Impact of acne on the daily life of adult patients: building a self-administered patient questionnaire

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Abstract
Background Acne is a long-lasting disease in adolescents and adults impacting the patient’s daily life. Currently, there is no specific questionnaire that assesses its impact in adult patients.
Aim To build a self-administered questionnaire assessing the impact of acne on the daily life in adult patients.
Method A multidisciplinary working group was created, including 3 experts in healthcare questionnaires and dermatologists specialized in acne. A questionnaire using a standardized methodology for designing self-administered patient questionnaires according to conceptual, development and validation phases was developed. A cultural and linguistic validation into US English was conducted, based on the original French version.
Results A 14-item questionnaire demonstrating consistency, reproducibility and high reliability was build. The questionnaire significantly correlated with the SF-12 mental and SF-12 physical scores and CADI, indicating good external validity.
Conclusion The present acne burden questionnaire AI-ADL allows the practitioner to assess quickly and easily the burden of acne in patients during his daily clinical practice. Moreover, its short format allows patients to express easily and quickly their feelings and to initiate a conversation between the practitioner and his patient. Thus, AI-ADL may help to better understand the multidimensional nature of acne, as well as the individual impact on the acne patient’s daily life and moreover, it may play a key role in the decision-making process of treatment initiation and involvement of the patient in the management of his acne.

Conflicts of interest
Sophie Seité is an employee of La Roche Posay, France. The other authors have no conflict of interest to disclose.

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Introduction
Acne vulgaris, a chronic disease of the pilosebaceous follicle. It causes non-inflammatory lesions, superficial inflammatory lesions and deep inflammatory lesions and if not or insufficiently treated it may result in scars. In the ‘Objectifs Peau’ study, published by the French Society of Dermatology (SFD), the prevalence of acne was 6.22% [95% CI: 5.89–6.56%] among individuals older than 15 years.1

With relapse being more and more frequent, acne is the main reason for dermatological consultation in France.2,3 For decades, acne has been considered being an adolescent disease. However, it may also persevere into adulthood, with a 60% prevalence reported in women aged 20–29 years and 26% in women between 40 and 49 years.4 In females, two types of adult acne may be observed: ‘persistent acne’ which is a disease continuation from adolescence, representing about 80% of adult acne
cases and ‘late-onset acne’ starting in adulthood, representing about 20%. According to Yentzer et al., one-third of all dermatology visits for acne in the United States are accounted for by women older than 25 years. Even though acne is neither a devastating nor life-threatening condition, it may cause psychosocial burden, with major implications on the patient’s daily life, quality of life and self-esteem. Its impact on the patient’s psyche has been reported being comparable with that of chronic medical conditions like asthma, diabetes or epilepsy. Gollnick et al., reported that there is a widespread misunderstanding among both physicians and lay people, who generally perceive acne as a simple, self-limited affliction of adolescents. According to the authors, acne is not an acute condition but rather a chronic one in continuous change as to its severity and body distribution.

There are several questionnaires such as the Cardiff Acne Disability Index (CADI), the acne-specific QoL questionnaire, the acne QoL scale and the 4-item index of acne QoL (acne-Q4) that all assess the impact of acne on quality of life or self-esteem of mainly adolescents and during clinical trials. However, according to our literature search, there is no specific tool that allows to assess in the daily practice the impact of acne on the daily life of adult patients.

Therefore, we believe that creating such a tool may be useful for both adult patients and clinicians in charge of patient management.

The objective of the present study was to develop a self-administered questionnaire allowing assessing the impact of acne on the daily life of patients with acne.

**Methodology**

This method was developed according to the 2010 COSMIN checklist and all items were verified in posteriori versus the updated 2018 COSMIN risk of bias checklist. The work was approved by the national Ethics committee in June 2018 (Angers, France). According to French regulations for this type of work, no written informed consent was to be obtained from participating patients.

A standard methodology for creating QoL questionnaires was used and multidisciplinary working group of experts (healthcare professionals such as physicians and public health specialists as well as medical experts in acne) was created. The questionnaire followed the format presented Seidenberg et al. and Leidy et al. for the building of a multiple ability self-report questionnaire and of health-related quality of life claims. Response modalities were determined via an expert consensus using the 7-point Likert scale: ‘never’ (0), ‘rarely’ (1), ‘sometimes’ (2), ‘often’ (3), ‘very often’ (4), ‘constantly’ (5) ‘not concerned’ (0). To prevent any confusion with changes in perception due to symptoms related to comorbidities, the majority of questions included the wording ‘due to my acne’.

