

# Social and economic correlates of depressive symptoms and perceived stress in South African adults

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## ABSTRACT

**Objectives:** Adults in South Africa demonstrate rates of mental illness at or above levels elsewhere in the developing world. Yet there is a research gap regarding the social context surrounding mental health in this region. The objective of this analysis was to characterize the prevalence and correlates of depressive symptoms and perceived stress among a heterogeneous South African population.

**Methods:** Low-income adults (n = 257) in Capetown, Port Elizabeth and Durban were interviewed regarding demographics, income, subjective social status, life events and decision-making. The Center for Epidemiologic Studies Depression Scale (CES-D) and Cohen's Perceived Stress Scale (PSS) were used.

**Results:** CES-D scores were 18.8 (SD 11.7), with 50.4% of men and 64.5% of women exceeding the cut-off at which professional care is recommended (p = 0.03). PSS scores were 18.6 (SD 6.7), with a mean of 17.5 among men and 19.6 among women (p = 0.02). In multivariate regressions, increased CES-D scores were associated with more household members (p < 0.1), lower educational attainment (p = 0.07), less income stability (p < 0.07), lower subjective social status (p < 0.01) and independent decision-making (p = 0.04). Increased PSS scores were associated with female gender (p < 0.05), multiracial race (p < 0.02), more household members (p < 0.1), lower subjective social status (p < 0.02) and recent birth or catastrophe (p < 0.01).

**Conclusions:** Depressive symptoms and perceived stress are public health concerns in this sample, with more symptoms among those with fewer resources. The prevention of mental illness is critical, especially in vulnerable populations.

Mental illness encompasses a wide variety of psychiatric conditions, including psychotic disorders, anxiety disorders and mood disorders (eg, depression). Depression includes symptoms such as feelings of sadness, worthlessness or guilt, whereas anxiety involves feelings of tension, fear and apprehension.<sup>1</sup> Unipolar depressive disorder, a form of depression, is the leading cause of years lost due to disability in high, low and middle-income countries and is the seventh leading contributor to disability-adjusted life years worldwide.<sup>2</sup> Yet in many parts of the world the stigma and lack of awareness surrounding depression prevents individuals who have psychiatric illnesses from receiving proper treatment.<sup>3</sup>

In Africa, depression was historically thought to be rare or non-existent<sup>4</sup> and even now the prevalence of mental illness in general remains

underestimated.<sup>2</sup> Newer studies, however, have demonstrated prevalences at or above levels elsewhere in the developing world,<sup>5</sup> with particular vulnerability in certain subgroups such as women and individuals of low socioeconomic status (SES).<sup>6–10</sup> In sub-Saharan Africa, many other conditions including infectious diseases and conditions surrounding maternal and child health compete for the attention of healthcare providers.

Prevalence ranges of mental disorders in South Africa are difficult to report because studies examine different psychiatric conditions and use different measurement techniques even when studying the same conditions. For example, one analysis of a very small sample in a rural village found the prevalence of psychiatric morbidity to be 27%<sup>9</sup> and a similar study in a rural and largely impoverished area of the KwaZulu-Natal province showed a 23.9% prevalence of depression and anxiety.<sup>6</sup> In another small study,<sup>11</sup> South African college students had higher depression scores than Nigerian or American students but prevalence rates were not reported.

In a developed country setting poor mental health has been found to be associated independently with female gender, low educational attainment, poor health, unemployment, low income and lack of a stable marriage.<sup>12–18</sup> Studies in developing countries are fewer in number but generally produce similar findings, with increased depression or emotional stress associated with lower educational attainment, greater poverty, worse health, lack of a stable marriage<sup>19</sup> and employment in an informal job rather than a formal job.<sup>20</sup>

In South Africa, depression has been associated with gender and race, albeit in small and non-representative studies. Women have been shown to be more likely to present with depression, whereas men are more likely to experience substance abuse and psychotic illnesses.<sup>7 10 21</sup> South African students of differing African origin ethnicities have been shown to have similar depression scores, although the study did not include whites, Indians, or those of multiracial descent for comparative analyses.<sup>11 22</sup> Other studies in South Africa suggest that higher levels of depressive symptoms are associated with having a low income, being unmarried, having low education and having poor health.<sup>6 23–25</sup>

