

Understanding the Burden of Adult Female Acne

^aEMIL A. TANGHETTI, MD; ^bARIANE K. KAWATA, PhD; ^cSELENA R. DANIELS, PharmD, MS; ^dKAREN YEOMANS, BSc; ^eCAROLINE T. BURK, PharmD, MS; ^fVALERIE D. CALLENDER, MD

^aThe Center for Dermatology and Laser Surgery, Sacramento, California; ^bEvidera, Bethesda, Maryland; ^cAllergan Inc., Irvine, California; ^dUnited BioSource Corporation, Montreal, Quebec; ^eHealth Outcomes Consultant, Laguna Beach, California; ^fCallender Dermatology and Cosmetic Center, Glenn Dale, Maryland

ABSTRACT

Objective: Typically regarded as an adolescent condition, acne among adult females is also prevalent. Limited data are available on the clinical characteristics and burden of adult female acne. The study objective was to describe clinical characteristics and psychosocial impact of acne in adult women. **Design:** Cross-sectional, web-based survey. **Setting:** Data were collected from a diverse sample of United States females. **Participants:** Women ages 25 to 45 years with facial acne (≥ 25 visible lesions). **Measurements:** Outcomes included sociodemographic and clinical characteristics, perceptions, coping behaviors, psychosocial impact of acne (health-related quality of life using acne-specific Quality of Life questionnaire and psychological status using Patient Health Questionnaire), and work/productivity. **Results:** A total of 208 women completed the survey (mean age 35 ± 6 years), comprising White/Caucasian (51.4%), Black/African American (24.5%), Hispanic/Latino (11.1%), Asian (7.7%), and Other (5.3%). Facial acne presented most prominently on cheeks, chin, and forehead and was characterized by erythema, postinflammatory hyperpigmentation, and scarring. Average age of adult onset was 25 ± 6 years, and one-third (33.7%) were diagnosed with acne as an adult. The majority (80.3%) had 25 to 49 visible facial lesions. Acne was perceived as troublesome and impacted self-confidence. Makeup was frequently used to conceal acne. Facial acne negatively affected health-related quality of life, was associated with mild/moderate symptoms of depression and/or anxiety, and impacted ability to concentrate on work or school. **Conclusion:** Results highlight the multifaceted impact of acne and provide evidence that adult female acne is under-recognized and burdensome. (*J Clin Aesthet Dermatol.* 2014;7(2):22–30.)

Acne vulgaris (hereafter referred to as acne) is one of the most frequently encountered externally visible skin diseases in dermatology for individuals between 15 and 40 years of age in the United States.¹ Acne has typically been regarded as an adolescent condition; however, in the past two decades, findings from research and clinical practice have revealed that it is common in the adult population.^{1–6} Literature shows that among adult cases of acne, women are affected more frequently than men; approximately 12 to 22 percent of United States women suffer from adult acne,^{4–6} compared to three percent of men.⁴ Despite the higher prevalence of adult female acne (AFA),

there is limited research investigating the epidemiology, clinical presentation, and symptom burden of this skin disease in adult women.

Facial acne is a multifactorial disease with respect to its pathophysiology as well as its impact on daily functioning.^{7,8} Acne has also been associated with impaired health-related quality of life (HRQoL), at times with negative impacts as great as that of severe and even life-threatening diseases.^{1,9} Previous studies have demonstrated that facial acne can impair self-image, psychological wellbeing, and ability to develop social relationships.^{9–13} Acne is an externally visible disease, and the symptomatology and psychosocial impacts

DISCLOSURE: Dr. Tanghetti has received research grants from DUSA Pharmaceuticals; has received honoraria from Allergan, Galderma, and DUSA; and has consultancy agreements with Allergan, Merz, Galderma, and DUSA. Dr. Callender has received honoraria from Allergan, Galderma, and Valeant; and has consultancy agreements with Allergan, Galderma, and Valeant. Dr. Kawata is an employee of Evidera. Ms. Yeomans is an employee of United BioSource Corporation. Dr. Daniels is an employee of Allergan Inc. Dr. Burk serves as a consultant for Allergan Inc. This study was sponsored by Allergan Inc., Irvine, California. The sponsor and co-authors were involved in study design, statistical analysis, and interpretation of results. The authors had full access to data and were involved in critical review and editing of the manuscript. All authors provided approval prior to submission.

ADDRESS CORRESPONDENCE TO: Emil A. Tanghetti, MD; E-mail: et@dermatologyandlasersurgery.com

affect adolescent and adult females alike. Literature suggests that the symptom burden of AFA may be exacerbated by chronicity and physical disfigurement, such as scarring.¹⁴ The clinical characterization of AFA has not yet been well delineated, and it is currently unknown whether adult females require tailored acne treatments or attention to specific aspects of acne clearing compared to standard care for adolescents.¹⁴

The main objective of this study was to assess the symptom burden of AFA by 1) describing the clinical characteristics of AFA and 2) determining the psychosocial and productivity impacts of AFA.

METHODS

Study design. This was a cross-sectional, electronic, web-based observational survey conducted with participants in the United States from October to November 2011. The survey screened for patient-reported signs consistent with acne and captured data on clinical characteristics and psychosocial impact of acne among adult females. Clinical experts contributed to development of the acne screening criteria, survey content, and selection of patient-reported outcome (PRO) measures. The study design and materials were approved by a central ethics review board.

