

Title: Subjective well-being in patients with pemphigus: a path analysis

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Abstract

Background: Pemphigus is a chronic autoimmune blistering disease of the skin and mucosa severely impairing patients' health-related quality of life (HRQoL). To date, no studies have measured subjective well-being in terms of life satisfaction in pemphigus. Our main objective was to evaluate satisfaction with life in patients with pemphigus, and to analyse its relationship with clinical severity and HRQoL.

Methods: A cross-sectional survey was carried out enrolling 77 patients with pemphigus. Subjective well-being was measured by using the Satisfaction with Life Scale (SWLS). HRQoL was assessed by the Dermatology Life Quality Index (DLQI) and EQ-5D-5L. Disease severity was measured by Autoimmune Bullous Skin Disorder Intensity Score (ABSIS).

Results: Mean ABSIS, DLQI, EQ-5D-5L and SWLS scores of patients were 11.7 (SD 17.3), 5.4 (6.8), 0.84 (0.22) and 4.76 (SD 1.52), respectively. The proportion of patients indicating extreme dissatisfaction, dissatisfaction, slightly below average in life satisfaction, average satisfaction, high satisfaction and very high satisfaction with life was 6 (7.8%), 5 (6.5%), 14 (18.2%), 16 (20.8%), 21 (27.3%) and 15 (19.5%), respectively. Life satisfaction was independent from age, gender, level of education and type of disease. A path analysis revealed that there was no direct relationship between ABSIS and SWLS ($\beta = -0.09$; $p = 0.428$); however, the following indirect path was confirmed: ABSIS \rightarrow DLQI \rightarrow EQ-5D-5L \rightarrow SWLS.

Conclusions: Disease severity and HRQoL measures regularly used to assess patients' health status may be complemented with a measure of subjective well-being, such as SWLS, in order to achieve a more holistic assessment of patients' lives and optimise pemphigus care.

Keywords: pemphigus vulgaris, pemphigus foliaceus, path analysis, health-related quality of life, satisfaction with life, subjective well-being

JEL Classification: I10

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Conflict of interest:

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Compliance with ethical standards: This study received an ethical approval from the Medical Research Council of Hungary (ETT-TUKEB 27416-3/2016/EKU). Participants provided their explicit informed consent prior to beginning answering the survey. Participants provided implicit consent when submitted the questionnaire. Personal identifying information was not collected, and the participant responses were anonymized prior to analysis

Pemphigus is a rare, autoimmune blistering disease with two major subtypes pemphigus vulgaris and pemphigus foliaceus [1]. Pemphigus vulgaris accounts for approximately 70-90% of all cases with an annual incidence rate of 0.76 to 32 per million [2,3]. Mean age of onset is usually between 50 and 60 years. Pemphigus causes blisters and erosions developing on the skin or mucous membranes, such as in the mouth. Physical symptoms include itching, skin burning and pain. Pemphigus has a strong influence on patients' health related quality of life (HRQoL), but it largely affects other aspects of patients' life, such as social activities or productivity [4-6]. It has been shown that pemphigus is associated with one of the largest HRQoL impairment among chronic skin diseases [4,5,7-9].

Recently, subjective well-being has gained increasing attention in health policy. Subjective well-being reflects an overall evaluation of the quality of a person's life from their own perspective [10]. Evidence on subjective measures of well-being is in the focus of interest to provide a basis for reimbursement decisions about health technologies [11]. To use well-being outcomes in resource allocation decisions, the relationship between subjective well-being and the different dimensions of health, such as clinical symptoms, disease-specific and general HRQoL, needs to be explored [12]. Life satisfaction is a core indicator of people's subjective well-being. Satisfaction with life can be used as an outcome measure, as it is directly related to HRQoL. In patients suffering from chronic diseases, both physical and mental problems may have a substantial negative impact on satisfaction with life [13].

Patients' interpersonal relationships, social activities, sexual life and self-esteem are commonly adversely affected by chronic dermatological diseases [14]. In addition, patients may be dissatisfied with treatments and healthcare in general. Unemployment rate was also found higher in chronic skin diseases compared to health controls, and a proportion of patients also face a lower earning potential [15-18]. Dissatisfaction with life has been earlier reported in patients with atopic dermatitis, psoriasis, hidradenitis suppurativa, melanoma, systemic lupus erythematosus and urticaria [19-25]. Life satisfaction, however, has not yet been measured in pemphigus patients. Therefore, our main objective was to evaluate the satisfaction with life in patients with pemphigus and to analyse the relationship between severity of clinical symptoms, HRQoL and life satisfaction as an indicator of subjective well-being.