Although these analyses suggest correlations between mental illness and various demographic or socioeconomic characteristics, there is a gap in the research when it comes to rigorous and

**Table 1** Variables of interest by gender of respondent

Variable	Gender		Test of proportions or t test
	Male (n = 123)	Female (n = 133)	
Demographic characteristics			
Age (% in each category) in years			
<20	1.6	0.3	NS
20–29	33.3	31.6	NS
30–39	37.4	31.6	NS
40–49	18.7	25.6	NS
50–59	4.1	7.5	NS
>59	4.9	3.0	NS
Marital status (% in each category)			
Married, living with partner	47.2	32.3	0.02
Single, widowed, separated/divorced	52.9	67.7	0.02
Self-reported race (% in each category)			
African	65.9	71.2	NS
Multiracial	25.2	22.7	NS
Indian	4.9	4.6	NS
White	4.1	1.5	NS
Province (% in each category)			
Eastern Cape	36.6	27.8	NS
Western Cape	29.3	40.6	0.06
KwaZulu-Natal	34.2	31.6	NS
No in household (% in each category)			
1–2	22.8	13.5	0.05
3–8	61.8	71.4	NS
>8	15.4	15.0	NS
Socioeconomic characteristics			
Formal education (% in each category) in years			
<7	15.5	12.0	NS
8–12	66.7	63.2	NS
>12	17.9	24.8	NS
Income from regular employment (%)	77.2	75.9	NS
Sources of non-employment income (mean no of sources)	0.58	0.82	0.03
Income in past 30 days (median; US\$)*	279	241	NS
Income in past 30 days, adjusted for household size (median; US\$)*	70.8	50.2	NS
Subjective social status			
Community ladder (mean)	4.50	4.35	NS
Country ladder (mean)	3.93	4.01	NS
Creditworthy ladder (mean)	4.60	4.08	NS
Stressful life events			
Events not including birth and catastrophe (mean no of events)	1.60	1.64	NS
Birth in household (%)	8.9	10.5	NS
Catastrophe in household (%)	7.3	5.3	NS
Decision-making (mean no of items)			
Respondent alone	3.37	4.84	0.05
Respondent with partner	6.55	6.41	NS
Partner/other alone	3.08	1.75	0.01

NS, not significant,  $p > 0.10$ .

\*US\$1 = 7.3 South African rands. For statistical analysis, the logarithm of this variable was computed because of positive skew.

multivariate analyses examining the risk factors and social context surrounding depression in sub-Saharan Africa. We could only find one study that assessed the associations between depression and SES while controlling for other factors, conducted among pregnant women receiving HIV testing at antenatal clinics in KwaZulu-Natal.<sup>9</sup> Integrated models are critical in elucidating the determinants of depression and the ways in which social and environmental factors interact with biological mechanisms to alter mental health.<sup>10</sup>

To address this critical research gap, the analysis reported here will use a more rigorous methodology to obtain a better understanding of mental illness and associated factors in a

South African context. The objective of this analysis was to characterize the prevalence of depressive symptoms and perceived stress within this heterogeneous sample and to explore the contextual factors related to variations in these outcomes.

## METHODS

### Study design and sampling

Our sample frame was composed of individuals who had applied to a microcredit lending organisation with branches in Capetown, Port Elizabeth and Durban; details on the consumer credit market and of the sample collection have been reported

previously.<sup>26</sup> Briefly, new applicants to the programme were selected between September and November 2004; these applicants had initially been rejected by the lender but were deemed potentially creditworthy. An independent firm surveyed 787 of these individuals or another person in their household with an interview that included questions on demographics, SES, subjective social status, major life events, household decision-making and various indicators of mental health. Only one individual per household was interviewed. The surveys were conducted in English and translated as needed. Surveyors were able to complete 626 surveys for an 80% response rate. Mental health data were collected in approximately 50% of cases when the loan applicant could be interviewed, producing the final sample size of 257.

