

GENDER DIFFERENCES IN DEPRESSION AND SMOKING AMONG YOUTH IN CAPE TOWN, SOUTH AFRICA

Anita F. Fernander, PhD; Alan J. Flisher, PhD, FC Psych;
Gary King, PhD; Farzad Noubary, BS; Carl Lombard, PhD;
Mystique Price, BS; Derek Chalton, PhD

Objective: Gender differences in the association between depression and smoking has received inconsistent support among youth in national samples in the United States and other countries. However, the examination of depression and smoking among South African male and female youth has not been sufficiently studied. This paper examines gender differences in the association between depression, racially classified social group (RCSG) status, social amenities, and grade level with smoking among South African youth in Cape Town.

Design: Six-hundred twenty students completed a questionnaire on socio-demographic characteristics, smoking, and depression. Separate logistic regression procedures were conducted by gender to assess significant variations in correlates of ever smoker versus never smoker status and current smoker versus nonsmoker status. Variables included in the models were Beck Depression Inventory scores, RCSG, social amenities, and grade level.

Results: Primary analyses revealed that among girls, mild and severe depression were significant predictors of ever smoking status. In addition, girls who suffered from mild, moderate, and severe forms of depression were more likely to be current smokers than nonsmokers. Among boys, depression was not a significant predictor of smoking status.

Conclusions: The results support the need to incorporate mental health education strategies into smoking intervention programs, especially among school girls in Cape Town, South Africa. (*Ethn Dis.* 2006;16:41-50)

Key Words: Depression, Gender, Racially Classified Social Group Differences, Smoking, South African Youth

From the Department of Psychiatry and Mental Health, University of Cape Town (AJF) and Biostatistics Unit, Medical Research Council of South Africa (CL), South Africa; Department of Behavioral Science, College of Medicine, University of Kentucky, Lexington, Kentucky (AFF); Department of Biobehavioral Health, Penn State University, University Park, Pennsylvania (GK, FN).

INTRODUCTION

Cigarette smoking is commonly referred to as a pediatric disease because it is a problem that originates in youth, with 90% of all smokers initiating use by the age of 18 years.¹ Recently, Flisher, Parry, Evans, Muller and Lombard² found that 27% of South African youth in Cape Town were current smokers. Upon closer investigation, King et al³ found that among Cape Town youth, White students were more likely to be current smokers (defined as a history of having smoked in the past 31 days; 36.3%) when compared to Colored (29.7%) and Black (9.7%) students. Flisher et al² found a gender effect in that Black males had higher prevalence rates (lifetime, previous year, and previous month) of smoking than Black females who smoked less than their Colored and White counterparts. It is expected that smoking rates among youth in South Africa will likely increase as the tobacco industry targets marketing toward youth in developing countries.^{4,5}

The current rates of smoking among South African youth and the estimated increase in prevalence rates are disturbing because smoking is a major yet preventable cause of morbidity and mortality. Most chronic diseases associated with tobacco use are not manifested until adulthood and it is

estimated that smoking-related illness will contribute to more than 10 million deaths annually over the next 30 years.^{5,6} Approximately 95,000 of these smoking-related deaths will occur in sub-Saharan Africa.⁷ Delineating and understanding risk factors associated with smoking among South African youth is a critical public health issue.

Documented risk factors for smoking among adolescents in the United States and other countries include individual factors as well as community and social influences, such as low self esteem,⁸⁻⁹ ethnic/racial status,¹⁰⁻²¹ religious culture/attendance,^{22,23} peer influences,²⁴⁻²⁹ poor school performance,^{22,30} socioeconomic status,³¹⁻³² weight control for girls,³³⁻³⁵ other drug use,^{28,34} and familial influences.^{9,32} Previous studies have also identified associations with affective disorders such as depression and anxiety and smoking among youth.^{12,26,36-52}

The prevalence of depressive symptoms among non-clinical samples of adolescents have ranged between 8.6% and 54%^{39,47,53-59} and there is a two-to three-fold increased risk of depressive symptomatology for adolescent girls compared with boys.⁶⁰⁻⁶² Epidemiologic studies applying clinical diagnostic criteria yield prevalence rates for current major depression among US adolescents ranging from 0.4%-7.0%.^{57,63-65} One published study examined a community sample of 500 Khayelitsha youth in an informal settlement area in Cape Town, South Africa and found the prevalence of dysthymic disorder was 4% and major depression was 3.4%.⁶⁶ Although revealing, the lack of representativeness of this sample points to the need to examine more fully rates of mental

Address correspondence and reprint requests to Anita F. Fernander, PhD; Department of Behavioral Science, College of Medicine; University of Kentucky; 103 College of Medicine Office Bldg; Lexington, KY 40536-0086; 859-323-4679; 859-323-5350 (fax); afern2@uky.edu

disorders among South African youth in Cape Town.

Investigators have postulated that individuals who are depressed may use nicotine as a form of self-medication in an attempt to treat their symptoms or improve their psychological well-being.^{37,67} In a psychiatric population of South African adolescents Bérard and colleagues,⁶⁸ found that 48.4% of the sample reported smoking. Smokers were significantly younger and scored higher on the Hamilton depression rating scale than nonsmokers.

Studies examining smoking among South African youth have explored familial influences,⁶⁹ academic performance and attendance,⁶⁹ socioeconomic status,² urbanization status,⁷⁰ comorbid substance use,⁷¹ and participation in other risk behaviors.⁷¹⁻⁷² However, we are not aware of any studies that have documented gender differences in the relationship between affective disorders, such as depression, and smoking among a non-clinical sample of South African adolescents. The early premise of cigarette smoking as a "gateway drug" along the progression of stages of illegal drug use among youth,⁷³⁻⁷⁴ is an important factor to consider. Identifying key variables that may influence smoking status and smoking initiation among South African male and female youth would be helpful in developing smoking prevention and intervention programs for this population. Thus, the aim of this analysis is to examine the association between depression and smoking among South African male and female youth in Cape Town.

METHODS

Sample

Data for this study were derived from the 1997 South African Community Epidemiology Network on Drug Use (SACENDU) School survey. A stratified sampling procedure utilizing postal zip codes was used to select students at non-

private high schools in Cape Town. The number of schools selected was proportional to the total number of students in all the schools in the geographic stratum. The probability of selection of a school was proportional to the number of students in the school. Within each selected school ($n=39$), two classes in each of two grades (8 and 11) were randomly chosen and 40 students were randomly selected. A maximum of five additional students per grade were selected as replacements for absentees, drop-outs, and transferees.