Methods

Study population and setting

Between December 2014 and June 2017, a cross-sectional study was conducted in four academic dermatology departments in Hungary. Consecutive patients over 18 years of age diagnosed with any form of pemphigus were enrolled after an informed consent form was read and signed. Permission for conducting the study was granted by the National Scientific and Ethical Committee (reference No. ETT-TUKEB 27416-3/2016/EKU).

First part of the survey asked patients about demographics, employment status, self-reported disease severity, utilisation of healthcare services in the past 12 months, HRQoL, and satisfaction with life. Dermatologists filled in the second part of the questionnaire. Based on medical records they provided data on clinical characteristics, medications, medical history and disease severity.

Outcome measures

EQ-5D-5L

EQ-5D-5L is a widely used generic instrument to assess general HRQoL [26,27]. It consists of two parts: a descriptive system and a visual analogue scale (EQ VAS). The descriptive system involves the following five dimensions of general HRQoL: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. For each dimension, patients may choose from five response levels (no problems = 1, slight problems = 2, moderate problems = 3, severe problems = 4 and unable to/extreme problems = 5) resulting in a total of 3125 (5^5) unique health states. In absence of a national value set in Hungary, the value set for England developed by Devlin et al. was applied in this study to derive EQ-5D index scores [28]. Thus, index scores may range from -0.285 to +1, where -0.285 corresponds to the worst and +1 to the best possible HRQoL. The second part of the instrument, EQ VAS is a 20-cm long, vertical visual analogue scale with endpoints of '0' (the worst health you can imagine) and '100' (the best you can imagine) recording patients' self-rating of their overall health.

DLQI

Dermatology Life Quality Index (DLQI) is a skin-specific self-reported questionnaire [29,30]. It consists of ten items covering the common problems affecting HRQoL of patients with skin

diseases, such as symptoms, side effects of treatment, daily activities, work or school, personal relationships, leisure activities, and feelings of embarrassment. Each item is scored on a 4-point scale: 'not at all' or 'not relevant'=0, 'a little'=1, 'a lot'=2 and 'very much'=3. DLQI total score is calculated by summing the score of each question resulting in a maximum of 30 and a minimum of 0, where the higher the score, the more HRQoL is impaired.

SWLS

The Satisfaction with Life Scale (SWLS) is an extensively used questionnaire to quantify people's global judgement on their the subjective well-being [31]. The Hungarian version of SWLS showed a good internal consistency reliability (Cronbach's α 0.84), convergent validity with the Rosenberg Self-esteem Scale and the Purpose in Life Test and an excellent test-retest reliability [32]. SWLS is a 5-item instrument each of which is rated on a 7-point scale ranging from 'strongly disagree' to 'strongly agree'. The total score was estimated as the average of the five items resulting in a score between 1 and 7, where a higher score reflects a greater life satisfaction for the individual [31]. The following cut-off scores were used to classify patients into SWLS groups: 1-2 ('extremely dissatisfied'), 2-3 ('dissatisfied'), 3-4 ('slightly below average satisfaction'), 4-5 ('average satisfaction'), 5-6 ('satisfied') and 6-7 ('highly satisfied') [33].

ABSIS

Severity of pemphigus was graded by using the Autoimmune Bullous Skin Disorder Intensity Score (ABSIS) [34-36]. The ABSIS total score ranges between 0 and 206, where a higher score indicates more severe disease. Subgroups of disease severity were defined based on the following cut-off values: limited (ABSIS 0-3), moderate (ABSIS 4-16), significant (ABSIS 17-52) and extensive (ABSIS 53-206) pemphigus [37].

Statistical analysis

First, sample and SWLS item characteristics were computed. As a preliminary analysis, Pearson's correlation coefficients were calculated to explore the relationships between the outcome measures. A correlation coefficient of 0-0.39 was defined as weak, 0.40-0.79 as moderate, and 0.80-1 as a strong correlation. The differences in SWLS scores between subgroups of patients were compared by using Mann-Whitney U test.