**Measures**

**Mental health**

Depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item questionnaire designed to assess the intensity of depressive symptoms.<sup>27, 28</sup> Scores range from 0 to 60, with a generally accepted cut-off score of 16 in the United States for high risk of clinical depression.<sup>28</sup> The CES-D has been used previously in Africa but not validated.<sup>29, 30</sup> In the current study, Cronbach’s  $\alpha$  for the total CES-D score was 0.88.

General perceived stress over the past week was assessed using a 10-item version of Cohen’s Perceived Stress Scale (PSS).<sup>31</sup> The test includes questions relating to stressful life experiences in the past month. Scores range from 0 to 40 and the test had a Cronbach’s  $\alpha$  of 0.72. The test has not previously been used in the African context but has been used widely in other countries (eg, Jordan,<sup>32</sup> Korea<sup>33</sup> and Spain<sup>34</sup>).

**Sociodemographics**

Details of the subjects’ demographic and socioeconomic characteristics were ascertained through questions about gender, age, marital status, race, educational attainment, household size, province of residence and number of people living in the household. The four primary classifications of self-reported race were African, white, Indian and multiracial. The three categories of education were defined as: (1) up to grade 7; (2) completion of grades 8–12; (3) completion of some postsecondary education.

**Income**

We asked about the total household income in the 30 days before the interview. Other income-related variables addressed the source of income, including whether someone in the household had regular employment and whether anyone received non-employment income (including pensions, disability grants, unemployment insurance and child support).

**Events**

We also queried participants about various major life events that had occurred in the household in the past 12 months. To simplify the analysis, these were categorised into: (1) birth; (2) catastrophe (including fire or flood); (3) other (such as weddings, funerals, theft, initiation ceremonies and others). These variables were included because both mothers and fathers are known to experience poor mental health in the postpartum period<sup>35, 36</sup> and major disasters have also been associated with mental illnesses such as depression and posttraumatic stress disorder.<sup>37</sup>

**Social status**

Subjective social status was assessed using the MacArthur Scale of Subjective Social Status, which asks participants to place themselves on a ladder in reference to a population.<sup>38</sup> The instrument has two parts, one linked to traditional SES indicators (income and education) that asks participants to rate themselves relative to everyone in their country and one linked to a more immediate local environment (placement in the local community).<sup>39</sup> For the purposes of the assessment described here, we developed an additional subjective social scale, asking the participant where they fit on a nine-point scale ranging from “extremely uncreditworthy” to “very creditworthy.”

**Household decision-making**

Respondents who reported that they were married or living with their partners were queried about who made the decisions in the relationship about various issues (eg, spending, family planning decisions and assisting relatives). We asked whether the primary decision-maker on each of these issues was: (1) the respondent; (2) both the respondent and his/her spouse or partner; or (3) the spouse/partner alone or someone else. Studies suggest that mental wellbeing, particularly that of women, is affected by the role that an individual plays in the household, including decision-making, financial power and the distribution of chores.<sup>40</sup> Because only individuals in relationships were asked these questions, the sample size for this variable was smaller than that for the entire sample (n = 83, 32.3% of sample).

**Data analysis**

Continuous variables were evaluated for skew. Income was found to have a positive skew and was normalised by taking the logarithm. Then, unadjusted associations between explanatory variables and the two outcome variables (depressive symptoms and perceived stress) were examined using simple linear regression. In these bivariate analyses, we also considered income adjusted for household size by dividing total income in the past 30 days by the number of people in the household. Variables with theoretical importance and those displaying a significant association in the unadjusted model were used to build the multiple regression models for each of the outcome

**Table 2** Summary of mental health indicators

Indicator	Percentage >16		Test of proportions	Mean		t Test
	Men	Women		Men	Women	
Depressive symptoms*	50.4	64.5	0.03	17.9	19.8	NS
Perceived stress†	–	–	–	17.5	19.6	0.02

NS, not significant,  $p > 0.10$ .

\*Depressive symptoms measured with the Center for Epidemiologic Studies Depression Scale. The cut-off above which professional care is recommended is 16.<sup>27, 28</sup>

†Perceived stress measured with Cohen’s Perceived Stress Scale.<sup>31</sup> No standard cut-off.