The interviews ensured broad recruitment and a coherent diversity of patients in terms of geographical location, as well as of age and sociological status. Participating subjects of at least 15 years of age had to have a clinically confirmed acne of any severity assessed on the GEA acne scale. Building this questionnaire followed the following process steps: conception, development, internal and external validation, test–retest validation and translation, cross-cultural adaptation and cognitive debriefing.

**Conception**

A literature research on PubMed was made to identify work about questionnaires and scoring systems related to acne. A series of interviews with dermatologists was conducted and patient reported outcomes (PRO) were comprehensively collected to assess the patients’ perceptions and complaints and assess the initial wording. Based on the initial wording reports, a list of items that were reformulated as simple questions were drew up. The final choice of questions was made by the working group, which semantically analysed the initial phrasing. The wording of each question was examined and questions were regrouped if similarities were considered to be too strong.

As a result, a semi-structured ‘Acne Impact on Adult Daily Life’ (AI-ADL) questionnaire was created covering 4 domains: relationships with others, economic consequences, impact on work, impact on daily life, on sexuality and libido were compiled.

**Development**

The questionnaire was administered to a random sample of acne patients. Completed questionnaires were analysed by an exploratory factor analysis. A semantic analysis of the initial conceptual questionnaire was performed and non-discriminating questions and questions, for which wording was considered non-pertinent, were eliminated. An inter-item correlation matrix was created in order to compile a condensed questionnaire and a scree plot was made to determine the number of pertinent dimensions followed by an exploratory factor analysis (EFA). Questions presenting a high cross factor loading of >0.250 were eliminated.

Detailed information about the statistical analysis methods are provided in supplemental material.

**Validation**

**Internal validation** The homogeneity of the items in the total score and in each dimension was tested using the Cronbach’s α coefficient. A confirmatory factor analysis with a higher order factor was to demonstrate the questionnaires’ factorial validity and greater uni-dimensionality. The model’s suitability was measured using the Tucker-Lewis index (TLI), the comparative fit index (CFI) and root mean-square error of approximation.
A Spearman correlation was calculated assessing the reliability between the AI-ADL and the SF-12 and CADI questionnaires and a confirmatory factorial analysis was performed to confirm the structure obtained from the exploratory factorial analysis. 

Detailed information about the statistical analysis methods are provided in Supplemental Material.

**External validation** To determine the questionnaire’s validity, 261 participants completed the shortened version of the questionnaire and 2 validated self-administered questionnaires.

**Test–retest validation** Test–retest analyses were carried out to assess reproducibility. Participating patients answered the AI-ADL questionnaire once and then again after 10 days. Answers were compared and the reliability of measurements confirmed using ICC and Bland and Altman plot.

**Translation, cross-cultural adaptation and cognitive debriefing**

The validated methodology was applied to generate a US English-language version according to the recommendations of the ISPOR task force.

Detailed information about the statistical analysis methods for the development and validation steps is provided in Supplemental Material. Statistical analyses were conducted using R software version 3.6.1 for Windows. The level of significance was set at 5%.

**Results**

**Conception**

In 2016, Zaenglein et al. identified 29 acne scoring systems and quality of life questionnaires. In addition, our literature research identified 4 more acne-related quality of life and other disease-impact questionnaires assessing the effect of acne on the psyche of the patients.

Verbal exchanges and several face-to-face meetings took place between dermatologists, psychologists, social workers and patient reported outcome (PRO) experts. A total of 160 acne patients expressed and shared their perceptions and complaints regarding their acne. These discussions and interviews resulted in an initial verbatim, leading to a 51-item conceptual questionnaire (Table S1, Supporting Information). Questions were categorized into the following 4 categories: relationships with others, economic consequences, impact on work and impact on everyday life. Moreover, the questionnaire was formatted using a Likert scale with 7 possible answers.