We conducted a path analysis to test a hypothesized model predicting SWLS scores from EQ-5D-5L index, DLQI, ABSIS scores. Among the four variables the following six paths were hypothesized and tested: (1) ABSIS → DLQI (+); (2) ABSIS → EQ-5D-5L (-); (3) ABSIS → SWLS (-); (4) DLQI → EQ-5D-5L (-); (5) DLQI → SWLS (-) and (6) EQ-5D-5L → SWLS (+). To determine whether the expected model was plausible with the data, we used a Chi-square test statistic. The following goodness-of-fit indices were used based on Hu and Bentler's recommendations: comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) [38]. A CFI of > 0.95 was considered as an indicative of good fit. Acceptable threshold values of RMSEA and SRMR were ≤0.06 and ≤0.08, respectively. P-values less than 0.05 were taken as statistically significant. The path analysis was conducted by using AMOS 23, all other analyses were performed by using SPSS 25.0 (Armonk, NY: IBM Corp.).

Results

General characteristics

A total of 77 patients completed the SWLS, DLQI and EQ-5D-5L questionnaires. Characteristics of the patient population are presented in Table 1. Mean age was 55.4 (SD 14.8) years, and 58% were female. The majority of patients (73%) were diagnosed with pemphigus vulgaris and 26% with pemphigus foliaceus. One patient had IgA pemphigus. Mean ABSIS score of the study population was 11.7 (SD 17.3). Based on ABSIS, 37 (48%), 20 (26%), 16 (21%) and 4 (5%) patients were grouped into mild, moderate and significant and extensive pemphigus subgroups. Mean EQ-5D-5L index and EQ VAS scores were 0.84 (0.22) and 69 (22), respectively.

Descriptive statistics of SWLS

Distribution of responses on the five items of SWLS is presented in Figure 1. The highest rate of 'strongly agree' responses was found for items 1, 3 and 5 (19%), while the highest rate of 'strongly disagree' responses was observed for item 5. The mean SWLS total score in the sample was 4.76 (SD 1.52). All five items exhibited very similar means: item 1: "In most ways, my life is close to my ideal" (4.83, SD 1.76), item 2: "The conditions of my life are excellent" (4.63, SD 1.80), item 3: "I am satisfied with my life" (4.92, SD 1.77), item 4: "So far I have

gotten the important things I want in my life” (4.7, SD 1.58) and item 5: “If I could live my life over, I would change almost nothing” (4.55, SD 1.85).

Six (7.8%) patients indicated extreme dissatisfaction, 5 (6.5%) dissatisfaction, 14 (18.2%) slightly below average in life satisfaction, 16 (20.8%) average satisfaction, 21 (27.3%) high satisfaction and 15 (19.5%) very high satisfaction with their lives, respectively.

Correlation analysis

Table 2 reports the correlations among ABSIS, DLQI, EQ-5D-5L and SWLS total scores. Moderate correlations were found between ABSIS and DLQI ($r=0.425$, $p<0.001$), between DLQI and EQ-5D-5L ($r=-0.593$, $p<0.001$) and between EQ-5D-5L and SWLS ($r=0.465$, $p=0.011$). ABSIS demonstrated a weak correlation with EQ-5D-5L ($r=-0.345$, $p=0.002$) and with SWLS ($r=-0.237$, $p=0.038$). A weak correlation was detected between DLQI and SWLS ($r=-0.288$, $p=0.011$).

Subgroup analysis of SWLS

Table 3 presents the total SWLS scores in subgroups of patients based on gender, age, education and type of pemphigus. Slightly higher mean SWLS scores were observed in females (4.82), patients aged >65 (4.91), those with a college or university degree (5.05) and pemphigus foliaceus patients (4.93); however, the differences were insignificant.

Results of the path analysis model

The path analysis model we evaluated is depicted in Figure 2. The results indicate that there was a statistically significant path from ABSIS->DLQI->EQ-5D-5L->SWLS. The model showed overall good fit indices: Chi-square=0.00 CFI = 1.00, SRMR = 0.00. The model explained 18.0% of the variance of DLQI, 36.2% of the EQ-5D-5L and 22.3 % of the SWLS.

