.26	0.31
	Coronary artery disease diagnosis	**<0.001**	0.47	0.47	0.77	0.099	0.24
	High cholesterol	0.46	**0.005**	0.46	0.56	0.89	0.31
	Hypertension	**<0.001**	0.65	0.65	0.22	0.73	0.66
	Heart attack	0.012	0.98	0.98	0.66	0.65	0.56
	IBD	0.69	0.88	0.55	0.54	0.30	0.059
Depression & Sleep	**Depression diagnosis**	0.74	0.58	0.34	0.58	0.064	0.14
	Felt depressed	**0.003**	0.84	0.83	0.89	0.20	0.62
	Psoriasis caused depression	**<0.001**	**<0.001**	0.88	0.59	0.71	0.077
	Thought about suicide	0.94	0.047	0.94	0.62	0.59	0.43
	Depression LW	0.94	0.78	0.71	0.089	0.61	0.28
	Depression LY	0.86	0.59	0.72	0.52	0.94	0.47
	Depression LT	0.38	0.61	0.62	0.30	0.45	0.96
	Sleep LW	0.28	0.54	0.56	0.90	0.57	0.36
	Sleep LY	0.061	0.39	0.23	0.91	0.37	0.47
	Sleep LT	**0.004**	0.28	0.28	0.86	0.34	0.65
Economic & Educational Outcomes	**Employed**	0.45	**0.001**	0.45	0.39	0.59	0.47
	How long current job	0.42	**<0.001**	0.42	0.87	0.23	0.26
	Work hours/week	0.18	**0.008**	0.18	0.56	0.24	0.27
	Hours worked overtime	0.12	0.19	0.69	0.082	0.017	0.77
	Career choice	0.52	0.087	0.31	0.23	0.40	0.59
	Work less	0.73	0.39	0.64	0.26	0.54	0.018
	Disability	0.20	0.31	0.63	0.25	0.75	0.57
	Undesired unemployment	0.98	0.96	0.93	0.65	0.17	0.41
	Collected unemployment	0.16	**0.004**	0.16	0.83	0.013	0.91
	Patient education	0.69	0.16	0.052	0.82	0.28	0.45
	Mother education	0.089	**<0.001**	0.089	0.10	0.72	0.23
	Father education	0.16	**<0.001**	0.16	0.24	0.89	0.077
	Household income	0.28	0.13	0.74	0.86	0.90	0.83
	Medicaid ever	0.73	0.011	0.73	0.051	0.22	0.21

* To correct for multiple hypothesis testing, only *P*-values <0.008 were considered significant.

Table 12. *P*-values for age at diagnosis, current age, disease duration, PASI, LY comparative severity, and LT comparative severity as predictors of surveyed dependent variables.* (continued)

		Age at Diagnosis	Age	Disease Duration	PASI	LY Comp. Severity	LT Comp. Severity
Social Anxiety & Substance Abuse	**Ever smoked**	0.25	0.017	0.25	0.082	0.81	0.95
	Age started smoking	0.68	0.92	0.56	0.81	0.33	0.63
	Packs per day	0.99	0.92	0.91	0.27	0.95	0.61
	Psoriasis caused smoking	0.70	0.68	0.20	0.49	0.73	**0.007**
	Recreational drugs	**<0.001**	0.43	0.43	0.42	0.84	0.45
	Psoriasis caused drug use	0.19	0.47	0.68	0.95	0.51	0.41
	Interaction w/ people	0.51	0.99	0.49	0.64	0.61	0.26
	Hide psoriasis LW	0.37	0.053	0.34	0.40	0.70	0.21
	Hide psoriasis LY	0.26	0.011	0.26	0.42	0.76	0.71
	Hide psoriasis LT	**<0.001**	0.78	0.78	0.31	0.14	0.98
	Self-confidence LW	0.16	0.043	0.65	0.61	0.80	0.61
	Self-confidence LY	0.79	**0.003**	0.79	0.74	0.20	0.78
	Self-confidence LT	0.17	0.012	0.17	0.89	0.022	0.97
	Avoid activities LW	0.67	0.21	0.42	0.45	0.57	0.93
	Avoid activities LY	0.82	0.068	0.10	0.61	0.29	0.80
	Avoid activities LT	0.19	0.052	0.62	0.90	0.12	0.89
Relationships	**Ever married**	0.91	**<0.001**	0.91	0.27	0.51	0.47
	Age first married	0.75	**0.003**	0.75	1.0	0.27	0.12
	Currently married	0.36	0.018	0.36	0.41	0.70	0.51
	Ever divorced	0.025	**<0.001**	0.025	0.85	0.49	0.92
	Children	0.76	**<0.001**	0.76	0.64	0.59	0.13
	No. of children	0.50	**<0.001**	0.49	0.25	0.84	0.69
	Psoriasis influenced no. of children	0.20	0.71	0.27	0.60	0.34	0.57
	Sex relationships LW	0.95	0.49	0.42	0.063	0.39	0.51
	Sex relationships LY	0.43	0.17	0.60	0.32	0.77	0.37
	Sex relationships LT	0.062	0.21	0.39	0.89	0.41	0.49
Discrimination**	**Discrimination work LY**	0.14	0.064	0.83	**0.002**	0.69	0.044
	Discrimination work severity LY	0.65	0.11	0.17	0.82	0.85	0.19
	Discrimination work LT	0.48	0.12	0.37	0.068	0.30	0.31
	Discrimination work severity LT	0.76	0.36	0.32	0.79	0.58	**0.006**
	Discrimination social setting LY	0.97	0.025	0.97	0.16	0.31	0.36
	Discrimination social setting severity LY	0.75	0.031	0.75	0.29	0.020	0.061
	Discrimination social setting LT	0.48	**0.002**	0.48	0.23	0.35	0.23
	Discrimination social setting severity LT	**0.002**	0.85	0.85	0.40	0.79	0.16
Religion**	**Religious services LY**	0.018	0.91	0.91	0.84	0.84	0.097
	Religious services LT	0.33	0.79	0.35	0.85	0.71	0.13
	How religious LY	0.12	0.21	0.61	0.73	0.24	0.37
	How religious LT	0.46	0.019	0.46	0.90	0.56	0.093
	Prayed LY	0.23	0.13	0.84	0.75	0.71	0.72
	Prayed LT	0.50	0.16	0.44	0.84	0.40	0.28
	Importance of God LY	0.017	0.89	0.89	0.29	0.89	0.83
	Importance of God LT	0.22	0.82	0.19	0.18	0.99	0.52
	Psoriasis affected religiousness	0.53	0.59	0.85	0.89	0.33	0.75

* To correct for multiple hypothesis testing, only *P*-values <0.008 were considered significant.
** Results are based on the responses of a smaller subset of 58 subjects.