### Table 1 Demographic and disease data of subjects participating in the development of the 19-item questionnaire

| Gender | Total | Mild | Moderate | Severe |
|--------|-------|------|----------|--------|
|        | N    | %    | N        | %      | N      | %     |
| Male   | 82   | 32.16% | 35 | 35.71% | 31 | 28.97% | 16 | 32.00% |
| Female | 173  | 67.84% | 63 | 64.29% | 76 | 71.03% | 34 | 68.00% |

| Age (years) | Mean | SD | Years | SD | Years | SD | Years | SD |
|-------------|------|----|-------|----|-------|----|-------|----|
|             | 22.1 | 7.6 | 23.2  | 8.6 | 22.2  | 7.5 | 19.5  | 4.8 |

| Acne Severity | Total | Mild | Moderate | Severe |
|---------------|-------|------|----------|--------|
|               | N    | %    | N        | %      | N      | %    |
| Mild          | 98   | 38.43% | 98 | 100.00% | 0 | 0.00% | 0 | 0.00% |
| Moderate      | 107  | 41.96% | 0  | 0.00%   | 107 | 100.00% | 0 | 0.00% |
| Severe        | 50   | 19.61% | 0  | 0.00%   | 0   | 0.00% | 50 | 100.00% |

| BMI          | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
|--------------|------|----|------|----|------|----|------|----|
|              | 21.9 | 3.7 | 21.1 | 3.0 | 22.3 | 4.2 | 22.7 | 3.6 |

| Acne duration (years) | Total | Mild | Moderate | Severe |
|-----------------------|-------|------|----------|--------|
|                       | N    | %    | N        | %      | N      | %    |
|                       | 7.3  | 6.3  | 7.5      | 6.7    | 7.9    | 6.6  | 5.9    | 4.5 |

| Lesions type | Total | Mild | Moderate | Severe |
|--------------|-------|------|----------|--------|
|              | N    | %    | N        | %      | N      | %    |
| Lesions     | 98   | 38.43% | 37 | 37.76%   | 41 | 38.32% | 20 | 40.00% |
| Scars       | 55   | 21.57% | 19 | 19.39%   | 19 | 17.76% | 17 | 34.00% |

| Localization | Total | Mild | Moderate | Severe |
|--------------|-------|------|----------|--------|
|              | N    | %    | N        | %      | N      | %    |
| Face        | 250  | 98.04% | 95 | 96.94%   | 107 | 100.00% | 48 | 96.00% |
| Chest       | 66   | 25.88% | 17 | 17.35%   | 27 | 25.23% | 22 | 44.00% |
| Back        | 119  | 46.67% | 38 | 38.78%   | 55 | 51.40% | 26 | 52.00% |

N: number, SD: standard deviation, BMI: Body Mass Index.
Detailed demographic and disease data for participants are provided in Table 1.

The semantic analysis of this questionnaire resulted in a 19-item questionnaire.

**Exploratory factor analysis** Results from the inter-item matrix correlation (Fig. 1) eliminated 5 questions, resulting in a 14-item questionnaire.

All KMO scores confirmed a suitable dataset for conducting an EFA; all scores were above 0.87 with 12 items scoring above 0.95. The scree plot (Fig. 2) determined one pertinent dimension, and therefore, the EFA was not performed.

**Validation**

The 14-item questionnaire was distributed together with SF-12 and CADI questionnaires to 207 patients with a clinically confirmed acne according to the GEA scale.18

**Internal validation** The Cronbach’s $\alpha$ coefficient was 0.949, confirming a high coherence.

The confirmatory factorial analysis confirmed the robustness of the one factorial solution with values for TLI, CFI and RMSEA of 0.998, 0.998 and 0.054, respectively. Figure 3 represents how each item relates to its subscale and how the subscales relate to the underlying factor.

**External validation** Correlation with the SF-12 and CADI scores were high with a correlation of 0.084 (CI95%: [−0.053; 0.218] with the SF-12 physical score; $P = 0.228$), of $-0.558$ (CI95%; [−0.645; −0.457]; $P < 0.001$) with the SF-12 mental score and of 0.757 (CI95% [0.692; 0.81]; $P < 0.001$) with the CADI score correlating the best, confirming the validity of the AI-ADL questionnaire.

The Kruskal–Wallis test confirmed the statistically significant ($P < 0.001$) difference of AI-ADL scores among the different acne severity according to the GEA.18 The more severe acne, the higher was the AI-ADL score (mean AI-ADL scores for: mild acne $19.06 \pm 13.36$, moderate acne: $27.25 \pm 16.09$ and severe acne: $35.36 \pm 16.67$).

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**Figure 1** Representation of inter-items polychorics correlation.