Study population: Recruitment and screening. All participants were recruited through the YouGov PollingPoint Panel in the United States (Palo Alto, California) from a pool of registered panelists ≥ 18 years of age who expressed willingness to complete health surveys about their medical condition(s). Participants were offered an incentive for participation in the form of redeemable points (500–1,000 “Polling Points”), credited upon survey completion. Eligible panelists were women between the ages of 25 and 45 years; had an active e-mail address at the time of study invitation; were able to read and understand English; had presence of self-reported acne, defined as ≥ 25 visible facial lesions using survey-provided photographs at the time of screening; and fulfilled one of the age/race/ethnicity strata targeted for the sample. Recruitment aimed to enroll a stratified sample based on age and race, with a minimum target of 200 female panelists with AFA. The stratification goals for age were 50 percent women ages 25 to 35 years and 50 percent women ages 36 to 45 years and for race/ethnicity were 50 percent White/Caucasian women (including Arab/Middle Eastern), 25 percent Black/African American women, and 25 percent Asian, Hispanic, or Other women.

Interested participants “opted in” to the survey using a web link provided in the e-mail invitation that directed them to a HIPAA (Health Insurance Portability and Accountability Act of 1996)-compliant Internet portal. Participants were provided information on informed consent (including California Experimental Subject’s Bill of Rights for California residents) and consented to participate by selecting “I consent to participate” on the web page, as a proxy for written informed consent. After consent was obtained, potential participants completed sociodemographic questions and were screened for survey eligibility. Panelists who did not respond to the survey invitation within two days

were sent an e-mail reminder; no more than two reminders were issued to any panelist. Respondents had the right to withdraw consent at any time by prematurely terminating the online survey or formally withdraw their consent by notifying YouGov.

Study variables. Sociodemographic and clinical characteristics. Sociodemographic data were collected to understand the demographic characteristics of adult women with acne. Clinical presentation of AFA was also evaluated, including acne onset, chief complaints or bothersome aspects of acne, specific acne signs/symptoms, and acne location. Acne onset at age ≥ 18 years was considered adult onset.

Perceptions about acne and coping behaviors. Perceptions about acne and behavior patterns of AFA were assessed by asking panelists about the degree of troublesomeness for specific acne signs and acne overall, most important aspects of acne clearing, their feelings about acne, methods used to cope with acne, and myths or beliefs about acne.

Acne-specific quality-of-life questionnaire (Acne-QoL). Acne-related HRQoL was assessed using the Acne-specific Quality of Life questionnaire (Acne-QoL),¹⁵ a 19-item PRO measure evaluating the impact of facial acne in the past week across four domains: self-perception, role-social, role-emotional, and acne symptoms. Responses were based on a 7-point Likert-type scale, “Extremely” to “Not at all” for 16 items and “Extensive” to “None” for the three symptom-related items. The time frame in this survey was modified with developer permission (communication with Allison M. Nguyen, Associate Director, Epidemiology, Merck Research Laboratories; January 26, 2011) from “past week” to “past four weeks,” to better understand acne-related QoL over an extended time period. The Acne-QoL is scored by subscales (self-perception, role-emotional, and acne symptoms scores range from 0–30; role-social score ranges from 0–24), where higher scores indicate better HRQoL. The instrument has been validated and has evidence of acceptable content validity, internal consistency, and test-retest reliability.¹⁶

Patient health questionnaire (PHQ-4). Psychological status was assessed by the 4-item Patient Health Questionnaire (PHQ-4).¹⁷ The PHQ-4 is a self-administered questionnaire assessing core depression and anxiety symptoms in the past two weeks. Each PHQ-4 item is responded to on a 4-point scale from 0 (not at all) to 3 (nearly every day) and total score interpreted as normal (scores of 0–2), mild (3–5), moderate (6–8), and severe (9–12) depression or anxiety. The PHQ-4 has been validated in the general population.¹⁸

Productivity at work or school. The impacts of AFA on work productivity were assessed among respondents who reported being employed and/or in school part-time or full-time and included missing school or work because of acne breakouts and interference of acne in ability to do work over the past four weeks.

Quality control and data management. Quality control measures were implemented to ensure data integrity. Validation rules (e.g., data ranges, skip patterns,

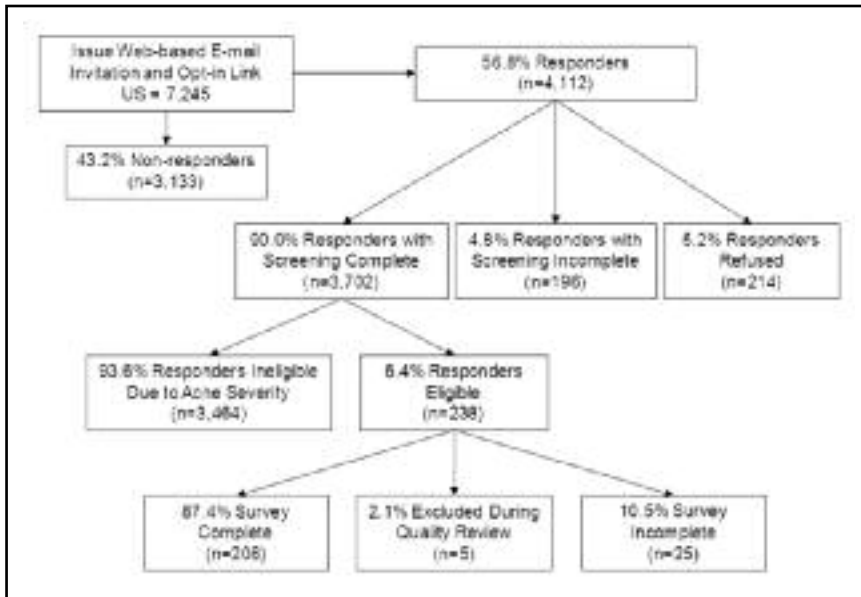


Figure 1. Survey participant disposition

error messages) were built into the survey to control quality of incoming data. The survey was pre-tested with a small YouGov sample prior to full launch and accuracy of the database verified. Participants were required to answer all survey items; only records where the reported age and gender was consistent with existing YouGov profile data were included in the final sample. Data were also monitored by YouGov for repetitive response patterns indicating that the participant was not sufficiently engaged in active response.

