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Smoking in Cape Town: Community Influences on Adolescent Tobacco Use

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Background. **This paper examines the effect of pro- and antisocial opinions about communities on cigarette use by Black, Colored, and White 8th- and 11th-grade students in Cape Town, South Africa.**

Methods. **This analysis consists of 1,328 students who completed a questionnaire in 1997 on sociodemographic characteristics, substance abuse, adolescent behaviors, and opinions about their communities. Structural equation modeling (SEM) was used to assess hypotheses related to the social development model positing direct and indirect associations between community constructs and smoking within the previous 31 days.**

Results. **White students had the highest proportion (36.3%, $P < 0.01$) of past-31-days smokers compared to Colored (29.7%) and Black (9.7%) students. SEM analysis showed that among all groups the strongest association ($\beta = 0.29$, Whites, $P < 0.01$; $\beta = .14$, Coloreds, $P < 0.01$; $\beta = 0.05$, Blacks, $P < 0.05$) with recent cigarette smoking was the personal knowledge of adults who engaged in antisocial behavior.**

Conclusions. **Youth smoking behavior may be affected by antisocial adult behavior, subjective adult norms, and community affirmation. Thus, in addition to other factors, social norms and community influence should be considered in preventing adolescent smoking.**

Key Words: **adolescents; smoking; community; South Africa; race.**

INTRODUCTION

Adolescents constitute a large proportion of the 1.1 billion smokers worldwide [*1*]. According to the World Health Organization, adolescent cigarette smoking is likely to increase tremendously in the next two decades as the tobacco industry concentrates its marketing on youth in developing countries [*2,3*].

It is estimated that more than 10 million people annually will die from smoking-related illnesses over the next 30 years [*1,3*]. In 1995 alone, about 95,000 smoking-related deaths occurred in sub-Saharan Africa [*1,4*]. One consequence of more young people smoking in developing countries is the additional economic and social costs in the countries which can least afford them.

However, not all countries or communities will experience similar increases in mortality or morbidity due to adolescent tobacco consumption. Social forces such as religion, culturally proscribed gender roles, urbanization, laws limiting use and promotion, cost of cigarettes, and the history of consumption may exert strong countervailing influences on youth smoking behavior [*5–7*].

In South Africa, the smoking rate of adolescents (15 to 19 years old) in 1998 was 10% and more than twice as many males (14%) as females (6%) smoked. Previous studies on cigarette smoking among South African adolescents and young adults have been primarily descriptive in nature [*1,8*] or have addressed issues such as the associations between cigarette smoking and family structure [*9*], poor scholastic progress [*9*] school absenteeism [*9*] or drop-out [*10*], socioeconomic status [*9*], urbanization status [*11,12*], use of other substances [*13*], and participation in other risk behaviors [*13–15*]. One aspect of adolescent smoking behavior that has not been systematically studied in South Africa and other developing countries is the role of community institutions, norms and values, socialization, identity, and social bonding as embodied in the social development model (SDM). Though not a test of the SDM, this paper examines related hypotheses suggesting that greater social bonding and favorable opinions of youth about their communities are associated with lower adolescent use of cigarettes [*16–18*].

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Of particular interest in this analysis was the influence of pro- and antisocial attitudes about their communities on recent cigarette use by high school children in Cape Town, South Africa. This analysis may have important cross-cultural and cross-national implications for understanding the role of communities in combating adolescent tobacco use and reducing smoking-related illnesses.

METHODS

Sample

Data for this study were derived from the 1997 South African Community Epidemiology Network on Drug Use (SACENDU) school survey. Due to resource limitations, a sampling procedure was used to select students in grade (8 and 11) at nonprivate high schools in Cape Town. Schools were stratified by zip codes representing geographic strata. The number of schools selected in a stratum was proportional to the total number of students in all the schools in the 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 grades 8 and 11 were randomly chosen and 40 students were randomly selected from a combined list of the students in the two classes. A maximum of five additional students per grade were selected as replacements for absentees, drop-outs, and transferees. If a class had fewer than 5 absentees, drop-outs, or transferees, only the necessary number of substitutions was made to bring the number of students in the grade up to 40. If, for example, there were 38 students present (i.e., there were 2 absentees, drop-outs, or transferees), then 2 replacements were added to the sample. If there were more than 5 absentees, drop-outs, or transferees, we only replaced 5. We were reluctant to have too many replacements, as this would have reduced the representativeness of the sample.