ABSYS had a positive effect on DLQI ($\beta = 0.425$; $p<0.001$) indicating that the disease severity assessed by the dermatologist affects the skin-specific HRQoL perceived by the patient. The ABSIS scores demonstrated no direct impact on EQ-5D-5L index scores ($\beta =-0.114$; $p=0.262$). An indirect path was detected between ABSIS and EQ-5D-5L index through DLQI score. Contrary to our expectations, there was no direct relationship between ABSIS and SWLS ($\beta=-0.090$; $p=0.428$). DLQI had a negative effect on EQ-5D-5L ($\beta=-0.545$; $p<0.001$) implying that

skin-specific HRQoL did influence general HRQoL. There was no direct relationship between DLQI and SWLS ($\beta=0.011$; $p=0.935$). However an indirect path was detected by which the DLQI affected SWLS through the EQ-5D-5L. Finally, a significant relationship was found between EQ-5D-5L and SWLS ($\beta=0.440$; $p<0.001$).

Discussion

The aim of the present study was to investigate life satisfaction as a proxy for subjective well-being and its predictors in pemphigus patients through a path analysis. The mean SWLS score was 4.76 indicating an overall average satisfaction with life. Nearly one-third (32.3%) of patients rated their satisfaction with their life to be 'below average'. Life satisfaction was independent from patients' age, gender, level of education and type of disease. A path analysis revealed the following indirect path: ABSIS \rightarrow DLQI \rightarrow EQ-5D-5L \rightarrow SWLS. Physician's objective assessment of disease severity (ABSIS) had no direct impact on life satisfaction. This route highlights the mediating effect of the patients' perception about HRQoL on satisfaction with life.

Coping with the daily limitations caused by a chronic disease often affects patients' perception of health and satisfaction with life [39]. Previous research has shown significantly lower life satisfaction in patients with various chronic skin diseases [19-25]. For example, 16.6% of patients with atopic dermatitis in the US reported being at least somewhat dissatisfied with life [25]. In our study, 14.3% of patients declared to be dissatisfied or highly dissatisfied. A potential explanation for this could be that the majority of patients were well-treated and indicated a relatively low disease severity and less deterioration in their HRQoL, which was very likely responsible for the rather positive results regarding life satisfaction.

Earlier research suggests a good validity of the EQ-5D-5L in pemphigus patients [8]. Nevertheless, it may fail to capture some of the broader impact of pemphigus on HRQoL and subjective well-being [11]. For example, in a recent survey among members of the general population in the UK, respondents identified several important aspects of health that are not covered by the five dimensions of the EQ-5D, such as mental and emotional health and happiness [40]. Non-health outcomes including ability to work, financial security and social support in one's life might be important determinants of life satisfaction.

A practical implication of our study is that objective perception of the physician on disease severity only has an indirect effect on satisfaction with life. In routine practice, disease severity and HRQoL instruments regularly used to assess patients' health status may be complemented with a measure of subjective well-being, such as SWLS in order to achieve a more holistic assessment of patients' lives and optimise pemphigus care. This would also enable the use of subjective well-being outcomes to aid health policy decisions.

This is the first study in the literature to report on life satisfaction in pemphigus patients. Furthermore, our analyses were based on a relatively large number of patients, considering the rarity of the disease. Among the study's limitations, it needs to be acknowledged that the study was conducted in university dermatology departments, and systematic selection bias due to centre effects could have been present. Thus, the results may not be representative of the entire population of patients with pemphigus. However, the study population included a large variety of pemphigus patients in terms of clinical characteristics and severity. Secondly, many other factors possibly influencing life satisfaction has not been measured in this survey. Further research is required to identify unexplored the drivers of subjective well-being in pemphigus patients.

In conclusion, an overall average satisfaction with life was identified in patients with pemphigus. A higher level of general HRQoL is the major determinant of life satisfaction in pemphigus patients. The path analysis identified skin-specific HRQoL and disease severity as indirect predictors of satisfaction with life. These results underscore the importance of achieving remission in benefiting the lives of patients with pemphigus.