Statistical analyses. Descriptive statistics were used to evaluate survey data. For continuous variables, sample size, mean, standard deviation (SD), median, and minimum and maximum were examined. For categorical variables, frequencies were reported. Acne-QoL and PHQ-4 were scored based on guidelines set forth by the instrument developers; descriptive statistics were reported for scale scores in the total sample. Results for the pooled survey sample are described in this paper. Additional analyses are ongoing and results will be reported in upcoming publications.

RESULTS

Sample characteristics. A flow diagram of study participants and eligibility is presented in Figure 1. A total of 7,245 female panelists were invited to participate in the survey, of which 3,702 responded to the e-mail invitation, provided consent, and completed eligibility screening. Among those screened, 208 were eligible and completed the survey. The final sample obtained fulfilled target stratification goals for age and race and comprised 51.9 percent 25- to 35-year olds (n=108) and 51.4 percent White/Caucasian females (n=107). Arab/Middle Eastern was included as part of the White/Caucasian category; YouGov race categories align to the US census rather than skin types,

and at the time of the survey, panelists of Arab/Middle Eastern descent comprised less than two percent of the panel. Surveys on average were completed within 25 minutes.

Sociodemographic and clinical characteristics.

Sociodemographic characteristics of the study sample are presented in Table 1. Approximately half were Caucasian (51.4%), and the remainder of the sample was comprised of Black/African American (24.5%), Hispanic or Latino (11.1%), Asian (7.7%), and Other (5.3%). The average age of the sample was 35.4 years (SD=5.8). More than half (51.5%) were employed full or part time and virtually all (95.7%) had completed at least high school. Based on body mass index (BMI), approximately half (51.9%) were overweight or obese with BMI ≥ 25.0 . More than half (56.7%) reported a total annual household income of US \$50,000 or less. More than 80 percent

were covered by some type of health insurance, and the majority (77.9%) had prescription drug coverage.

Clinical characteristics are described in Table 2. The majority (80.3%) of participants had 25 to 49 visible facial lesions (referred to as “pimples”) at the time of survey completion (Figure 2). Mean age of onset of acne was 15.9 years (SD=6.6) and acne generally began to bother or concern them around age 18 (SD=7.7). Among those who had experienced teenage acne, nearly three-quarters (73.2%) described their adult acne as the same or worse/more severe than as a teenager. In terms of acne treatment, approximately half (49.5%) had ever (in their lifetime) visited a health care professional (HCP) or dermatologist for acne and one-third (33.7%) had previously been diagnosed with adult acne. However, a smaller percentage (15.9%) had recently (within the past three months) visited an HCP for acne treatment.

Lesions and postinflammatory hyperpigmentation (PIH; referred to as “dark marks”) were common, and more than 70 percent of the sample reported being bothered by these acne signs. Acne was also experienced in multiple locations. Facial acne presented most prominently on the cheeks (79.8%), chin (77.9%), and forehead (77.4%; Figure 3). Beyond the face, acne was also reported on the back (45.7%), chest (38.9%), and other areas on the body (16.3%). Almost all (>90%) had experienced at least some erythema (referred to as “redness”) from facial acne in the past four weeks, with more than half (68.8%) describing their erythema as being moderate to extensive. Nearly two-thirds had experienced moderate-to-extensive scarring (63.0%) or PIH (62.0%) in the past four weeks.

Participants most frequently reported their acne breakouts as being triggered by hormones/menstrual cycle (60.6%), stress (55.3%), sweating (40.9%), cosmetics/makeup (39.9%), and humidity/weather (33.2%). The most

TABLE 1. Sociodemographic characteristics

	TOTAL SAMPLE (N=208)
AGE (IN YEARS) Mean (SD) Median (minimum-maximum)	35.4 (5.8) 35.0 (25–45)
RACE/ETHNICITY (n, %) White/Caucasian (including Arab/ Middle Eastern*) Black or African American Hispanic or Latino Asian Other	107 (51.4%) 51 (24.5%) 23 (11.1%) 16 (7.7%) 11 (5.3%)
EMPLOYMENT STATUS (n, %) Employed, full-time (paid) Employed, part-time (paid) Unemployed Other Prefer not to answer	84 (40.4%) 23 (11.1%) 94 (45.2%) 5 (2.4%) 2 (1.0%)
EDUCATION (n, %) Less than a high school diploma High-school graduate More than a high school diploma Prefer not to answer	8 (3.8%) 31 (14.9%) 168 (80.8%) 1 (0.5%)
TOTAL ANNUAL HOUSEHOLD INCOME (n, %) \$0–\$20,000 \$20,001–\$50,000 \$50,001–\$100,000 \$100,000 and over Prefer not to answer	43 (20.7%) 75 (36.1%) 64 (30.8%) 21 (10.1%) 5 (2.4%)
BMI CATEGORIES (n, %) Underweight (below 18.5) Normal (18.5–24.9) Overweight (25.0–29.9) Obese (30.0 and above) Missing	7 (3.4%) 75 (36.1%) 42 (20.2%) 66 (31.7%) 18 (8.7%)

*The Arab/Middle Eastern population comprises a minimal percentage (<2%) of the web panel from which the sample was drawn.