Human subject approval for the project was granted by the Research Ethics Committee of the University of Cape Town, Faculty of Health Sciences. Consent was also obtained from the education departments, the schools, and the students. Parental consent was not requested. Anonymity and confidentiality were assured. Students were informed that they could choose not to participate in the study or to omit answering certain questions without any negative repercussions. Members of the research team distributed a self-administered questionnaire (available in Afrikaans, Xhosa, and English) during regular school periods in the absence of teachers or other school personnel.

A total of 2,946 students completed Part I of the survey, which consisted of sociodemographic questions and items about substance abuse, sexual activity, and other adolescent health risk behaviors. From these 2,946 students, a subsample of 1,328 was randomly selected to complete Part II of the survey, which focused on experiences in their communities, in schools, and with their families and peers. The results presented in this paper are from Part II respondents who completed both Part I and Part II and relate only to the "community" questions.

Measures

Sociodemographic questions were age, gender, years of city residence, and racially classified social groups (RCSG). Age was recoded as 12–14 years old, 15–17 years old, and 18 or older, and years of residence in the city was categorized into 1–5 years, 6–10 years, and 11 or more years. The RCSG variable was based on the former apartheid government's classification system (i.e. Black, Colored, White, and Asian). In South Africa, the term "Colored" is used to refer to people who descend from multiple Asian, European, or African ancestry. Asian students were excluded from this analysis because of the relatively small number of respondents ($n = 16$). In this study, the use of RCSG refers explicitly to the social conception of race [*19*].

Traditional measures of socioeconomic status (SES) such as family income and parental education were not collected from respondents. Alternatively, students were asked about the number of household amenities (i.e., television, electricity, telephones, and automobile), which has broad applicability in South Africa and other developing countries. We created an index of the number of household amenities by summing each participant's total number of amenities. Participants could have less than two amenities, two, three, or all four amenities. Repeating a grade was also included as an independent variable.

As presented in Table 1, questions on opinions about one's neighborhood and community influences were combined into categories of "no" ("definitely no," "no") and "yes" ("yes," "definitely yes"). For opinions about one's neighborhood, the numbers in Table 1 indicate the percentage who said "no" to the question. A response of "no" indicated that a student liked his or her neighborhood. For questions regarding community affirmation, the numbers in Table 1 indicate the percentage who said "yes" to the question. A response of "yes" indicated that a student received encouragement from adults in the neighborhood. Similarly, responses to questions concerning antisocial adult behavior of none, one, two, three or four, or five or more adults were combined into categories of none and one or more adults. For antisocial adult behavior, numbers in the table indicate the percentage who said "one or more" adults. This response means that the student had seen one or more adults engage in each type of behavior. The items involving adult use of drugs and selling or dealing in drugs are included to assess antisocial behavior and not because they refer to youth substance use (as

TABLE 1

Components of the Community Construct

Factor	Possible responses	Community questionnaire items	Smoking levels: Not recently (n = 134)	Smoking levels: Within 31 days (n = 359)	Smoking levels: Total (n = 1267)[a]
Opinions of neighborhood	definitely no, no, yes, definitely yes	I'd like to get out of my neighborhood.	10.9%	27.4%	31.4%
		I like my neighborhood.	10.9%	29.2%	73.8%
		I feel safe in my neighborhood.	10.9%	29.0%	67.6%
Subjective adult norms	very wrong, wrong, a little bit wrong, not wrong at all	How wrong would most adults in your neighborhood think it was for people your age to use marijuana/ dagga?	8.1%	26.1%	10.0%
		How wrong would most adults in your neighborhood think it was for people your age to drink alcohol?	12.5%	37.6%	24.9%
		How wrong would most adults in your neighborhood think it was for people your age to smoke cigarettes?	12.5%	42.4%	40.2%
Community affirmation	definitely no, no, yes, definitely yes	My neighbors notice when I'm doing a good job and let me know.	10.0%	26.8%	59.9%
		There are people in my neighborhood that encourage me to do my best.	9.5%	27.7%	72.9%
		There are people in my neighborhood who are proud of me when I do something well.	10.2%	27.1%	73.5%
Antisocial adult behavior	none, 1, 2, 3 or 4, or 5 or more adults	How many adults have you known personally in the last year that used drugs?	10.3%	35.7%	55.7%
		How many adults have you known personally in the last year that sell or deal in drugs?	8.5%	38.9%	41.3%
		How many adults have you known personally in the last year that have been in trouble with the police?	10.0%	35.5%	45.1%

[a] Sixty-one respondents failed to answer the questions about smoking; therefore, the sample size decreases from 1328 to 1267.

does the outcome of cigarette smoking). Those items assessing subjective adult norms were combined into categories of "wrong" ("very wrong," "wrong") or "not wrong" ("a little bit wrong," "not wrong at all"). For subjective adult norms, numbers in the table represent the percentage who said "not wrong." This response means that students did not believe that adults thought each type of behavior was wrong. Results were not significantly different in the bivariate analysis using the four-level compared to the two-level response formats. The overall Cronbach's α reliability coefficient for the recoded community influence variables of opinions of neighborhood, subjective adult norms, community affirmation, and antisocial adult behavior was 0.66. The α was 0.58, 0.69, and 0.60 for Black, Colored, and White students, respectively.