A total of 2,946 students completed Part I of the survey, which included sociodemographic and cigarette smoking questions. From these 2,946 students, a subsample of 946 was randomly selected to complete Part III of the survey, which included the Beck Depression Inventory (BDI).⁷⁵ The results presented in this paper are from Part III respondents (all of whom also completed Part I). Formatting differences in the BDI portion of Part III of the survey was different from other scales on the questionnaire and led to a large number of missing items. Students with missing data on the BDI were subsequently excluded from the analyses ($n=326$). The resultant sample consisted of 623 students. (There were no significant differences regarding the demographic variables between students with complete vs incomplete data on the BDI. However, students with complete BDI data were more likely to have ever smoked a whole cigarette in his/her lifetime – ie, ever smoker).

Racially classified social groups (RCSG) were used in the analyses. In this study, the use of RCSG refers explicitly to the social conception of race.¹⁴ The race groups of Black, White, Colored (ie, derived from Asian, European, and African ancestry) and Asian are as defined by the repealed population Registration Act of 1950. (As there were only three Asians in the sample, they were excluded from the analyses). There are dangers of analyzing the data by RCSG

since these groups do not have anthropological or genetic validity. However, RCSG as classified above is used here for descriptive purposes and as a control variable because differences between these groups have been found, for many indicators of health, to be mediated by political and economic factors.⁷⁶

Human subject approval was provided by the Research Ethics Committee of the University of Cape Town, Faculty of Health Sciences. Students were informed that they could choose not to participate in the study or to omit answering certain questions without any negative repercussions.

Instrument

The instrument was translated from English into the other main languages spoken in Cape Town (Afrikaans and Xhosa) and then back translated into English by individuals whose home languages were either Afrikaans or Xhosa. Very similar versions of the instrument have been used in previous studies and it has been subjected to extensive pilot studies in small groups and classrooms of youth in Cape Town, South Africa.⁷² The test-retest reliability of the items Cohen's kappa⁷⁷ was 0.85 (.80-.91 [95% confidence interval]) for cigarettes.⁷⁸ The instrument included all 21 items from the Beck Depression Inventory.⁷⁵ Cronbach's alpha reliability coefficient for the BDI was .91. Using Landis and Koch's⁷⁹ criteria, test-retest reliability for the BDI among Cape Town youth have reportedly ranged from fair to almost perfect.⁸⁰ Students were also asked if they had used a fictitious substance (Derbisol). None of the students included in the current analyses responded positively to this item.

Procedure

Members of the research team distributed a self-administered questionnaire during regular school periods in the absence of teachers or other school personnel. The seating was arranged such that confidentiality was preserved. After completing the questionnaire, the

Table 1. Sociodemographic characteristics

	% Black (n=109)	% Colored (n=323)	%White (n=169)	% Total (N=620)
Gender				
Male (n=256)	13.7	54.8	31.5	42.0
Female (n=354)	21.1	52.6	26.3	58.0
Number of amenities*				
<2 (n=28) [†]	64.3	28.6	7.1	4.7
2 (n=55) [†]	34.5	56.4	9.1	9.3
3 (n=159) [†]	25.2	60.4	14.4	26.8
4 (n=351) [†]	38.1	30.0	31.9	59.2
Grade level				
9 th (n=264)	16.1	54.9	29.0	42.4
11 th (n=356)	19.7	52.9	27.4	57.6
Total	18.1	53.7	28.2	100.0

* N<620 due to missing values.

† χ^2 probability $P<.01$.

students placed it in an envelope, which they sealed before handing in. The level of student participation was satisfactory and no student refused to participate.

Data Analyses

The primary smoking variable was a two-level cigarette smoking indicator about whether an adolescent had ever smoked a whole cigarette in his/her lifetime (ie, ever smoker) or was a lifetime abstainer (ie, never smoker). Ever smokers were re-categorized into current smokers and former smokers based on whether they had smoked in the past 31 days. Those who had consumed cigarettes within this time period were categorized as current smokers and former smokers if they had not. The nonsmokers category consisted of both never and former smokers.

The depression variable consisted of the total score from the BDI. For analytical purposes the following categories were developed according to scale guidelines: minimal level of depression (scores ranging from 0–13); mildly depressed (scores ranging from 14–19); moderately depressed (scores ranging from 20 to 28); and severely depressed: (scores ranging from 29 to the maximum score of 63). For the primary hypothesis test of the association between smoking status and depression,

scores on the BDI were analyzed as continuous data.

Traditional measures of socioeconomic status (SES), such as family income and parental education were not collected from respondents. Alternatively, students were asked about their number of household amenities (ie, television, electricity, telephones, and automobiles). An index of the number of household amenities was created by summing each participant's total number of amenities. Participants could have less than two amenities, two, three, or all four amenities. The number of amenities served as a proxy variable for SES.

For the primary analyses the STATA computer program was used to conduct logistic regression on the two binary smoking status responses (never smoker vs ever smoker; current smoker vs nonsmoker). STATA produced accurate estimates for the standard errors of the regression coefficients, as it takes the complex sample design into account. As existing research has suggested the etiology and prevalence of depression may differ by gender, and our preliminary logistic regression analyses revealed a significant gender main effect, logistic regressions were conducted on separate gender models to assess statistically significant variations in correlates of smoking status. Vari-

ables included in the multivariate analyses were RCSG, depression, social amenities, and grade level.

RESULTS

Preliminary Results

Socio-Demographics

Colored students (54%) comprised the majority of the 620 subjects (54%), followed by Whites (28%) and Blacks (18%; see Table 1). Overall, 58% of the students were female and significant gender differences were found by RCSG ($P=.05$). Grade level representativeness was fairly equitable across RCSG groups ($P=.53$), with 43% of the students in grade 8 and 57% in grade 11. However, scores revealed that on average Blacks were significantly older (17.0 years, ± 3.1) than either Colored (15.4 years, ± 1.8) or White (15.4 years, ± 1.6) students ($P<.01$). Significant differences by RCSG were found with respect to SES ($P<.01$). The percentages of Black, Colored, and White students whose families possessed all four household amenities (ie, television, electricity, telephones, and an automobile) were 27%, 58%, and 82%, respectively.