TABLE 2. Clinical Characteristics

	TOTAL SAMPLE (N=208)
AGE WHEN ACNE STARTED (IN YEARS) Mean (SD) Median (minimum-maximum)	15.9 (6.6) 14.0 (1–40)
AGE WHEN ACNE STARTED (IN YEARS), FOR ADULT ONSET ACNE (AGE ≥18 YEARS)* Mean (SD) Median (minimum-maximum)	25.5 (6.2) 24.0 (18–40)
AGE WHEN ACNE BEGAN TO BOTHER OR CONCERN YOU Mean (SD) Median (minimum-maximum)	17.9 (7.7) 15.0 (7–41)
ACNE AS AN ADULT COMPARED TO ACNE AS A TEENAGER (n, %) Not as bad/less severe The same Worse/more severe Not asked	42 (20.2%) 70 (33.7%) 45 (21.6%) 51 (24.5%)
REDNESS FROM FACIAL ACNE IN THE PAST 4 WEEKS (n, %) None Some A moderate amount A lot Extensive	18 (8.7%) 47 (22.6%) 79 (38.0%) 54 (26.0%) 10 (4.8%)
SCARRING FROM FACIAL ACNE IN THE PAST 4 WEEKS (n, %) None Some A moderate amount A lot Extensive	24 (11.5%) 53 (25.5%) 63 (30.3%) 56 (26.9%) 12 (5.8%)
DARK MARKS FROM FACIAL ACNE IN THE PAST 4 WEEKS (n, %) None Some A moderate amount A lot Extensive	22 (10.6%) 57 (27.4%) 55 (26.4%) 56 (26.9%) 18 (8.7%)

*Based on participants who reported acne age of onset as age ≥ 18 years, n=51.

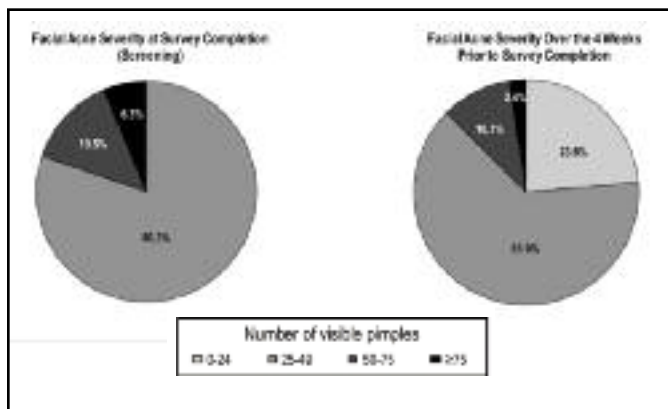


Figure 2. Severity of facial acne. Note: Participants were asked about current facial acne (today) as part of screening eligibility and facial acne on average over the last four weeks (overall).

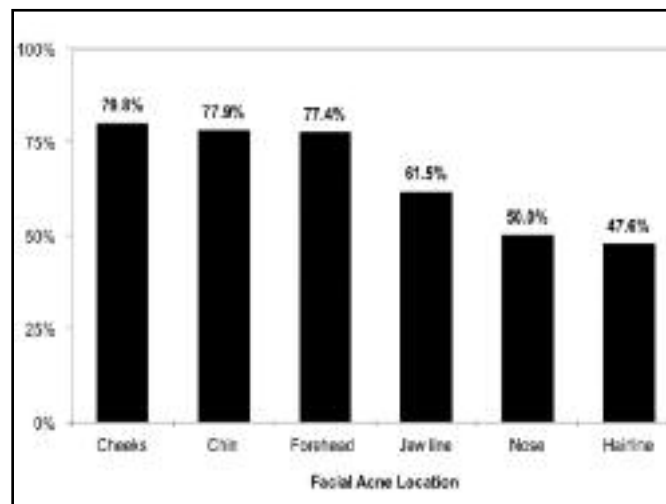


Figure 3. Acne location: Prominent areas of facial acne. Note: N=208; response options were not mutually exclusive; percentages may sum to more than 100 percent.

common comorbid health conditions were anxiety (29.8%), allergies/hay fever (28.8%), depression (21.2%), and migraines (20.7%).

Perceptions about acne and coping behaviors. The majority (82.7%) of participants described their overall experience with facial acne signs as troublesome (Table 3); bumps full of pus, bumps, and PIH (dark marks) were individual acne signs ranked as being the most troublesome (Figure 4). When participants were asked about acne clearing, 45.2 percent indicated that clearing lesions was the most important aspect of acne clearing. However, two-thirds (65.9%) reported having experienced minimal or no acne clearing in the past four weeks.

In addition to being troublesome, acne and breakouts were associated with negative self-perceptions. More than 75 percent of participants “agreed” or “strongly agreed” that acne made them feel less confident, more self-conscious around other people, frustrated, and embarrassed (Table 3). Participants coped with acne in various ways; wearing makeup (58.2%) and “popping” or squeezing pimples (52.9%) were the most frequently reported coping methods (Table 4). Most did not feel confident or attractive without wearing makeup to conceal their acne (Figure 5). Among those who used makeup regularly, more than one-third felt “not at all” attractive or confident in their looks without makeup. Of those who used dietary methods to cope with acne, more than half tried to drink more water and less alcohol “most” or “all of the time.”