**Figure 2** Scree plot representing eigen values for each factor in the dataset and the simulated dataset.

**Figure 3** Confirmatory factor analysis representing how each item relates to its subscale and how the subscales relate to the underlying factor (Burden of treatment).
Test–retest analysis
The test–retest step was realized for 47 participants. Results demonstrated a very good reproducibility, with a total intra-class correlation (ICC) score of 0.992 and a CI 95% of [0.981, 0.997]. The Bland and Altman plot showed that high difference between scores was mainly present for subject with a high overall mean suggesting that this difference was due to fluctuation in acne manifestation rather than low reproducibility of the test (Fig. 4).

Cognitive debriefing, translation and cross-cultural adaptation
Cognitive debriefing did not result in any changes of the wording of the questions. The original French version of the questionnaire was translated and underwent linguistic and cultural validation into US English. The final, validated version of the questionnaire is given in Table 2.

Discussion and conclusion
Acne significantly affects patients’ quality of life. It occurs not only in adolescents or young adults, it occurs more and more frequently in adults over 25 years and there is a need for specific tools allowing to assess the impact of acne on the adults quality of life.22–30 Several questionnaires and other tools have been developed to assess the quality of life.14,22–25 However, most of the time, these questionnaires are not specific to acne and are used in clinical studies and are due to their length or their very general aspect not suitable for the daily clinical practice.31–34

We herewith present a short and an easy-to-use self-administered questionnaire allowing adult acne patients to assess the individual impact of the disease on their daily life. It is currently available in French and US English using easily understandable questions and with a total score of 70 points acne burden can be easily graded from no to severe burden. Its short format allows patients having difficulties to communicate to express themselves using a standardized mean and thus to initiate an exchange between the practitioner and his patient. Furthermore,

![Figure 4 Bland and Altman graph for the test–retest of the score representing the difference between test and retest total score by their mean.](image)

Table 2 Final 14-item AI-ADL questionnaire

| Score                                                                 | Always | Very often | Often | Sometimes | Rarely | Never | Not applicable |
|----------------------------------------------------------------------|--------|------------|-------|-----------|--------|-------|----------------|
| 1. Have you felt put down because of your acne?                       | 5      | 4          | 3     | 2         | 1      | 0     | 0              |
| 2. Have you felt worried about your future because of your acne?      |        |            |       |           |        |       |                |
| 3. Have you avoided having your photograph taken because of your acne?|        |            |       |           |        |       |                |
| 4. Have you felt worried about meeting someone for the first time      |        |            |       |           |        |       |                |
| because of your acne?                                                 |        |            |       |           |        |       |                |
| 5. Have you felt anxious about kissing someone because of your acne?  |        |            |       |           |        |       |                |
| 6. Have you felt ashamed because of your acne?                        |        |            |       |           |        |       |                |
| 7. Have you felt that other people stare at you because of your acne? |        |            |       |           |        |       |                |
| 8. Do you feel lonely because of your acne?                           |        |            |       |           |        |       |                |
| 9. Have you found it difficult to concentrate because of your acne?   |        |            |       |           |        |       |                |
| 10. Have you felt angry because of your acne?                         |        |            |       |           |        |       |                |
| 11. Have you felt discouraged because of your acne?                   |        |            |       |           |        |       |                |
| 12. Have you lost confidence in yourself because of your acne?        |        |            |       |           |        |       |                |
| 13. Have you felt uneasy because of your acne?                        |        |            |       |           |        |       |                |
| 14. Have you felt worried about being out in public because of your acne? |        |            |       |           |        |       |                |

Sub score (sum of scores for question 1–14)

Total score (sum for sub scores 0–5)

Total score: 0 – no burden, from 1 to 20 – mild burden, between 21 and 30 – moderate burden, above 31 – severe burden.
using the questionnaire at subsequent visits allows assessing the evolution over time of acne burden on the patient. However, to confirm its utility, data about its use in the daily clinical practice needs to be gathered though real-life data collections.

In the daily clinical practice, the total burden score will be obtained by summing up scores for each of the 14 questions as defined in the aforementioned method description, with ‘never’ or ‘not applicable’ scoring 0, ‘rarely’ 1, ‘sometimes’ 2, ‘often’ 3, ‘very often’ 4 and ‘constantly’ 5.

With a total AI-ADL score of 70 points, we suggest the following burden grading: 0 = no burden, from 1 to 20 = mild burden, between 21 and 30 = moderate burden and above 31 = severe burden.

The 9-step methodology required to generate linguistically-validated and cross-culturally-adapted versions in other languages is well-established. It is with an internal consistency exceeding the minimum reliability criterion of 0.90 for individual analysis.