Depressive Characteristics

Over half of all respondents (64%) reported minimal levels of depression, according to the BDI, compared to those reporting mild, moderate, and severe levels of depression (13%, 12%, and 10%, respectively; see Table 2). Mean scores on the BDI were higher among Blacks (14.4 ± 1.0) than any other group with their scores significantly higher than Whites (9.9 ± 0.8) but not Coloreds (12.7 ± 0.6 ; $P<.01$). Significant gender differences were found on the BDI with adjusted mean scores for males lower than those for females (8.5 ± 8.5 and 14.6 ± 11.7 , respectively; $t<.01$). There were no significant differences in BDI scores by SES ($P=.07$). Mean scores on the BDI

Table 2. Depression among Cape Town students

Depression Category	% Black				% Colored				% White				% Total			
	Min (n=61)	Mild (n=9)	Mod (n=23)	Sev (n=14)	Min (n=197)	Mild (n=51)	Mod (n=39)	Sev (n=36)	Min (n=126)	Mild (n=19)	Mod (n=12)	Sev (n=12)	Min (n=386)	Mild (n=79)	Mod (n=74)	Sev (n=62)
Gender																
Male (n=256) [†]	70.6	5.9	17.6	5.9	77.9	14.7	5.2	2.2	87.2	3.8	1.3	7.7	80.1	9.8	5.9	4.3
Female (n=354) [†]	50.7	9.6	23.3	16.4	48.3	16.5	17.6	17.6	63.7	17.6	12.1	6.6	53.4	15.5	17.0	14.1
Number of amenities ^{*,†}																
<2 (n=28)	38.9	27.8	22.2	11.1	12.5	50.0	25.0	12.5	50.0	50.0	0.0	0.0	32.1	35.7	21.4	10.7
2 (n=55)	63.2	5.3	26.3	5.2	61.3	9.7	16.1	12.9	60.0	0.0	0.0	40.0	63.8	6.9	17.2	12.1
3 (n=159)	62.5	5.0	20.0	12.5	59.4	11.5	15.1	13.5	78.3	8.7	8.7	4.3	64.2	9.1	15.2	11.5
4 (n=351)	60.7	3.6	21.4	14.3	63.8	17.3	9.2	9.7	74.6	11.6	7.3	6.5	67.3	14.1	9.4	9.1
Grade																
8th (n=264) [†]	65.8	7.3	17.1	9.8	70.7	17.9	7.1	4.3	75.7	12.2	4.0	8.1	71.6	14.0	7.6	6.8
11th (n=356) [†]	53.0	8.8	23.5	14.7	53.6	14.2	15.8	16.4	73.7	10.5	9.5	6.3	59.3	12.4	15.4	12.9
Total	57.8	8.3	21.1	12.8	61.0	15.8	12.1	11.1	74.6	11.3	7.1	7.1	64.2	13.1	12.3	10.3

*N<620 due to missing values.
[†] χ^2 probability $P<.05$.
[‡] χ^2 probability $P<.01$.

were higher for 11th grade students (14.1 ± 11.4) than for 8th grade students (9.6 ± 9.2 ; $t<.01$). Age was significantly correlated with BDI scores ($r=.19$, $P<.01$).

Smoking Characteristics

The proportion of students who had never smoked a whole cigarette was approximately 52% (Table 3). Nineteen percent of the respondents reported smoking during the last year, but not in the past 31 days, and 29% of the students reported smoking a cigarette within the last month (current smoker). Significant RCSG differences were found on smoking status ($P<.01$) with Colored students having the highest proportion (64%) of current smokers compared to White (30%) and Black (11%) students. Males and females current smoking status was comparable (30% and 27%, respectively; $P=.44$). On average, Black students who were current smokers were significantly more likely to delay the onset of smoking by approximately two years with mean age of onset of smoking at $15.4 (\pm 2.4)$ years for Blacks compared to $13.2 (\pm 1.9)$ years for Colored students and $13.1 (\pm 2.1)$ years for White students ($P<.01$). A higher percentage of 11th graders (36%) were current smokers than were 8th graders (19%; $P<.01$). No significant gender difference on age of smoking initiation was found ($t=.38$), with average onset for females $13.1 (\pm 1.9)$ years and $12.7 (\pm 1.5)$ years for males. A higher percentage of students whose families possessed less than two household amenities were smokers (33%), compared to those who reported four, three, and two household amenity (24%, 26%, and 7%, respectively; $P<.01$).

Primary Results

Ever Smokers vs Never Smokers

Table 4 details the multiple logistic regression model for ever smokers compared to never smokers by gender.

Table 3. Smoking among Cape Town students

Smoking Status	% Black			% Colored			% White			% Total		
	Never (n=85)	Former (n=7)	Current (n=12)	Never (n=141)	Former (n=70)	Current (n=110)	Never (n=80)	Former (n=37)	Current (n=50)	Never (n=318)	Former (n=117)	Current (n=175)
Gender												
Male (n=256)	22.6	85.7	50.0	45.0	32.9	46.2	45.0	51.4	42.0	39.1	43.1	44.7
Female (n=354)	77.4	14.3	50.0	55.0	67.1	53.8	55.0	48.6	58.0	61.9	56.9	55.3
Number of amenities ^{*, †}												
<2 (n=27)	19.5	0.0	8.3	2.8	4.4	0.9	2.5	0.0	0.0	7.0	2.6	1.2
2 (n=57)	20.7	0.0	16.7	9.9	5.8	11.1	2.5	5.6	2.0	11.1	6.1	8.7
3 (n=161)	35.4	42.9	50.0	30.3	30.4	25.0	15.0	16.7	8.0	29.5	26.1	22.0
4 (n=358)	24.4	57.1	25.0	53.9	59.4	63.0	80.0	77.8	90.0	52.4	65.2	68.2
Grade level [†]												
8th (n=259) [†]	38.8	28.6	25.0	51.8	55.8	24.5	46.3	51.4	34.0	46.5	53.0	28.0
11th (n=351) [†]	61.2	71.4	75.0	48.2	44.2	75.5	53.7	48.6	66.0	53.5	47.0	72.0
Total	81.7	6.7	11.5	43.9	21.8	34.3	47.9	22.2	29.9	52.1	19.2	28.7

* N<620 due to missing values.