The survey also revealed common beliefs or myths about acne (Table 5). Most females (94.7%) believed that stress causes acne. More than half (51.9%) of the sample thought that an over-the-counter (OTC) product (e.g., a good face cream or cleanser from a cosmetics counter) can effectively clear acne. Many believed sunscreen exacerbates acne (40.4%) and that makeup should not be worn if you have acne (40.4%). Over one-third (38.5%) also thought that acne will clear up by itself with time. Over one-quarter (27.9%) believed that frequent face washing can help clear acne.

Acne-QoL. The participants reported low mean scores on each of the four Acne-QoL domains, indicating that facial acne had negatively impacted their overall HRQoL in the past four weeks (Table 6). The average acne symptoms domain score was 13.8 (SD=7.4), suggesting active, progressive acne and limited improvement in acne signs. Low scores on self-perception (mean=10.7, SD=8.7) indicated that acne had a negative impact on perception of appearance. The role-emotional domain (mean=11.5, SD=9.0) reflected negative emotions about having to deal with acne. Lastly, the mean role-social domain score was 11.8 (SD=8.4), inferring that acne negatively affected social functioning.

PHQ-4. The PHQ-4 (mean=5.3, SD=3.9) indicated that mild-to-moderate symptoms of depression and/or anxiety were present within the past two weeks (Table 6).

Productivity at work or school. Work environment was evaluated in participants who were employed full- or part-time. The majority (83.2%) reported working with others in-person, with face-to-face exposure to co-workers and/or the public in their current working environment. A smaller number (16.8%) reported having limited interaction with others at their job, and of those, one-third (33.3%) attributed acne as the cause of their limited exposure. Few female participants (17.8%) had changed jobs or their job function since the onset of their acne, and 36.8 percent of those who did change positions cited acne as the reason for the change.

Among participants who were employed or in school full- or part-time, 12.3 percent had missed going to work or school in the past four weeks because of an acne breakout. Almost half (43.4%) had difficulty concentrating at work or school “some” or “all of the time” because of their acne. In addition, more than one-quarter (28.7%) reported that acne had interfered with work or school. Acne had at least a moderate impact on work ability (at work or school) for

TABLE 3. Acne perceptions

	TOTAL SAMPLE (N=208)
CONSIDERING YOUR OVERALL EXPERIENCE WITH FACIAL ACNE, ARE YOUR ACNE SYMPTOMS TROUBLESOME TO YOU? (n, % YES)	
	172 (82.7%)
HOW TROUBLESOME ARE YOUR SYMPTOMS (n, %)	
Very severely	21 (10.1%)
Severely	60 (28.8%)
Moderately	72 (34.6%)
Mildly	18 (8.7%)
Not at all troublesome	1 (0.5%)
Not applicable*	36 (17.3%)
AMOUNT OF ACNE CLEARING ACHIEVED IN THE PAST 4 WEEKS (n, %)	
Complete clearing	11 (5.3%)
Marked clearing	12 (5.8%)
Moderate clearing	48 (23.1%)
Minimal clearing	100 (48.1%)
No clearing at all	37 (17.8%)
FEELINGS ABOUT ACNE	
My acne makes me feel less confident (n, %)	
Strongly disagree/disagree	19 (9.1%)
Neutral	29 (13.9%)
Agree/strongly agree	160 (76.9%)
My acne makes me feel self-conscious around other people (n, %)	
Strongly disagree/disagree	20 (9.6%)
Neutral	28 (13.5%)
Agree/strongly agree	160 (76.9%)
I get very frustrated when I see or think about my acne (n, %)	
Strongly disagree/disagree	17 (8.2%)
Neutral	33 (15.9%)
Agree/strongly agree	158 (76.0%)
I get very embarrassed when I see or think about my acne (n, %)	
Strongly disagree/disagree	20 (9.6%)
Neutral	27 (13.0%)
Agree/strongly agree	161 (77.4%)

*Participants who previously reported that acne symptoms were not troublesome were classified as not applicable

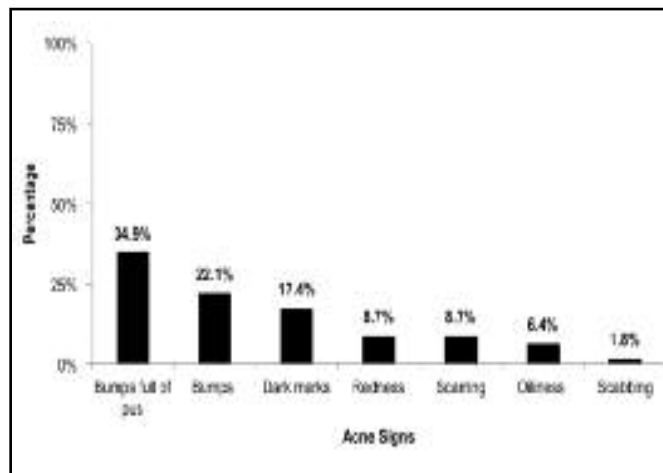


Figure 4. Most troublesome acne sign. Note: N=172; percentage of female patients who assigned a ranking of 1 (most troublesome) for each acne sign.

approximately one-third of the female participants (35.2% responded “moderately,” “quite a bit,” or “extremely”).

DISCUSSION

This was the first cross-sectional, web-based study to collect detailed patient-level information on clinical characteristics, perceptions and coping behaviors, psychosocial impacts, and work productivity in AFA. Data from this study provide a foundation for describing facial AFA characteristics and examining its symptom burden in a diverse sample of adult women, as well as providing guidance for future studies on this topic.