**Table 3** Simple linear associations between possible explanatory variables and mental health indicators

Variable	Depressive symptoms	Perceived stress scale
	$\beta$	$\beta$
Mental health		
Depressive symptoms <sup>†</sup>	–	0.37**
Perceived stress scale <sup>‡</sup>	1.13**	–
Demographic		
Female gender	1.88	2.04*
Age (years)	0.03	–0.03
Marital status		
Not married (reference)	–	–
Married	1.82	1.08
Race		
African (reference)	–	–
Multiracial	–0.31	2.33*
Indian	1.27	2.27
White	–9.62*	–3.32
Province		
Eastern Cape (reference)	–	–
Western Cape	–2.91	0.50
KwaZulu-Natal	–2.26	–0.22
Number in household	0.48*	0.24 <sup>†</sup>
Socioeconomic status		
Education		
<G7 (reference)	–	–
G8–G12	–4.92*	–0.21
>G12	–7.56**	–1.06
Regular employment	–4.02*	–1.27
Sum of non-employment incomes	3.37**	0.89***
Total income past 30 days	–1.73*	–0.31
Total income past 30 days (adjusted for household size)	–2.52**	–0.61
Subjective social status		
Place on community ladder	–2.02**	–0.78**
Place on country ladder	–1.09**	–0.54*
Place on creditworthiness ladder	–1.25**	–0.65**
Stressful life events		
Events not incl birth and catastrophe	1.42*	0.33
Birth	6.20*	4.94**
Catastrophe	9.42**	4.76**
Decision-making		
Respondent alone	1.11**	0.53*
Respondent with partner	–1.11**	–0.50*
Partner/other alone	0.52	0.21

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.10$ .

<sup>†</sup>Depressive symptoms measured with the Center for Epidemiologic Studies Depression Scale.

<sup>‡</sup>Perceived stress measured with Cohen's Perceived Stress Scale.<sup>31</sup>

variables. Sample sizes varied in the different models as a result of missing data. There were no differences by gender in the directions of the associations with depressive symptoms and perceived stress, so results for women and men were analyzed together to preserve power.

We then used linear multiple regression techniques to assess the contribution of several variables to our measures of depressive symptoms (models D1–D5) and perceived stress (models S1–S5). Model D1 included the demographic variables: gender, age, race, province of residence and number of people in household; these variables were included in all subsequent models. Model D2 included measures of SES: education, income and sources of regular and non-employment income. This model included income unadjusted for household size, because household size was included as a separate predictor variable. Model D3 included measures of subjective social status: place on community, country

and creditworthy ladders. Model D4 included variables representing major life events: birth, catastrophe and other. Model D5 included variables representing household decision-making: number of decisions made by the respondent alone and number made by the respondent in conjunction with his/her partner. Models S1–S5 were constructed identically, with perceived stress as the outcome variable.

All data were analyzed using StataSE 9.2 (Stata Corp, Inc, College Station, Texas, USA). Indicator variables were included in all analyses to account for the three geographical regions where the study took place.

## RESULTS

The individuals surveyed in this study were diverse with respect to gender, age, ethnicity, and various other demographic factors, as illustrated in table 1.