† χ^2 probability $P<.01$.

Logistic regression analysis revealed that, among girls, Blacks were significantly less likely (OR .08, 95% CI .03–.27) than Whites to be ever smokers. Mild and severe depression (OR 2.14, 95% CI .95–4.81; OR 1.94, 95% CI .95–3.97, respectively) were marginally significant predictors of smoking status as girls who suffered from either form of depression were more likely to be ever smokers than girls who experience minimal depression. Grade and SES were not statistical-

ly significant predictors of depression among girls.

Among boys, those in grade 11 were more likely (OR 2.23, 95% CI 1.26–3.93) than those in grade 8 to be ever smokers. Racially classified social groups (RCSG), depression, and SES were not statistically significant predictors of smoking status among boys.

Current Smoker vs Nonsmoker

Table 5 details the multiple logistic regression model for current smokers

compared to nonsmokers by gender. Mild, moderate, and severe depression (OR 2.33, 95% CI 1.02–5.33; OR 2.42, 95% CI 1.25–4.70; OR 2.47, 95% CI 1.21–5.03, respectively) were significant predictors of smoking status as girls who suffered from these forms of depression were more likely to be current smokers than those who experienced no depression. Black girls were significantly less likely (OR .15, 95% CI .05–.51) than White girls to be current smokers. Colored girls did not differ significantly from White girls in the adjusted probability of being a current smoker. Grade and SES were not statistically significant predictors of smoking status among girls.

Among boys, those in grade 11 were more likely (OR 3.30, 95% CI 1.64–6.63) than those in grade 8 to be current smokers. Racially classified social groups (RCSG), depression, and SES were not statistically significant predictors of smoking status among boys.

DISCUSSION

Symptoms of depression are associated with ever and current smoking status among adolescent females, but

Table 4. Multiple logistic regression for ever smokers vs never smokers stratified by gender*

Variables in Model	Females Odds Ratio (95% CIs)	Males Odds Ratio (95% CIs)
Depression category		
Minimal	1.00	1.00
Mild	2.14 (.95–4.81)	1.41 (.52–3.85)
Moderate	1.35 (.70–2.62)	0.60 (.20–1.83)
Severe	1.94 (.95–3.97)	2.81 (.66–11.88)
RCSG		
White	1.00	1.00
Colored	1.08 (.53–2.19)	1.37 (.64–2.94)
Black	0.08 (.03–.27)	0.72 (.26–1.97)
Grade level		
9 th	1.00	1.00
11 th	1.22 (.66–2.27)	2.23 (1.26–3.93)
SES		
High (<2 amenities)	1.00	1.00
Low (\leq 2 amenities)	0.81 (.39–1.67)	0.49 (.18–1.38)

* Probability modeled is that of being an ever smoker.

Table 5. Multiple logistic regression for current smokers vs nonsmokers separated by gender*

Variables in Model	Females Odds Ratio (95% CIs)	Males Odds Ratio (95% CIs)
Depression category		
Minimal	1.00	1.00
Mild	2.33 (1.02–5.33)	1.60 (.53–4.85)
Moderate	2.42 (1.25–4.70)	0.74 (.18–3.15)
Severe	2.47 (1.21–5.03)	2.77 (.50–15.42)
RCSG		
White	1.00	1.00
Colored	0.81 (.44–1.52)	2.16 (.84–5.53)
Black	0.15 (.05–.51)	0.81 (.23–2.80)
Grade level		
9 th	1.00	1.00
11 th	1.87 (.86–4.10)	3.30 (1.64–6.63)
SES		
High (>2 amenities)	1.00	1.00
Low (≤2 amenities)	0.87 (.43–1.75)	0.65 (.16–2.65)

* Probability modeled is that of being a current smoker.

not among males in this study of South African students in Cape Town. Average BDI scores for males were significantly lower than those of females and it is possible that this finding may have accounted, in part, for the failure to find an association of this variable with smoking among males. However, our findings are similar to other studies conducted in the United States.^{36,81} For example Acierno et al,³⁶ examining a national sample of adolescents, found that a diagnosis of depression was significantly associated with the likelihood of smoking among adolescent girls, but not among adolescent boys. However, the findings are in contrast to the findings of Killen et al²⁶ who reported depression predicted smoking initiation for boys, but not girls. Acierno and colleagues³⁶ posited that conflicting results across studies reflect differences in statistical strategies and variable operationalization. For example, in the present study and Acierno and colleagues' study, the effect of multiple risk factors, such as RCSG/race and SES, were controlled. In addition, both our study and Acierno et al's³⁶ work used a more conservative assessment of smoking status than that employed by Killen et al.²⁶ In Killen and colleagues study, an affirmative

response to a single item was sufficient to classify an individual as a smoker.²⁶ Acierno and colleagues³⁶ point out that the smoker classification strategy created by Killen et al²⁶ is likely to be heterogeneous, with infrequent or experimental smokers included along with active smokers.

The present finding of an association between depression and smoking is suggestive rather than causal. Mediating and/or moderating factors that may account for the association between depression and smoking found among girls and not boys may also be related to psychosocial influences (such as coping and/or mood regulation) as well as biological influences (such as a weight control and a possible genetic predisposition). While smoking, as a form of coping with psychosocial pressure, among adolescents is well-documented, studies examining gender differences in coping among adolescents are mixed.^{82,83} It is possible, that as depression leads to low self-esteem among girls they exhibit fewer coping resources (ie, social skills) to withstand social pressure to smoke. Furthermore, the association between depression and low self-esteem among adolescents has been demonstrated⁸⁴ and low self-esteem has been linked to adolescent

risk behaviors such as smoking.⁸⁵ Studies differentially examining associations between self-esteem, social skills, and the role of coping on smoking among adolescent male and female youth may need to be investigated.

As Breslau, Kilbey, and Andreski⁸⁶ and Acierno et al³⁶ have noted, a mediating factor, such as a desire for weight control, may be responsible for the association found between smoking and depression among girls but not boys. Due to societal pressures for thinness among women, female youth may be depressed due to dissatisfaction with their body image, and thus, may use smoking as a form of weight control.^{33,87} Alternatively, biological factors are suspected as explanations for gender differences in levels of depression.⁸⁸ Although possible, it is not known whether nicotine from tobacco provides gender specific neurochemical effects among youth.