Currently, there are no established guidelines for clinical diagnosis that differentiate adolescent from adult acne. There is not a clear definition of adult acne based on age of onset, which results in inconsistent usage of age demarcations in the literature (adult acne is often defined as onset ranging from 20–25 years).¹⁹ For many female participants in the current study, their facial acne was persistent (from teenage to adult years); only one-quarter (24.5%) experienced late onset acne as an adult. This finding corroborates previous studies, which suggested that AFA can often be chronic and continue throughout the adult years, whereas teenage acne generally resolves during adolescence, alluding to the fact that hormonal factors may play a role in chronicity and persistence of acne.^{20,21} As a result, AFA may be associated with different behaviors and needs than teenage acne and require treatment strategies tailored to adult acne sufferers. A high proportion of female panelists screened for this study were ineligible due to low acne severity (93.6% screened had <25 visible facial lesions); the low eligibility rate observed in this study is consistent with published findings that milder cases of acne may be more prevalent in adult women.¹⁹ In addition, survey results provide information on clinical aspects of AFA; facial acne presented most prominently on the cheeks, chin, and forehead and was commonly associated with erythema, PIH,

TABLE 4. Acne coping behaviors

TOTAL SAMPLE (N=208)	
METHODS USED TO COPE WITH YOUR ACNE (n, %)*	
Use makeup	121 (58.2%)
Use my hair (e.g., change my hairstyle or hair color)	40 (19.2%)
Change my diet	65 (31.3%)
Dry out my skin with alcohol or peroxide	58 (27.9%)
Go to tanning salons or lay out in the sun	11 (5.3%)
Have regular facials	24 (11.5%)
Follow a strict skin-cleaning routine	86 (41.3%)
Take vitamins	67 (32.2%)
Pop or squeeze my pimples	110 (52.9%)
Other	26 (12.5%)
MAKEUP	
Wear a lot of makeup to cover up my pimples (n, %)	
Never/rarely	27 (22.3%)
Sometimes	36 (29.8%)
Most of the time/all of the time	58 (47.9%)
Use a concealer to mask my acne pimples (n, %)	
Never/rarely	17 (14.0%)
Sometimes	24 (19.8%)
Most of the time/all of the time	80 (66.1%)
Use makeup to highlight areas of my face that don't have acne (n, %)	
Never/rarely	36 (29.8%)
Sometimes	36 (29.8%)
Most of the time/all of the time	49 (40.5%)
Use self-tanning products to make my acne less visible (n, %)	
Never/rarely	101 (83.5%)
Sometimes	10 (8.3%)
Most of the time/all of the time	10 (8.3%)
Do not wear makeup because it makes my acne worse (n, %)	
Never/rarely	71 (58.7%)
Sometimes	34 (28.1%)
Most of the time/all of the time	16 (13.2%)

*Select all that apply; percentages may sum to more than 100%.

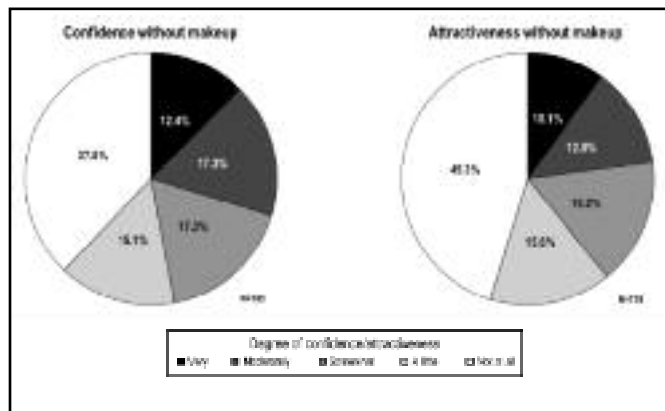


Figure 5. Confidence and attractiveness without makeup to cover acne

affect self-perceptions and emotions, as evidenced by reports of dissatisfaction with appearance, lack of confidence, and need to use coping methods. Acne has previously been noted as particularly troublesome in studies among patients who were less than 40 years old.^{14,23,24} Another study demonstrated that patients 20 years of age or older were significantly more likely to suffer appearance-related distress than 16- to 19-year olds.²⁵ Cumulatively, these findings support the impact of acne, particularly in the adult acne population. The present study also explored behavior modification and found increased use of makeup and other coping strategies (e.g., hair styling) to conceal the presence of acne. Makeup has previously been shown to have a positive effect on self-esteem and minimize the impact of facial acne.²³ Acne also impacted HRQoL and psychological status based on the results from the PRO measures (Acne-QoL and PHQ-4) included in the survey. Female participants had consistently low scores for all Acne-QoL domains, demonstrating that facial acne negatively impacted physical appearance as well as emotional and social functioning. Furthermore, the acne symptoms domain of this questionnaire described active and progressive acne (with little or no signs of improvement in acne signs), potentially associating lower HRQoL with presence or persistence of acne. Females also reported mild-to-moderate symptoms of depression and/or anxiety based on the PHQ-4. Although the PHQ-4 depression and anxiety symptom questions were not acne-specific, past research indicates that it is not uncommon to observe psychological disorders in acne patients due to facial disfigurement involved with this externally visible disease; some patients are severely affected psychologically and require more comprehensive services than acne treatment alone.²⁶ Poor quality of life in acne patients has been documented in the literature. Studies have described levels of social and emotional problems in acne patients comparable to patients with severe chronic disabling diseases, such as arthritis, epilepsy, and psoriasis.^{9,14} Beyond impaired emotional and social functioning, it was evident from survey results that acne was also associated with impaired work ability and productivity. However, the effects in this study appear less severe than those identified in a previous study, which

and scarring.