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Figure captions

Figure 1 Distribution of the responses on the 5 items of SWLS

SWLS = Satisfaction with Life Scale

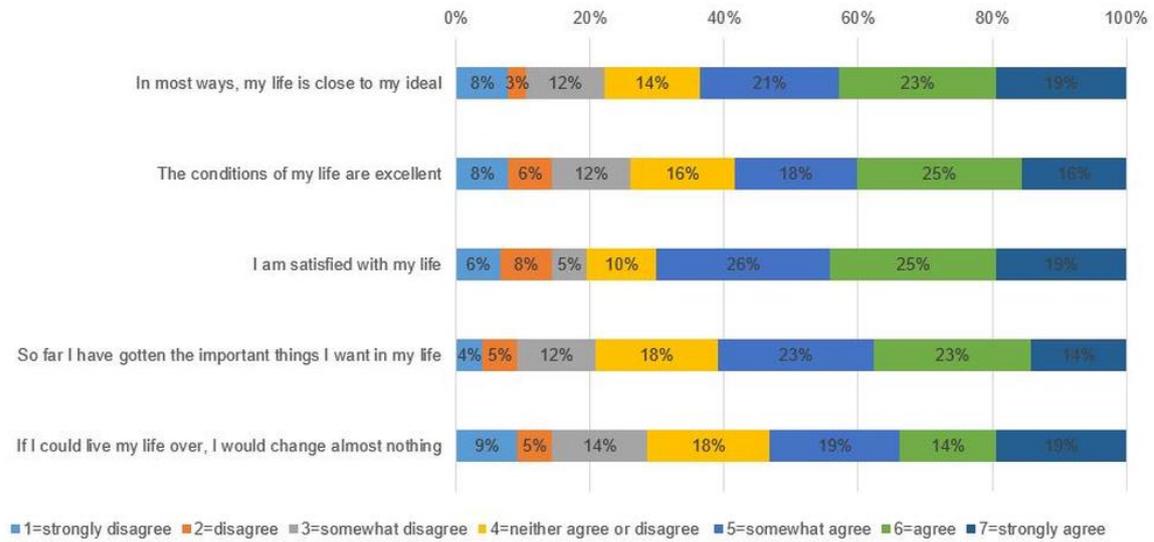


Figure 1 Path model

Notes: Every path coefficient is standardized (* $p < 0.001$). Dashed lines represent insignificant paths.

ABSIS = Autoimmune Bullous Skin Disorder Intensity Score; DLQI = Dermatology Life Quality Index; SWLS = Satisfaction with Life Scale.

