Research letter

Cumulative mental health consequences of acne: 23-year follow-up in a general population birth cohort study

DOI: 10.1111/bjd.13786

Dear Editor, Acne is a highly prevalent condition during adolescence and young adulthood worldwide, with rates between 12% and 99%.[1–4] Rates in adulthood range up to 50%.[5] The effects of acne, regardless of severity, can be debilitating, affecting many life domains.[6–10] Cross-sectional studies report associations between acne and anxiety, depression symptoms and suicide ideation compared with those having little or no acne.[4,7] However, no study has examined the relationship of acne with *psychiatric disorder* (i.e. psychological distress of greatest severity and clinical interest), nor has research ascertained the cumulative life course effects of acne on psychiatric disorder.[11] Here, we report data from a prospective-longitudinal study of a general population sample to determine whether acne preceded poor mental health at the disorder level, from adolescence to adulthood. The specific aim of this study was to examine the association between acne and the development of the most common psychiatric disorders of anxiety, depression, alcohol and cannabis dependence.

Data were from the Dunedin Multidisciplinary Health and Development Study, a longitudinal investigation of the health, development and behaviour of a general population birth cohort. Study participants were born between April 1972 and March 1973 in Dunedin, New Zealand. The cohort represents the full range of socioeconomic status in the general population of New Zealand's South Island and is primarily white. The longitudinal study was established at age three when those who were still resident in the province were followed up, and 91% (n = 1037; 52% male) participated. Subsequent assessments took place at ages 5 (96% of those alive participated), 7 (92%), 9 (92%), 11 (90%), 13 (82%), 15 (95%), 18 (97%), 21 (97%), 26 (97%) and 32 (96%), and most recently at 38 years, when 95% participated. At each age, a range of physical, mental and psychosocial measures were assessed on site by professional staff trained in each of the domains. Ethical approval was obtained for each phase of the study.

At all the assessments, professional staff with specific training in the relevant domains received further training standardized to protocol. Health professionals administered the general health interview (which included questions about acne) and the mental health interview. At the age 21 assessment, study participants were asked if, since age 15, they had 'a bad problem acne'; this was repeated at the next three assessments, i.e. at age 26 for the period from 21 to 26 years, at age 32 (26–32 years) and at age 38 (32–38 years). Mental health data were collected using the Diagnostic Interview Schedule, allowing disorder status to be made according to standardized Diagnostic and Statistical Manual of Mental Disorders criteria.[12] Each disorder (anxiety, depression, alcohol dependence and cannabis dependence disorders) was diagnosed regardless of the presence of other disorders using the past year as the reporting period. Adjustment was made for potential confounders: sex, socioeconomic status and prior adolescent psychiatric disorder (11–18 years).

Table 1 Associations between reported acne and psychiatric disorder between ages 21 and 38 years[a]

Psychiatric disorder	Age (years)	No acne (%)	Reported acne (%)
Anxiety	21	19·2	28·4
	26	24·0	27·5
	32	20·5	37·5
	38	20·0	37·1
Pooled		20·9	31·1
OR 1·45 (95% CI 1·10–1·92)* P = 0·009			
Depression	21	16·1	22·0
	26	16·2	20·3
	32	15·5	31·3
	38	16·4	14·3
Pooled		16·1	22·2
OR 1·36 (95% CI 0·99–1·87) P = 0·056			
Alcohol dependence	21	10·2	6·4
	26	17·1	18·8
	32	7·7	16·7
	38	9·7	5·7
Pooled		11·2	11·5
OR 0·91 (95% CI 0·60–1·37) P = 0·640			
Cannabis dependence	21	9·4	10·4
	26	9·7	5·8
	32	5·0	12·5
	38	4·2	0·0
Pooled		7·1	8·1
OR 0·85 (95% CI 0·53–1·37) P = 0·514			

OR, odds ratio; CI, confidence interval. [a]Sample size. 21 years: 957 (848 no acne, 109 reported acne); 26 years: 979 (910 no acne, 69 with acne); 32 years 962 (914 no acne, 48 reported acne); 38 years: 951 (916 no acne; 35 reported acne). *Significant at P < 0·05.