**Table 4** Multivariate regression model: depressive symptoms†

	Model D1 $\beta$ (95% CI)	Model D2 $\beta$ (95% CI)	Model D3 $\beta$ (95% CI)	Model D4 $\beta$ (95% CI)	Model D5 $\beta$ (95% CI)
Observations	242	195	240	239	78
Gender (1 = female)	2.07 (−0.90 to 5.04)	0.75 (−2.43 to 3.93)	1.32 (−1.47 to 4.10)	2.46† (−0.45 to 5.37)	5.74* (0.63 to 10.86)
Age	0.01 (−0.12 to 0.14)	−0.14 (−0.30 to 0.03)	−0.02 (−0.14 to 0.11)	0.01 (−0.12 to 0.14)	−0.05 (−0.31 to 0.21)
Race					
Multiracial	−0.07 (−3.85 to 3.72)	1.43 (−2.74 to 5.60)	2.85 (−0.95 to 6.65)	1.85 (−2.03 to 5.73)	0.53 (−5.72 to 6.78)
Indian	2.88 (−4.37 to 10.14)	0.71 (−7.91 to 9.33)	4.12 (−2.85 to 11.08)	4.69 (−2.46 to 11.84)	−1.03 (−12.34 to 10.27)
White	−8.38*** (−17.91 to 1.14)	−6.4 (−15.49 to 2.68)	−5.26 (−14.15 to 3.63)	−7.57 (−16.86 to 1.72)	−9.0 (−20.50 to 2.51)
Province					
KwaZulu-Natal	−2.41 (−6.24 to 1.41)	−2.19 (−6.43 to 2.05)	−1.72 (−5.28 to 1.83)	−2.4 (−6.15 to 1.36)	−2.08 (−8.64 to 4.47)
Western Cape	−2.74 (−6.48 to 1.00)	−1.87 (−5.76 to 2.02)	−2.56 (−6.05 to 0.92)	−4.23* (−8.00 to −0.46)	−2.54 (−8.41 to 3.34)
No of people in household	0.41*** (−0.05 to 0.86)	0.26 (−0.32 to 0.84)	0.42*** (−0.01 to 0.84)	0.21 (−0.26 to 0.67)	0.92† (−0.03 to 1.87)
Education					
G8–G12		−4.99*** (−10.44 to 0.47)			
>G12		−4.06 (−10.51 to 2.40)			
Regular employment income		0.84 (−4.30 to 5.98)			
Non-employment income		2.63* (0.39 to 4.86)			
Total income in past 30 days		−1.57*** (−3.26 to 0.12)			
Place on community ladder			−1.82** (−2.71 to −0.93)		
Place on country ladder			0.02 (−0.86 to 0.90)		
Place on creditworthy ladder			−0.73* (−1.29 to −0.17)		
Events not including birth and catastrophe				1.67* (0.33 to 3.00)	
Birth				4.89*** (−0.20 to 9.99)	
Catastrophe				9.29** (3.28 to 15.31)	
Solo decision-making					0.02 (−1.19 to 1.23)
Joint decision-making					−1.12* (−2.20 to −0.04)
Constant	17.23** (10.66 to 23.79)	36.70** (22.06 to 51.33)	28.42** (21.42 to 35.43)	14.07** (7.40 to 20.74)	20.31* (0.20 to 40.42)
R-squared	0.048	0.133	0.197	0.127	0.31

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.10$ . †Depressive symptoms measured with the Center for Epidemiologic Studies Depression Scale.<sup>27, 28</sup>

Depressive symptom scores in the sample overall were 18.8 (SD 11.7), with 57.4% of the sample higher than the standard proposed cut-off of 16 used in US populations (table 2). Among men, 50.4% had scores that exceeded this cut-off compared with 64.5% of women. Perceived stress scores were 18.6 (SD 6.7), with a score of 17.5 among men and 19.6 among women; there is no standard cut-off used for this measure.

### Simple linear regressions

Univariate analyses revealed associations between the mental health measures and various independent variables, which have been grouped into several categories including demographic, socioeconomic, subjective social status, life events and decision-making (table 3). Decreased levels of depressive symptoms were associated with education beyond primary school, white race compared with African race and fewer household members. Moreover, regular employment and higher income in the past 30 days were associated with decreased depressive symptoms, whereas more sources of non-employment income were correlated with increased depressive symptoms. Higher placement of oneself on the community, country or creditworthy ladder was associated with lower depressive symptom scores. The occurrence of various major life events—birth and catastrophe in particular—were also associated with increased depressive symptoms. Respondents who reported making more decisions by themselves reported increased depressive symptoms, whereas those who reported making decisions in conjunction with their partners reported lower levels of depressive symptoms.

Increased perceived stress was associated with female gender, multiracial race compared with African race and a greater

number of household members. More sources of non-employment income was also associated with having a higher perceived stress score, as was lower self-perceived placement on community, country and creditworthy ladders and the occurrence of a birth or catastrophe. Finally, decision-making variables were once again significant, associated with higher perceived stress for decision-making alone and lower perceived stress for those making decisions in coordination with a partner.