Another explanation for the gender differences found in the smoking and depression association may pertain to related issues underlying the diffusion of innovations. In the current study the prevalence of smoking is lower among girls, which implies that the girls who smoke are innovators of smoking. It is possible that the innovators of smoking in this population are motivated primarily by personal factors (such as depression). Social influence may be less important since smoking is not common in this population. Conversely, once smoking is more common, social influence becomes more important at the expense of personal factors. There may be other ways in which the innovators differ from those that commence smoking later, for example the existence of family problems (which are, in turn, associated with depression).⁸⁹

Twenty-eight percent of the students in this study met the criteria for current smoker status and just over half the students had never smoked a cigarette. Colored students were found to have

the highest proportion of current smokers while Blacks had the lowest proportion. In addition, Black students had a significantly longer delay of smoking initiation than other students. Furthermore, Black girls were less likely to be ever smokers or current smokers than White girls. Studies among US adolescents have also noted racial differences in smoking where Black students are least likely to be smokers.^{12,13,16,35} Possible explanations for the lower rates of smoking found among Blacks in the current study may be due to access to less disposable income, other socio-cultural factors, and/or less exposure to media.

A higher percentage of 11th graders were ever or current smokers than were 8th graders, particularly among boys. Coogan et al⁴⁰ and Gritz et al¹² also found a higher history and incidence of smoking and history of smoking among students in upper grade levels compared to students in lower grade levels. However, these findings are in contrast to Bérard and colleagues⁶⁸ study of an outpatient psychiatric population of adolescents who found that smokers were significantly younger than non-smokers among the South African youth. It is possible that compared to clinically-treated samples, quitting rates are lower among community-based sample and this may account for differences in smoking rates found in Bérard and colleagues study. Socio-economic status (SES) was also found to differentiate smokers from non-smokers. A higher percentage of students with less than two amenities were smokers compared to those with two or more amenities. Studies conducted in the United States, using educational status as a proxy variable for SES, have found an inverse relationship between smoking and SES.⁹⁰⁻⁹¹

Of note also are the differential findings on BDI scores. The finding that females had significantly higher BDI scores than males is similar to other studies conducted on

depressive symptomatology among adolescents in the United States and Spain.^{12,36,42,45,56,60,61,81,90,91,92} The vast majority of adolescents reported minimal levels of depressive symptomatology.

Age was also significantly positively related with BDI scores. Goodman and Capitman⁴⁵ and Brooks and colleagues⁸¹ found associations of age with depressive symptoms in that adolescents with high depressive symptoms were significantly older. Explanations for this age effect that have been provided include alteration of societal experiences, changes in self perception, rises in hormone levels, and alterations in the size or function of brain structures, or combinations of these.⁹³ In addition, students with higher scores on the proxy variable of SES were also more likely to report higher levels of depression. This finding is similar to those of Hanna and colleagues⁹¹ who operationalized SES as family income below or above poverty threshold, but unlike the findings documented by Goodman and Capitman⁴⁵ where lower household income and lower parental education were associated with depression. Different methods of assessing SES across studies may be responsible for the lack of consistency found across studies.

It is noteworthy that significant racial differences were found on the BDI with Blacks reporting higher scores and Whites reporting the lowest scores. To date, there have been inconsistent findings regarding depression in racial subgroups. The current study's findings are in contrast to Brooks and colleagues⁸¹ and Garrison and colleagues⁹⁴ who found Black youth in the United States had decreased odds of feeling depressed when compared to White students. Other studies in the United States have documented that adolescents who identify themselves racially as Black, Hispanic, or Other are more likely to report higher levels of depression than Whites.^{12,95,96,97} Lack of confirmatory results across studies may

be related to the inconsistent methods of assessing depression among youth. While some studies have utilized psychometrically valid and standardized scales other studies have used single or multiple items (with demonstrated or lacking reliability) to assess depressive symptomatology. Mental health disorders among Blacks in South Africa may be related to the social legacy of apartheid and disadvantages in the post-apartheid era. This topic warrants additional investigation, using standardized scales like the BDI.

Limitations and Strengths

The limitations of this study include the restriction of study subjects to students who were in attendance at school on the day the survey was administered. Dropouts and absentees were not included. There is evidence from previous studies in Cape Town^{69,98} that rates of substance use are higher for these sub-groups. Second, the study relied on self-report data. Although great lengths were taken to ensure confidentiality, there was no way of assessing underreporting of tobacco use. Furthermore, a large number of subjects from the larger sample were excluded due to formatting differences in the BDI section of the questionnaire. However, no significant differences were found on the demographic variables among those students with complete vs incomplete data on the BDI. The decision to exclude subjects with missing data, rather than develop a total BDI score for subjects with missing data based upon an imputation, was made to protect the integrity of the scale. It appears unlikely that the alternative decision to include the students due to missing data on the BDI, who were found more likely to be "never" smokers compared to students with complete data on the BDI ($P=.04$), would have skewed the study results because more smokers were present in the data that was analyzed and a higher prevalence may not have

changed the risk estimates found. In addition, the study did not include biochemical verification of smoking. Finally, the study was cross-sectional, which limits the extent to which conclusions can be drawn about the causal nature of the associations between depression and smoking.

Despite these limitations, the current study has several important strengths. Whereas other studies examining the depression and smoking relationship in other populations have used single item or non-standardized measures of depression, a standardized measure was utilized in this study. Furthermore, whereas other population-based studies conducted among non-South African youth have used various assessments of smoking status, we used a commonly accepted definition of current smoking status (defined as smoking within the past 31 days). No published studies examining the relationship of depression and smoking status of adolescents in South Africa exist.

These results provide useful insights for smoking prevention and cessation interventions and support the need to screen for and incorporate mental and emotional health education strategies that aggressively prevent and treat symptoms of depression among female adolescents in Cape Town, South Africa.

ACKNOWLEDGMENTS

The work reported in this paper was supported by grants from the World Health Organization Program on Substance Abuse, the United Nations Development Program, the South African Medical Research Council, the Faculty of Health Sciences Research Committee of the University of Cape Town, the Minority International Research Training Program of the Fogarty International Center (5 T37 TW00113-04) and the National Institutes of Drug Abuse (P50 DA10075). We also gratefully acknowledge the support for the Department of Psychiatry and Mental Health of the University of Cape Town.