Long-lasting skin diseases affect the patient’s physical and mental well-being. Disease impact or burden accounts for the broadest aspects of disease-related disability, covering psychological, physical, social and economic factors, simultaneously taking into account QoL, community integration, organisation of everyday life, as well as medical resource consumption. Thus, using questionnaires allow to evaluate this overarching impact.16,35–38

Based on advances made in QoL research over the last decades, healthcare professional and regulatory agencies, such as the US Food and Drug Administration (FDA) and the European Medicine Agency (EMA), currently face complex issues related to the development of health-related quality of life claims for both product labelling and promotion.36 Leidy et al. issued recommendations to the healthcare industry for ensuring that all health-related QoL claims are based on rigorously-designed studies, with appropriate methodolgy and instrumentation.39

Development in the clinical research area has led to an ever more widespread use of questionnaires, and this trend is most likely to continue in the near future. The reason for this is the increasing relevance of data that are both closer to clinical practice and increasingly needed to achieve market access. Moreover, QoL, patient wellbeing and patient-centred outcome data are required more and more by reimbursement agencies, such as NICE in the UK and IQWIG in Germany.38

In conclusion, the present acne burden questionnaire AI-ADL allows the practitioner to quickly and easily assess the burden of acne in patients during the daily clinical practice. Moreover, its short format allows patients to express easily and quickly their feelings and to initiate a conversation between the practitioner and his patient. Thus, AI-ADL may help to better understand the multidimensional nature of acne, as well as the individual impact on the acne patient’s daily life and thus play a key role in the decision-making process of treatment initiation and involvement of the patient in the management of his acne.

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References
1. Richard MA, Corgibet F, Beylot-Barry M, Barbaud A, Bodemer C, Chaussade V et al. Sex- and age-adjusted prevalence estimates of five chronic inflammatory skin diseases in France: results of the << OBJEC-TIFS PEAU >> study. J Eur Acad Dermatol Venereol 2018; 32: 1967–1971.
2. Dreno B, Layton A, Zouboulis CG, Lopez-Estebaran JL, Zalewska-Janowska A, Bagatin E et al. Adult female acne: a new paradigm. J Eur Acad Dermatol Venereol 2013; 27: 1063–1070.
3. Dreno B. Recent data on epidemiology of acne. Ann Dermatol Vénéréol 2010; 137(12 Supplement 2): 3–5.
4. Collier CN, Harper JC, Cafardi JA, Cantrell WC, Wang W, Foster KW et al. The prevalence of acne in adults 20 years and older. J Am Acad Dermatol 2008; 58: 56–59.
5. Yentzer BA, Hick J, Reese EL, Uhas A, Feldman SR, Balkrishnan R. Acne vulgaris in the United States: a descriptive epidemiology. Cutis 2010; 86: 94–99.
6. Do JE, Cho SM, In SI, Lim KY, Lee S, Lee ES. Psychosocial aspects of acne vulgaris: a community-based study with Korean adolescents. Ann Dermatol 2009; 21: 125–129.
7. Dunn LK, O’Neill JL, Feldman SR. Acne in adolescents: quality of life, self-esteem, mood, and psychological disorders. Dermatol Online J 2011; 17: 1.
8. Tasoula E, Gregoriou S, Chalikias J, Lazarou D, Danopoulou I, Katsambas A et al. The impact of acne vulgaris on quality of life and psychic health in young adolescents in Greece. Results of a population survey. An Bras Dermatol 2012; 87: 862–869.
9. Shuster S, Fisher GH, Harris E, Binnell D. The effect of skin disease on self image [proceedings]. Br J Dermatol 1978; 99(Suppl 16): 18–19.
10. Gollnick HP, Finlay AY, Shear N. Can we define acne as a chronic disease? If so, how and where? Am J Clin Dermatol 2008; 9: 279–284.
11. Martin AR, Lookingbill DP, Botek A, Light J, Thiboutot D, Girman CJ. Health-related quality of life among patients with facial acne – assessment of a new acne-specific questionnaire. Clin Exp Dermatol 2001; 26: 380–385.
12. Gupta MA, Johnson AM, Gupta AK. The development of an Acne Quality of Life scale: reliability, validity, and relation to subjective acne severity in mild to moderate acne vulgaris. Acta Derm Venereol 1998; 78: 451–456.
13. Tan J, Fung KY, Khan S. Condensation and validation of a 4-item index of the Acne-QoL. Qual Life Res 2006: 15: 1203–1210.
14. Motley RJ, Finlay AY. Practical use of a disability index in the routine management of acne. Clin Exp Dermatol 1992; 17: 1–3.
15. Mokkink LB, de Vet H CW, Prinsen CAC, Patrick DL, Alonso J et al. COSMIN risk of bias checklist for systematic reviews of patient-reported outcome measures. Qual Life Res 2018; 27: 1171–1179.
16. Seidenberg M, Haltiner A, Taylor MA, Hermann B, Wyler A. Development and validation of a Multiple Ability Self-Report Questionnaire. J Clin Exp Neuropsychol 1994; 16: 93–104.
17. Leidy NK, Revicki DA, Geneste B. Recommendations for evaluating the validity of quality of life claims for labeling and promotion. Value Health 1999; 2: 113–127.
18. Dreno B, Poli F, Pawan H, Beylot C, Faure M, Chivot M et al. Development and evaluation of a Global Acne Severity Scale (GEA Scale) suitable for France and Europe. J Eur Acad Dermatol Venereol 2011; 25: 43–48.
19. Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika 1951; 16: 297–334.
20. Brazier JE, Roberts J. The estimation of a preference-based measure of health from the SF-12. Med Care 2004; 42: 851–859.
21. Wild D, Grove A, Martin M, Eremenco S, McElroy S, Verjee-Lorenz A et al. Principles of good practice for the translation and cultural
22 Zaenglein AL, Pathy AL, Schlosser BJ, Alikhan A, Baldwin HE, Berson DS et al. Guidelines of care for the management of acne vulgaris. J Am Acad Dermatol 2016; 74: 945–73.e33.