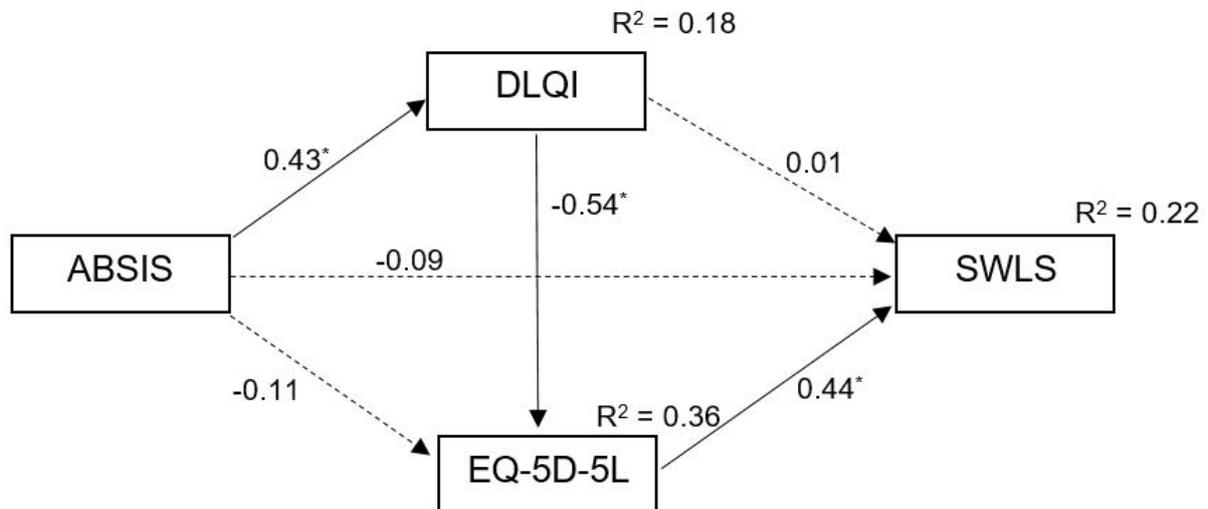


Table 1 General characteristics of the sample

| Characteristics | N (%) or mean (SD) |
|---------------------------------|--------------------|
| Number of subjects | 77 |
| Age (years) | 55.4 (14.8) |
| Female | 45 (58.4%) |
| Education | |
| Primary school | 13 (16.9%) |
| High school | 42 (54.5%) |
| College/university | 22 (28.6%) |
| Employment* | |
| Employed full-time | 29 (37.7%) |
| Employed part-time | 8 (10.4%) |
| Unemployed | 4 (5.2%) |
| Disability pensioner | 12 (15.6%) |
| Retired | 27 (35.1%) |
| Student | 1 (1.3%) |
| Other | 1 (1.3%) |
| Disease duration (years) | 4,4 (5.3) |
| Type of pemphigus | |
| Pemphigus vulgaris | 56 (72.7%) |
| Pemphigus foliaceus | 20 (26.0%) |
| IgA pemphigus | 1 (1.3%) |
| ABSIS (0-206) | 12.6 (18.9%) |
| Severity groups | |
| Limited (ABSIS 0-3) | 37 (48.1%) |
| Moderate (ABSIS 4-16) | 20 (26.0%) |
| Significant (ABSIS 17-52) | 16 (20.8%) |
| Extensive (ABSIS 53-206) | 4 (5.2%) |
| DLQI (0-30) | 5.36 (6.88) |
| EQ-5D-5L (-0.285-1) | 0.84 (0.22) |
| Current treatment | |
| None | 2 (2.6%) |
| Topical therapy (only) | 7 (9.1%) |
| Systemic therapy* | 68 (88.3%) |

*Combinations are possible.

ABSIS = Autoimmune Bullous Skin Disorder Intensity Score; DLQI = Dermatology Life Quality Index; SWLS = Satisfaction with Life Scale.

Table 2 Correlation matrix of the outcome measures

| | ABSIS | DLQI | EQ-5D-5L |
|----------------------------|------------------|------------------|-----------------|
| ABSIS (0-206) | - | - | - |
| DLQI (0-30) | 0.425 (p<0.001) | - | - |
| EQ-5D-5L (-0.285-1) | -0.345 (p=0.002) | -0.593 (p<0.001) | - |
| SWLS (1-7) | -0.237 (p=0.038) | -0.288 (p=0.011) | 0.465 (p=0.011) |

ABSIS = Autoimmune Bullous Skin Disorder Intensity Score; DLQI = Dermatology Life Quality Index; SWLS = Satisfaction with Life Scale.

For ABSIS and DLQI, higher scores represent worse health status and for EQ-5D-5L and SWLS higher scores refer to better health status/satisfaction with life.

Table 3 SWLS scores in subgroups of patients

| | Mean (SD) | Median (IQR) | p-value |
|---------------------|------------------|---------------------|------------------|
| Gender | | | <i>p = 0.688</i> |
| Male | 4.68 (1.34) | 4.90 (2.05) | |
| Female | 4.82 (1.65) | 5.20 (2.40) | |
| Age groups | | | <i>p=0.181</i> |
| 18-45 | 5.22 (1.45) | 5.3 (1.8) | |
| 46-65 | 4.45 (1.59) | 4.7 (2.2) | |
| 66- | 4.91 (1.39) | 5.2 (2.3) | |
| Education | | | <i>p = 0.577</i> |
| Primary | 4.58 (2.11) | 4.80 (4.00) | |
| Secondary | 4.66 (1.46) | 4.80 (2.20) | |
| Tertiary | 5.05 (1.25) | 5.20 (1.75) | |
| Type of pemphigus | | | <i>p = 0.562</i> |
| Pemphigus vulgaris | 4.70 (1.59) | 5.00 (2.20) | |
| Pemphigus foliaceus | 4.93 (1.34) | 5.00 (2.20) | |

SWLS = Satisfaction with Life Scale