REFERENCES

- Gilpin EA, Lee L, Evans N, Pierce J. Smoking initiation rates in adults and minors: US, 1944-1988. *Am J Epidemiol.* 1994;140(6):535-543.
- Flisher AJ, Parry CD, Evans J, Muller M, Lombard C. Substance use by adolescents in Cape Town: prevalence and correlates. *J Adolesc Health.* 2003;32:58-65.
- King G, Flisher AJ, Mallett R, et al. Smoking in Cape Town: community influences on adolescent tobacco use. *Prev Med.* 2003;36:114-123.
- Institute of Medicine. Toward a youth-centered prevention policy. In: Lynch BS, Bonnie RJ, eds. *Growing Up Tobacco Free: Preventing Nicotine Addiction in Children and Youths.* Washington, DC: National Academy Press; 1994;3-28.
- The Global Youth Tobacco Survey Collaborative Group. Tobacco use among youth: a cross country comparison. *Tob Control.* 2002;11:252-270.
- World Health Organization. Smoking prevalence. In: Lopez A ed. *Tobacco or Health: A Global Status Report.* Geneva: Geneva World Health Organization; 1997a;1-8.
- World Health Organization. Health effects. In: Lopez A, ed. *Tobacco or Health: A Global Status Report.* Geneva: World Health Organization; 1997b;43-48.
- Aneshensel CS, Huba GJ. Depression, alcohol use, and smoking, over one year: a four-wave longitudinal causal model. *J Abnorm Psychol.* 1983;92:134-150.
- Conrad KM, Flay BR, Hill D. Why children start smoking cigarettes: Predictors of onset. *Br J Addict.* 1992;87:1711-1724.
- Chen X, Unger JB. Hazards of smoking initiation among Asian-American and non-Asian adolescents in California: a survival model analysis. *Prev Med.* 1999;2:589-599.
- Chen X, Unger JB, Cruz TB, Johnson CA. Smoking patterns of Asian-American youth in California and their relationships with acculturation. *J Adolesc Health.* 1999;24:321-328.
- Gritz ER, Prokhorov AV, Hudmon KS, et al. Cigarette smoking in a multiethnic population of youth: methods and baseline findings. *Prev Med.* 1998;27:365-384.
- Johnston LD, O'Malley PM, Bachman JG. *National Survey Results on Drug Use from the Monitoring the Future Study, 1975-1995.* Rockville, Md: US Dept of Health and Human Services, Public Health Services, University of Michigan Institute for Social Research, National Institute on Drug Abuse National Institutes of Health; 1996.
- King G. The "race" concept in smoking: a review of the research on African Americans. *Soc Sci Med.* 1997;45:1075-1087.
- Koepke D, Flay BR, Johnson CA. Health behaviors in minority families: the case of cigarette smoking. *Fam Community Health.* 1990;13:35-43.
- Landrine H, Richardson JL, Klonoff EA, Flay B. Cultural diversity in the predictors of adolescent cigarette smoking: the relative influence of peers. *J Behav Med.* 1994;17:331-346.
- Mermelstein R. Explanations of ethnic and gender differences in youth smoking: a multi-site, qualitative investigation. *Nicotine Tob Res.* 1999;1:S91-S98.
- Nichter M. Smoking: what does culture have to do with it? *Addiction.* 2003;98(suppl 1):139-145.
- Unger JB, Palmer A, Dent CW, Rohrbach LA, Johnson CA. Ethnic differences in adolescent smoking prevalence in California: are multi-ethnic youth at higher risk? *Tob Control.* 2000;9(suppl 2):II9-II14.
- Unger J, Rohrbach LA, Cruz L, et al. Ethnic variation in peer influences on adolescent smoking. *Nicotine Tob Res.* 2001;3:167-176.
- US Department of Health and Human Services. *Preventing Tobacco Use Among Young People: A Report of the Surgeon General.* Rockville, Md: US Dept of Health and Human Services Centers for Disease Prevention and Health Promotion, Office on Smoking and Health; 1994. Publication No. S/N 017-001-00491-0.
- Kaufman NJ, Castrucci BC, Mowery PD, Gerlach KK, Emont S, Orleans CT. Predictors of change on the smoking uptake continuum among adolescents. *Arch Pediatr Adolesc Med.* 2002;156(6):581-587.
- Wilcox P. An ecological approach to understanding youth smoking trajectories: problems and prospects. *Addiction.* 2003;98(suppl 1):57-77.
- Alesci NL, Forster JL, Blaine T. Smoking visibility, perceived acceptability, and frequency in various locations among youth and adults. *Prev Med.* 2003;38(3):272-281.
- Distalan JM, Gilpin EA, Choi WS, Pierce JP. Parental influences predict adolescent smoking in the United States, 1989-1993. *J Adolesc Health.* 1998;22:466-474.
- Killen JD, Robinson TN, Haydel KF, et al. Prospective study of risk factors for the initiation of cigarette smoking. *J Consult Clin Psychol.* 1997;65:1011-1016.
- Kobus K. Peers and adolescent smoking. *Addiction.* 2003;98(suppl 1):37-55.
- Scal P, Ireland M, Borowsky IW. Smoking among American adolescents: a risk and protective factor analysis. *J Community Health.* 2003;28(2):79-97.
- Wahlgren DR, Hovell MF, Slyman DJ, Conway TL, Hofstetter CR, Jones JA. Predictors of