### Multivariate regressions

In models D1–D5 (table 4), having more depressive symptoms was associated with having a higher number of household members, more sources of non-employment income, lower total income in the past 30 days, high school education compared with less than high school education, lower self-perceived status on the community and creditworthy ladders, recent experience of a birth, catastrophe or other life event and making decisions without one's partner. In addition, in models D4 and D5 female gender was associated with increased depressive symptoms, whereas in model D1 white race was associated with fewer depressive symptoms and in model D4 living in the Western Cape was associated with fewer depressive symptoms.

In models S1–S5 (table 5), increased perceived stress was associated with female gender, multiracial race and more household members. Moreover, higher levels of perceived stress were associated with lower self-perceived status on the community and creditworthy ladders, recent birth or catastrophe. Also, in model S3 Indian race was associated with increased perceived stress.

**Table 5** Multivariate regression model: perceived stress<sup>†</sup>

	Model S1 $\beta$ (95% CI)	Model S2 $\beta$ (95% CI)	Model S3 $\beta$ (95% CI)	Model S4 $\beta$ (95% CI)	Model S5 $\beta$ (95% CI)
Observations	248	200	246	246	82
Gender (1 = female)	2.13* (0.48 to 3.78)	1.95* (0.02 to 3.88)	1.82* (0.25 to 3.38)	2.18** (0.58 to 3.79)	4.11* (0.93 to 7.30)
Age	-0.04 (-0.11 to 0.04)	-0.06 (-0.16 to 0.04)	-0.04 (-0.12 to 0.03)	-0.03 (-0.10 to 0.05)	-0.08 (-0.24 to 0.07)
Race					
Multiracial	2.68* (0.61 to 4.76)	3.08* (0.58 to 5.58)	4.44** (2.33 to 6.55)	3.40** (1.28 to 5.53)	2.84 (-1.04 to 6.73)
Indian	2.47 (-1.46 to 6.40)	1.78 (-3.17 to 6.73)	3.93* (0.12 to 7.74)	2.9 (-0.98 to 6.77)	-1.63 (-8.84 to 5.57)
White	-2.47 (-7.45 to 2.51)	-2.27 (-7.40 to 2.87)	-0.8 (-5.51 to 3.91)	-2.18 (-7.03 to 2.68)	-0.76 (-7.70 to 6.17)
Province					
KwaZulu-Natal	0.37 (-1.75 to 2.48)	-0.24 (-2.80 to 2.31)	0.7 (-1.30 to 2.69)	0.71 (-1.37 to 2.79)	0.05 (-4.09 to 4.20)
Western Cape	0.02 (-2.05 to 2.08)	0.35 (-1.97 to 2.66)	0.26 (-1.70 to 2.21)	-0.13 (-2.21 to 1.94)	-1.93 (-5.53 to 1.67)
No of people in household	0.25*** (-0.01 to 0.50)	0.18 (-0.17 to 0.53)	0.25* (0.01 to 0.49)	0.14 (-0.12 to 0.40)	0.54*** (-0.09 to 1.16)
Education					
G8–G12		-1.5 (-4.64 to 1.63)			
>G12		-1.38 (-5.09 to 2.34)			
Regular employment income		0.64 (-2.38 to 3.66)			
Non-employment income		0.39 (-0.92 to 1.69)			
Total income in past 30 days		-0.55 (-1.57 to 0.46)			
Place on community ladder			-0.62* (-1.12 to -0.13)		
Place on country ladder			-0.39 (-0.88 to 0.10)		
Place on creditworthy ladder			-0.44** (-0.76 to -0.13)		
Events not including birth and catastrophe				0.53 (-0.21 to 1.27)	
Birth				4.40** (1.57 to 7.23)	
Catastrophe				5.31** (1.84 to 8.77)	
Solo decision-making					-0.05 (-0.82 to 0.72)
Joint decision-making					-0.49 (-1.17 to 0.19)
Constant	16.73** (13.04 to 20.42)	22.70** (14.13 to 31.27)	22.70** (18.72 to 26.69)	15.05** (11.27 to 18.83)	19.99** (7.29 to 32.68)
R-squared	0.079	0.096	0.2	0.152	0.246