In Table 1, estimates (odds ratios) of the association between acne and risks of psychiatric disorder obtained from population-averaged models, using generalized estimating equation models, are presented. The estimates of the population average rates of psychiatric disorder for those reporting acne and those not reporting acne revealed a consistent pattern of those reporting acne having higher rates of anxiety disorder [odds ratio (OR) = 1·45; 95% confidence interval (CI) 1·10–1·92; P = 0·009). There was also a marginally significant tendency for those reporting acne to have major depressive disorder (OR = 1·36; 95% CI 0·99, 1·87; P = 056). In contrast, neither alcohol nor cannabis dependence disorders were associated with reports of bad acne. When adjusted for confounders (Table 2), anxiety disorders remained significantly associated with acne (OR = 1·45; 95% CI 1·07–1·97; P = 018). However, major depressive disorder was no longer associated with acne (P = 0·119) (post-hoc analyses indicated that a relation between depressive *symptoms* and acne remained after adjustment for covariates), and associations between acne and alcohol or cannabis dependence disorder remained not significant. Interaction analyses showed no significant age or sex interactions suggesting that the effects of acne on mental health were similar across the age range studied and that these effects were similar for both females and males.

To our knowledge, these are the first data reporting on the association between self-reported acne problems and the more clinically relevant psychiatric disorders from adolescence to adulthood in a general population sample. We observed an elevated risk for anxiety disorders, which persisted from adolescence well into adulthood. This association remained after adjustment for prior psychiatric disorder status during adolescence. Post-hoc analyses adjusting for the anxiety prone personality type (negative emotionality as assessed by the Multidimensional Personality Questionnaire[13]) revealed that this association was not an artefact of this personality type (following adjustment, OR = 1·42; 95% CI 1·04–1·95; P = 0·03). Strengths of these analyses include use of a longitudinal-prospective design, which allowed the temporality of the exposure and outcome to be established, the use of the same measures at four age periods from adolescence to adulthood and the very high retention rate which reduced the possibility of bias from attrition. A limitation was that acne was self-reported rather than objectively assessed by a clinician; however, self-reported facial acne has been highly correlated with clinical evaluation[15] and is associated with psychological distress, regardless of severity or clinical diagnosis.[4,8] Supporting the validity of our measure, we examined a subgroup who had consulted a doctor for their problem with acne between 15 and 21 years (data not available at later ages) and obtained the same pattern of findings.

Table 2 Associations between acne and mental health outcomes, adjusted for covariates

Psychiatric disorder	β (sec)	P-value	Odds ratio (95% confidence interval)
Anxiety	0·37 (0.16)	0·018	1·45 (1·07–1·97)*
Depression	0·27 (0.17)	0·119	1·31 (0·93–1·83)
Alcohol dependence	−0·15 (0.23)	0·524	0·86 (0·55–1·36)
Cannabis dependence	−0·03 (0.26)	0·905	0·97 (0·58–1·62)

Covariates included sex, childhood socioeconomic status, and psychiatric disorder status between 11 and 18 years old. *Significant at P < 0·05.

Acne was one of the top 10 most prevalent diseases globally in 2010,[14] and anxiety and depression are among the most common psychiatric disorders, together accounting for approximately 55% of mental health burden of disease.[15] In this study spanning 23 years, we report a nontrivial relationship between a highly prevalent skin condition (acne) and a high burden psychiatric disorder (anxiety). Dermatologists, general practitioners and other health professionals should be aware of this association and be encouraged to assess mental health status when treating patients presenting for acne during adolescence as well as adulthood.

Acknowledgments

The authors are indebted to Dr Phil Silva, founder of the Dunedin Study, and to the Study members and their families for their long-term involvement.

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Funding sources: The Dunedin Multidisciplinary Health and Development Research Unit is supported by Health Research Council of New Zealand. This research also received funding support from the U.S. National Institute on Aging (grants AG032282); the UK Medical Research Council (grants G0601483; G0100527) and U.S. NIMH (grants MH45070; MH499414).

Conflicts of interest: none declared.