- tobacco use initiation in adolescents: a two-year prospective study and theoretical discussion. *Tob Control*. 1997;6:95-103.
30. Newcomb MD, Maddahian EM, Bentler PM. Risk factors for drug use among adolescents: concurrent and longitudinal analyses. *Am J Public Health*. 1986;525-531.
 31. Lewis PC, Harrell JS, Bradley C, Deng S. Cigarette use in adolescents: the Cardiovascular Health in Children and Youth Study. *Res Nurs Health*. 2001;24(1):27-37.
 32. Zhu BP, Giovino GA, Mowery PD, Eriksen MP. The relationship between cigarette smoking and education revisited: implications for categorizing person's educational status. *Am J Public Health*. 1996;86:1582-1589.
 33. Camp DE, Klesges RC, Relyea G. The relationship between body weight concerns and adolescent smoking. *Health Psychol*. 1993;12:24-32.
 34. Dowdell EB. Urban seventh graders and smoking: a health risk behavior assessment. *Issues Compr Pediatr Nursing*. 2002;25(4):217-229.
 35. Robinson LA, Klesges RC, Zbikowski SM, Glaser R. Predictors of risk for different stages of adolescent smoking in a biracial sample. *J Consult Clin Psychol*. 1997;65:653-662.
 36. Acierno RA, Kilpatrick DG, Resnick HS, Saunders BE, De Arellano M, Best C. Assault, PTSD, family substance use, and depression as risk factors for cigarette use in youth: findings from the national survey of adolescents. *J Trauma Stress*. 2000;13(3):381-396.
 37. Anda RF, Williamson DF, Escobedo LG, Mast EE, Giovino GA, Remington PL. Depression and the dynamics of smoking: a national perspective. *JAMA*. 1990;264:1541-1545.
 38. Botvin GJ, Botvin EM. Adolescent tobacco, alcohol, and drug abuse: prevention strategies, empirical findings, and assessment issues. *Arch Gen Psychiatry*. 1992;13:291-301.
 39. Cicchetti D, Toth SL. The development of depression in children and adolescents. *Am Psychol*. 1998;53:221-241.
 40. Coogan PF, Adams M, Geller AC, et al. Factors associated with smoking among children and adolescents in Connecticut. *Am J Prev Med*. 1998;15:17-24.
 41. Covey LS, Tan D. Depressive mood, the single-parent home, and adolescent cigarette smoking. *J Public Health*. 1990;80:1330-1333.
 42. Escobedo LG, Reddy M, Giovino GA. The relationship between depressive symptoms and cigarette smoking in US adolescents. *J Abnorm Psychol*. 1998;93:433-440.
 43. Fergusson DM, Lynskey MT, Horwood J. Comorbidity between depressive disorders and nicotine dependence in a cohort of 16-year-olds. *Arch Gen Psychiatry*. 1996;53:1043-1047.
 44. Glass R. Blue mood, blackened lungs: depression and smoking. *JAMA*. 1990;264:1583-1584.
 45. Goodman E, Capitman J. Depressive symptoms and cigarette smoking among teens. *Pediatrics*. 2000;106(4):748-755.
 46. Kandel DB, Davies M, Karus D, Yamaguchi K. The consequences in young adulthood of adolescent drug involvement: an overview. *Arch Gen Psychiatry*. 1986;43:746-754.
 47. Kaplan SL, Hong GK, Weinhold C. Epidemiology of depressive symptomatology. *J Am Acad Child Adolesc Psychiatry*. 1984;23:91-98.
 48. Patton GC, Carlin JB. Depression, anxiety, and smoking initiation retrospective study over 3 years. *Am J Public Health*. 1998;88:1518.
 49. Reynolds I, Rob MI. The role of family difficulties in adolescent depression, drug-taking, and other behavioral problems. *Med J Aust*. 1989;149:250-256.
 50. Simantov E, Schoen C, Klein J. Health-compromising behaviors: why do adolescents smoke or drink? *Arch Pediatr Adolesc Med*. 2000;154:1025-1033.
 51. Tyas S, Pederson L. Psychosocial factors related to adolescent smoking: a critical review of the literature. *Tob Control*. 1998;7(4):409-420.
 52. Wang WA, Fitzhugh EC, Green BL, Turner LW, Eddy JM, Westerfield RC. Propective social-psychological factors of adolescent smoking progression. *J Adolesc Health*. 1999;24:2-9.
 53. Bimaher B, Ryan ND, Williamson D. Childhood and adolescent depression: a review of the past 10 years. *J Am Acad Child Adolesc Psychiatry*. 1996;35:1427-1439.
 54. Campell T, Byrne B, Baron P. Gender differences in the expression of depressive symptoms in early adolescents. *J Early Adolesc*. 1992;12:326-328.
 55. Fleming JE, Offord SR, Boyle MH. Prevalence of childhood and adolescent depression in the community. *Br J Psychiatry*. 1989;155:647-655.
 56. Kandel DB, Davies M. Epidemiology of depressive mood in adolescents: an empirical study. *Arch Gen Psychiatry*. 1982;39:1205-1212.
 57. Lewinsohn P, Hops H, Roberts R, Seeley JR, Andrews JA. Adolescent psychopathology. I. Prevalence and incidence of depression and other DSM-III-disorders in high school students. *J Abnorm Psychol*. 1993;102(1):133-144.
 58. Rutter M, Tizard J, Yule W, Graham P, Whitmore K. Isle of Wight studies 1964-1974. *Psychiatry Med*. 1976;6(2):313-332.
 59. Weinberg WA, Emslie GJ. Weinburg Screening Affective Scales (WSAS and WSAS-SF). *J Child Neurol*. 1988;3:294-296.
 60. Sarles R, Neinstein L. Depression. In: Neinstein LS, ed. *Adolescent Health Care: A Practical Guide*. Philadelphia, Pa: Lippincott, William, and Wilkins; 2002:1432-1442.
 61. Schraedley PK, Gotlib IH, Hayward C. Gender differences in correlates of depressive symptoms in adolescents. *J Adolesc Health*. 1999;25:98-108.
 62. Shaffer D, Gould MS, Fisher P, et al. Psychiatric diagnosis in child and adolescent suicide. *Arch Gen Psychiatry*. 1996;53(4):339-348.
 63. Fleming JE, Offord SR. Epidemiology of childhood depressive disorders: a critical review. *J Am Acad Child Adolesc Psychiatry*. 1990;29:571-580.
 64. Kashani JH, Beck NC, Hoepfer EW. Psychiatric disorders in a community sample of adolescents. *Am J Psychiatry*. 1987;144:584-589.
 65. Reinhertz HZ, Giaconia RM, Silverman AB, et al. Early psychosocial risks for adolescent suicidal ideation and attempts. *J Am Acad Child Adolesc Psychiatry*. 1995;34(5):599-611.
 66. Robertson BA, Ensink K, Parry CDH, Chalton D. Performance of the Diagnostic Interview Schedule for Children version 2.3. *J Am Acad Child Adolesc Psychiatry*. 1999;9:1156-1159.
 67. Carmody T. Affect regulation, nicotine addiction, and smoking cessation. *J Psychoactive Drugs*. 1989;21:331-342.
 68. Bérand RMF, Lockhart IA, Boermeester F, Tredoux V. Cigarette smoking in an adolescent psychiatric population. *S Afr Med J*. 2002;92:58-61.
 69. Flisher AJ, Chalton DO. Urbanization and adolescent risk behavior. *S Afr Med J*. 2001;91:243-249.
 70. Flisher AJ, Parry CD, Muller M, Lombard C. Stages of substance use among adolescents in Cape Town, South Africa. *J Subst Abuse*. 2002;7:162-167.
 71. Flisher AJ, Zivovogel CF, Chalton DO, Leger PH, Roberson BA. Risk-taking behavior of Cape Peninsula high-school students: Part III. Cigarette smoking. *S Afr Med J*. 1993;83(7):477-479.
 72. Liang H, Flisher AJ, Chalton DO. Violence and substance use in adolescents with increasing severity of suicidal behavior. *Arch Suicide Research*. 2003;7:29-40.
 73. Kandel DB. Stages in adolescent involvement in drug use. *Science*. 1975;190:912-914.
 74. Kandel DB, Kessler RC, Margulies RZ. Antecedents of adolescent initiation into stages of drug use: a developmental analysis. *J Youth Adolesc*. 1978;7:13-40.