Findings from this survey corroborated that facial AFA imposes an emotional and social burden on women by impairing self-perception and behaviors, HRQoL, psychological status, and work productivity.²² Facial acne overall, as well as individual acne signs (e.g., bumps full of pus, PIH), were seen as troublesome. Acne was also shown to

TABLE 5. Myths about acne

	TOTAL SAMPLE (N=208)
MYTHS ABOUT ACNE (n, % TRUE)*	
Stress causes acne	197 (94.7%)
You can treat acne with a good face cream or cleanser from a cosmetics counter	108 (51.9%)
Sunscreen will make your acne worse	84 (40.4%)
You should not wear makeup if you have acne	84 (40.4%)
You just have to wait and let acne go away with time	80 (38.5%)
Eating chocolate gives you acne	75 (36.1%)
You should wash your skin four times a day if you have acne	58 (27.9%)
You can treat acne by “popping” pimples	46 (22.1%)
Acne is just a cosmetic problem	36 (17.3%)
Adults do not get acne	24 (11.5%)
You can “clear up” a pimple by scrubbing at it	30 (14.4%)

*Each statement responded to as true or false

TABLE 6. Health-related quality of life and psychological status

	TOTAL SAMPLE (N=208)
ACNE-SPECIFIC QUALITY OF LIFE QUESTIONNAIRE (ACNE-QoL)*	
Self-Perception domain score (0–30)	
Mean (SD)	10.7 (8.7)
Median (minimum-maximum)	9.5 (0.0–30.0)
Role-Emotional domain score (0–30)	
Mean (SD)	11.5 (9.0)
Median (minimum-maximum)	10.0 (0.0–30.0)
Role-Social domain score (0–24)	
Mean (SD)	11.8 (8.4)
Median (minimum-maximum)	11.0 (0.0–24.0)
Acne Symptoms domain score (0–30)	
Mean (SD)	13.8 (7.4)
Median (minimum-maximum)	14.0 (0.0–30.0)
PATIENT HEALTH QUESTIONNAIRE (PHQ-4)**	
Total score (0–12)	
Mean (SD)	5.3 (3.9)
Median (minimum-maximum)	4.0 (0.0–12.0)
PHQ-4 Categories (n, %)	
Normal (score 0–2)	58 (27.9%)
Mild (score 3–5)	60 (28.8%)
Moderate (score 6–8)	49 (23.6%)
Severe (score 9–12)	41 (19.7%)

*Higher scores indicate better acne-related quality of life.

**Higher scores indicate more symptoms of depression and/or anxiety.

reported significantly higher unemployment rates among acne patients 18 to 30 years of age compared to matched controls.²⁷

The design of this study was unique in that it focused on a subpopulation of acne sufferers that has not been studied extensively, allowing for clinical characteristics and burden of AFA to be evaluated more critically. Additional advantages of this web-based study included stratified recruitment to generate data on a diverse sample of female participants of different ages and races. This approach also offered access to a large pool of US panelists, a high level of control in survey programming (e.g., pre-programmed skip patterns, automated data checks for quality control), and rapid data collection.

This study was not without limitations. Web-based data collection methodology may inherently have selection bias since individuals who do not actively engage in computer-based communications may not have been included in the sample. In addition, all clinical information were based on participant self-report and no physician records or diagnostic information were confirmed. Patient perceptions of acne signs and severity may differ from clinical assessments, and study eligibility based on patient-reported facial lesion count may not be as accurate as diagnosis of clinically relevant acne by an HCP. Facial acne severity was assessed at the time of screening; therefore, current acne severity may have influenced perceptions related to acne. Lastly, enrollment was limited to female participants who self-reported ≥25 visible facial lesions, thereby excluding milder cases with fewer lesions and limiting the conclusions that can be drawn about the AFA population as a whole. Clinical experience has shown that patients with less than 25 visible lesions still carry a significant burden. Although this more prevalent group of female patients with acne was not evaluated in the current study, future research should include similar evaluation for

milder cases of acne. Further details on the overall strengths and limitations of web-based patient surveys have previously been described by Payne et al.²⁹

CONCLUSION

In conclusion, adult women with acne are a unique and under-studied patient population. The findings from this study highlight the multifaceted impact of acne. As healthcare providers gain more understanding of the physical and emotional burden of AFA, they will be able to connect with female patients more effectively on both a practical level in terms of treating and understanding the pervasive impacts of acne. Acne has typically been regarded as an adolescent condition despite its prevalence among adults, particularly adult females. Female patients may also be particularly vulnerable to the isolating effects of adult acne and require assurance that they are not alone in their feelings and concerns about this disease. Opportunity to discuss their disease openly with their provider can facilitate collaboration between patients and clinicians to identify the best approaches to treatment and management that will meet the needs of patients.

This study was only an initial step in describing adult acne and recognizing the burden associated with acne in adult female patients. These results may help to inform HCPs about the characteristics, perceptions, HRQoL, and psychological status of adult women with acne and increase awareness of the psychosocial impact of AFA. Research is ongoing to further describe this subpopulation. Future research on acne treatment should focus on characterizing and understanding how to treat all types of AFA from mild to severe cases.