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.10$ . <sup>†</sup>Perceived stress measured with Cohen's Perceived Stress Scale.<sup>31</sup>

## DISCUSSION

Depressive symptom scores were high compared with other studies that have used the CES-D and 50.4% of men and 64.5% of women exceeded the cut-off of 16, used in the United States to ascertain the risk of depression. The mean CES-D score in our sample was 18.8 (SD 11.7). As a basis of comparison, previous studies have reported CES-D scores that range from 16.2 to 17.9 for low-income individuals in the United States<sup>41</sup> and 8.9–12.9 among the general United States population.<sup>42</sup> Perceived stress scores were also high, with men scoring 17.5 on average and women scoring 19.6. In multivariate analyses, increased depressive symptoms were associated with having more household members, non-white race, lower educational attainment, more sources of non-employment income, lower income in the past 30 days, lower subjective social status on the community and creditworthy ladders and making decisions without a partner. In multivariate analyses, increased perceived stress was associated with female gender, multiracial background, more household members, lower subjective social status on the community and creditworthy ladders and the occurrence of a birth or catastrophe.

Participants in our study had a mean annual income of US\$6465, which is notably lower than the US\$13 000 estimated gross domestic product per capita for South Africa,<sup>43</sup> indicating the low SES of our sample. These data are confirmed by the placement by study participants on the subjective ladders. Mean self-perceived status in reference to the country of South Africa was 4.0 and mean placement in reference to the community was 4.4, suggesting that the study participants perceived themselves to be of low SES. In addition, they perceived themselves to be lower than the reference population

in terms of creditworthiness. Despite this seeming homogeneity, we found that our sample was diverse, with the range of SES profiles among subjects—in particular education and non-employment income—associated with increases in depressive symptoms and perceived stress scores.

The primary limitations to interpreting and generalising from this study are the design, the sample population and the instruments. Because the design was cross-sectional, it precludes the possibility of drawing conclusions about the directionality of the associations between the variables. Furthermore, because the study subjects were selected from a pool of marginally creditworthy applicants for a high-interest rate (200% annualised percentage rate) lending product, they represent a potentially marginalised and low SES population and thus their scores and risk factors may differ from those of the general South African populace. Moreover, we did not collect data on HIV status, a health factor that may significantly affect mental health, economic and other outcomes in the context of South Africa where the prevalence of HIV is very high. Finally, the survey instruments have not previously been validated in South Africa, so they may not accurately capture local conceptions or manifestations of mental illness.

There is a shortage of treatment options available for depressive and anxiety disorders in South Africa,<sup>7 44</sup> with a focus instead on tertiary care for psychotic and substance abuse disorders. Furthermore, primary care providers are generally not trained to detect psychiatric disorders such as depression and anxiety.<sup>6 9 25</sup> Despite a 1997 White Paper presented by the South African Department of Health that encouraged increasing resources in mental healthcare,<sup>45</sup> the Department's 2006–7 Annual Health Plan made no mention of mental illness as a

## What this study adds

- ▶ In sub-Saharan Africa, health researchers and practitioners have focused primarily on reducing infectious diseases and promoting conditions relating to physical wellbeing. The protection of mental health is, however, an equally high priority. Some preliminary research from South Africa suggests that there are particular populations at greatest risk of mental illness but the existing studies are small and have not used multivariate models for analysis.
- ▶ The study reported here demonstrates a high number of depressive symptoms and high number of symptoms of perceived stress among low-income South African adults who applied for a high-interest rate loan. Higher levels of depressive symptoms and perceived stress were independently associated with female gender, multiracial background, greater household size and lower subjective social status.
- ▶ These results suggest that many South African adults living in poverty are at great risk of experiencing depressive symptoms and perceived stress and that future interventions should target adults within this population who are particularly vulnerable.

public health priority.<sup>46</sup> Moreover, studies assessing community attitudes towards mental illness in South Africa find that there is stigma surrounding the mentally ill and misunderstanding with respect to the causes of mental illness, both of which may affect the seeking of treatment.<sup>47</sup> Consequently, the results of this study will contribute to a better awareness of the correlates of mental health in South Africa so that interventions can be more effectively designed and executed in the future.

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