75. Beck AT, Steer RA. *Manual for the Beck Depression Inventory*. San Antonio, Tex: The Psychological Corporation; 1993.
76. Ellison GT, De Wet T, Ljsselmuiden CB, Richter L. Desegregating health statistics and health research in South Africa. *S Afr Med J*. 1996;86:1257-1262.
77. Cohen J. A coefficient of agreement of nominal scales. *Educ Psychol Meas*. 1960;20:37-46.
78. Flisher AJ, Evans J, Muller M, Lombard C. Test-retest reliability of self-reported adolescent risk behavior. *J Adolesc*. 2004;27:207-212.
79. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics*. 1977;33:159-174.
80. Ward CL, Flisher AJ, Zississ C, Muller M, Lombard C. Reliability of the Beck Depression Inventory and the Self-Rating Anxiety Scale in a sample of South African adolescents. *Journal of Child and Adolescent Mental Health*. 2003;15:73-75.
81. Brooks TL, Harris SK, Thrall JS, Woods ER. Association of adolescent risk behaviors with mental health symptoms in high school students. *J Adolesc Health*. 2002;31(3):240-246.
82. Fournet DL, Wilson KL, Wallander JL. Growing or just getting along? Technical and adaptive competence in coping among adolescents. *Child Dev*. 1998;69(4):1129-1144.
83. McGee ZT. Urban stress and mental health among African-American youth: assessing the link between exposure to violence, problem behavior, and coping strategies. *J Cult Divers*. 2001;8(3):94-104.
84. Kirshner K. Fostering the sense of self: group psychotherapy for girls in early adolescence. *J Child Adolesc Group Therapy*. 1994;4(1):27-43.
85. Abernathy T, Massas L, Romano-Dwyer L. The relationship between smoking and self-esteem. *Adolescence*. 1995;30(120):899-907.
86. Breslau N, Kilbey MM, Andreski P. Vulnerability to psychopathology in nicotine-dependent smokers: an epidemiologic study of youth adults. *Am J Psychiatry*. 1993;150:941-946.
87. Moore SM, Gullone E. Fear of weight gain: its correlates among school-aged adolescents. *Psychol Rep*. 1995;76:1305-1306.
88. Stoppard JM. Gender, psychosocial factors, and depression. In: Cappelliez P, Flynn RJ, eds. *Depression and the Social Environment: Research and Intervention with Neglected Populations*. Montreal: McGill-Queen's University Press; 1993:423.
89. King G, Flisher AJ, Noubary F, Reece R, Marais A, Lombard C. Substance abuse and behavioral correlates of sexual assault among South African adolescents. *Child Abuse Neglect*. 2004;28:683-696.
90. Calafat A, Amengual M, Palmer A, Saliba C. Drug use and its relationship to other behavior disorders and maladjustment signs among adolescents. *Subst Use Misuse*. 1997;32(1):1-24.
91. Hanna EZ, Yi H, Dufour MC, Whitmore CC. The relationship of early-onset regular smoking to alcohol use, depression, illicit drug use, and other risky behaviors during adolescence: results from the youth supplement to the Third National Health and Nutrition Examination Survey. *Subst Use Misuse*. 2001;13:265-282.
92. Patten C, Gillin C, Farkas A, Gilpin E, Berry C, Pierce J. Depressive symptoms in California adolescents: family structure and parental support. *J Adolesc Health*. 1997;20:271-278.
93. Goodyer IM. The epidemiology of depression in childhood and adolescence. In: Verhulst FC, Koot HM, eds. *The Epidemiology of Child and Adolescent Psychopathology*. Oxford: Oxford University Press; 1995:210-226.
94. Garrison CZ, Jackson KL, Marsteller F, McKeown R, Addy C. A longitudinal study of depressive symptomatology in young adolescents. *J Am Acad Child Adolesc Psychiatry*. 1990;29(4):581-585.
95. Emslie GJ, Weinberg WA, Rush AJ, Adams RM, Rintelmann JW. Depressive symptoms by self-report in adolescence: Phase I of the development of a questionnaire for depression by self-report. *J Child Neurol*. 1990;5(2):114-121.
96. Prescott CA, McArdle J, Hishinuma E. Prediction of major depression and dysthymia from CES-D scores among ethnic minority adolescents. *J Am Acad Child Adolesc Psychiatry*. 1998;37:495-503.
97. Schoenbach V, Kaplan B, Wagner E, Grimson R, Miller F. Prevalence of self-reported depressive symptoms in young adolescents. *Am J Public Health*. 1983;73(11):1281-1287.
98. Flisher AJ, Chalton D. High-school dropouts in a working-class South African community: Selected characteristics and risk-taking behavior. *J Adolesc*. 1995;18:105-121.

AUTHOR CONTRIBUTIONS

Design and concept of study: Fernander, Flisher, Lombard
Acquisition of data: Flisher
Data analysis and interpretation: Fernander, Flisher, King, Noubary, Lombard, Price, and Chalton
Manuscript draft: Fernander, Flisher, King, Noubary, Lombard, Price, and Chalton
Statistical expertise: Flisher, King, Noubary, Lombard, and Chalton
Acquisition of funding: Flisher, King
Administrative, technical, or material assistance: Fernander, Flisher, King, Price
Supervision: Fernander, Flisher