ACKNOWLEDGMENT

The authors would like to acknowledge the following individuals for their contributions to the study: Teresa K. Wilcox (Evidera) for her leadership contributions to survey design, execution, analytical design, and interpretation of results; Krista A. Payne (Evidera) for survey design; Ren Yu (UBC) for data analysis and statistical support; Sunning Tao, Irene Pan, and Marielle Bassel (UBC) for project support; Sepideh F. Varon (Allergan) for strategy support in refocusing subject recruitment; Samantha Luks, Ashley Grosse, and Jason Cowden (YouGov) for web survey management and implementation; and Daya Perkins (Allergan) for editorial support in the preparation and styling of this manuscript.

CONTRIBUTORS

Drs. Daniels and Burk participated in planning the study, collecting the data, and interpreting the results. Dr. Kawata and Ms. Yeomans participated in planning the study, collecting the data, conducting the analyses, and interpreting the results. Drs. Tanghetti and Callender participated in interpreting the results. Dr. Kawata and Ms. Yeomans wrote the initial first draft of the article. All authors were involved in planning the article, critical review, and editing of the first draft and subsequent revisions of the paper. All authors approved the manuscript before submission.

REFERENCES

- Stern RS. Medication and medical service utilization for acne 1995–1998. *J Am Acad Dermatol.* 2000;43(6):1042–1048.
- Stern RS. The prevalence of acne on the basis of physical examination. *J Am Acad Dermatol.* 1992;26(6):931–935.
- Stern RS. Acne therapy. Medication use and sources of care in office-based practice. *Arch Dermatol.* 1996;132(7):776–780.
- Goulden V, Stables GI, Cunliffe WJ. Prevalence of facial acne in adults. *J Am Acad Dermatol.* 1999;41(4):577–580.
- Poli F, Dreno B, Verschoore M. An epidemiological study of acne in female adults: results of a survey conducted in France. *J Eur Acad Dermatol Venereol.* 2001;15(6):541–545.
- Perkins AC, Maglione J, Hillebrand GG, et al. Acne vulgaris in women: prevalence across the life span. *J Womens Health (Larchmt).* 2012;21(2):223–230.
- Callender VD. Acne in ethnic skin: special considerations for therapy. *Dermatol Ther.* 2004;17(2):184–195.
- Tanghetti EA. Combination therapy is the standard of care. *Cutis.* 2005;76(2 Suppl):8–14.
- Mallon E, Newton JN, Klassen A, et al. The quality of life in acne: a comparison with general medical conditions using generic questionnaires. *Br J Dermatol.* 1999;140(4):672–676.
- Barnes LE, Levender MM, Fleischer AB, Jr., Feldman SR. Quality of life measures for acne patients. *Dermatol Clin.* 2012;30(2):293–300, ix.
- 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):1.
- Smith JA. The impact of skin disease on the quality of life of adolescents. *Adolesc Med.* 2001;12(2):vii, 343–353.
- Dreno B. Assessing quality of life in patients with acne vulgaris: implications for treatment. *Am J Clin Dermatol.* 2006;7(2):99–106.
- Lasek RJ, Chren MM. Acne vulgaris and the quality of life of adult dermatology patients. *Arch Dermatol.* 1998;134(4):454–458.
- Martin AR, Lookingbill DP, Botek A, et al. Health-related quality of life among patients with facial acne—assessment of a new acne-specific questionnaire. *Clin Exp Dermatol.* 2001;26(5):380–385.
- Girman CJ, Hartmaier S, Thiboutot D, 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(5):481–490.
- Kroenke K, Spitzer RL, Williams JB, Lowe B. An ultra-brief screening scale for anxiety and depression: the PHQ-4. *Psychosomatics.* 2009;50(6):613–621.
- Lowe B, Wahl I, Rose M, et al. A 4-item measure of depression and anxiety: validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *J Affect Disord.* 2010;122(1-2):86–95.
- Preneau S, Dreno B. Female acne—a different subtype of teenager acne? *J Eur Acad Dermatol Venereol.* 2012;26(3):277–282.
- Shaw JC, White LE. Persistent acne in adult women. *Arch Dermatol.* 2001;137(9):1252–1253.
- Gollnick HP, Finlay AY, Shear N, Global Alliance to Improve Outcomes in Acne. Can we define acne as a chronic disease? If so, how and when? *Am J Clin Dermatol.* 2008;9(5):279–284.
- Tan JK, Vasey K, Fung KY. Beliefs and perceptions of patients with acne. *J Am Acad Dermatol.* 2001;44(3):439–445.
- Matsuoka Y, Yoneda K, Sadahira C, et al. Effects of skin care and makeup under instructions from dermatologists on the quality of life of female patients with acne vulgaris. *J Dermatol.* 2006;33(11):745–752.
- Smithard A, Glazebrook C, Williams HC. Acne prevalence, knowledge about acne and psychological morbidity in mid-adolescence: a community-based study. *Br J Dermatol.* 2001;145(2):274–279.
- Hassan J, Grogan S, Clark-Carter D, et al. The individual health burden of acne: appearance-related distress in male and female adolescents and adults with back, chest and facial acne. *J Health Psychol.* 2009;14(8):1105–1118.
- Baldwin HE. The interaction between acne vulgaris and the psyche. *Cutis.* 2002;70(2):133–139.
- Cunliffe WJ. Acne and unemployment. *Br J Dermatol.* 1986;115(3):386.
- Payne KA, Varon SF, Kawata AK, et al. The International Burden of Migraine Study (IBMS): study design, methodology, and baseline cohort characteristics. *Cephalalgia.* 2011;31(10):1116–1130. ●