23 Girman CJ, Hartmaier S, Thiboutot D, Johnson J, Barber B, DeMuro-Mercon C et al. Evaluating health-related quality of life in patients with facial acne: development of a self-administered questionnaire for clinical trials. Qual Life Res 1996; 5: 481–490.

24 Anderson RT, Rajagopalan R. Development and validation of a quality of life instrument for cutaneous diseases. J Am Acad Dermatol 1997; 37: 41–50.

25 Anderson R, Rajagopalan R. Responsiveness of the Dermatology-specific Quality of Life (DSQL) instrument to treatment for acne vulgaris in a placebo-controlled clinical trial. Qual Life Res 1998; 7: 723–734.

26 Dreno B, Bagatin E, Blume-Peytavi U, Rocha M, Gollnick H. Female type of adult acne: Physiological and psychological considerations and management. J Dtsch Dermatol Ges 2018; 16: 1185–1194.

27 Preneau S, Dreno B. Female acne - a different subtype of teenager acne? J Eur Acad Dermatol Venereol 2012; 26: 277–282.

28 Holzmann R, Shakery K. Postadolescent acne in females. Skin Pharmacol Physiol 2014; 27(Suppl 1): 3–8.

29 Lasek RJ, Chren MM. Acne vulgaris and the quality of life of adult dermatology patients. Arch Dermatol 1998; 134: 454–458.

30 Hosthota A, Bondade S, Basavaraaj V. Impact of acne vulgaris on quality of life and self-esteem. Cutis 2016; 98: 121–124.

31 Chilicka K, Maj J, Panaszek B. General quality of life of patients with acne vulgaris before and after performing selected cosmetological treatments. Patient Prefer Adherence 2017; 11: 1357–1361.

32 Haroon MZ, Alam A, Ullah I, Ali R, Taimur MF, Raza K. Quality of life and depression among young patients suffering from acne. J Ayub Med Coll Abbottabad 2019; 31: 436–440.

33 Richter C, Trojahn C, Hillmann K, Dobos G, Kanti V, Vogt A et al. Sensitivity to change of the Dermatology Life Quality Index in adult females with facial acne vulgaris: a validation study. J Eur Acad Dermatol Venereol 2017; 31: 169–174.

34 Hayashi N, Higaki Y, Kawamoto K, Kamo T, Shimizu S, Kawashima M. A cross-sectional analysis of quality of life in Japanese acne patients using the Japanese version of Skindex-16. J Dermatol 2004; 31: 971–976.

35 Meyer N, Paul C, Feneron D, Bardoulat I, Thiriet C, Camara C et al. Psoriasis: an epidemiological evaluation of disease burden in 390 patients. J Eur Acad Dermatol Venereol 2010; 24: 1075–1082.

Supporting information

Additional Supporting Information may be found in the online version of this article:
Table S1 51-item conceptual questionnaire (French original version)
Data S1 Detailed statistical methodology for the development and validation of the questionnaire