An underlying assumption of this paper is that students reside in communities or neighborhoods composed predominately of their own RCSG. Though communities in Cape Town have become increasingly integrated, the legacy of apartheid is strongly reflected in distinct patterns of residential segregation [*20*]. Thus, references to "my community" or "your neighborhood" are likely to be consistent with this assumption.

The dependent variable is a three-level cigarette smoking variable created from two questions that determined whether an adolescent had ever smoked a whole cigarette and whether he or she had smoked a cigarette within the preceding 31 days. An additional question assessed whether the student had smoked a cigarette within the last year, but this item was not needed for constructing the dependent variable, as each student who had smoked within the previous 31 days had, of course, smoked within the previous year. The categories were (a) never smoked, (b) smoked but not within the past 31 days, and (c) smoked in the past 31 days.

Data Analysis

The Statistical Packages for the Social Sciences (SPSS 10.0) were used to conduct descriptive analysis, which consisted mainly of frequency distributions and cross-classification tables (χ^2 analysis) comparing sociodemographic characteristics and key variables related to adolescent smoking behavior. SPSS was also used to conduct exploratory factor analysis. The Survey Data Analysis computer program was used to obtain the correct estimates for the χ^2 statistic in the bivarate analysis based on the complex sample design.

The Structural Equation Modeling (SEM) program AMOS 4.0 [*21*] has been widely used in research em-

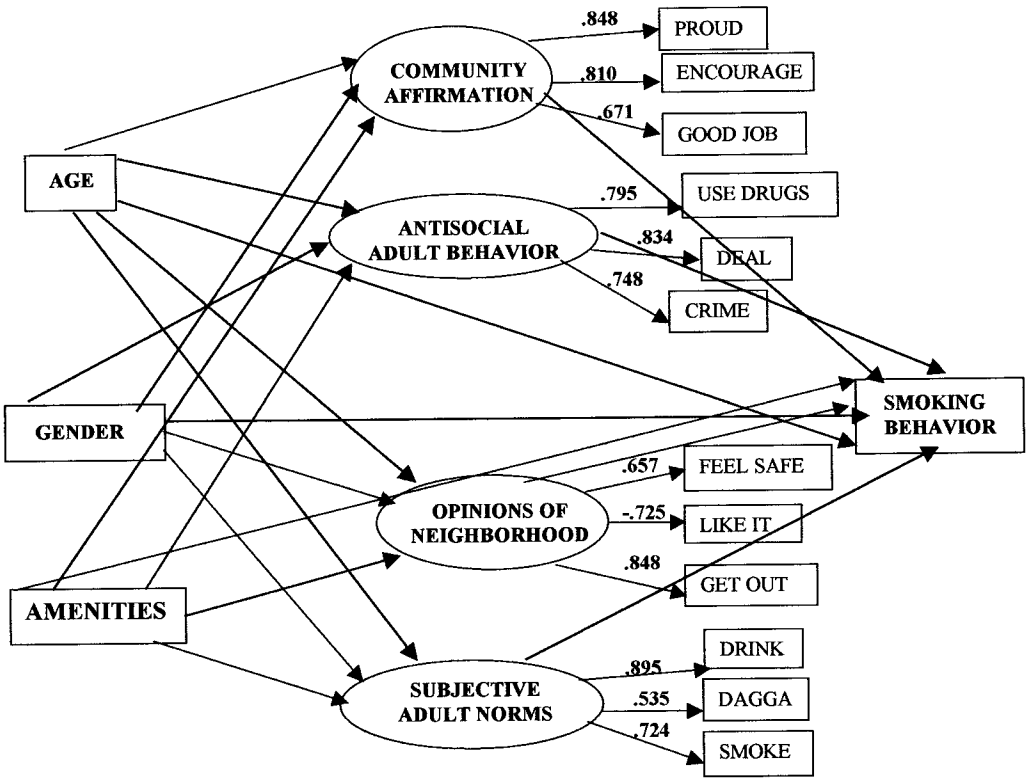

FIG. 1. Preliminary SEM diagram with factor loadings.

ploying theoretical models to test for multiple relationships among variables [*22*,*23*]. A key advantage of using SEM is that it permits the modeling of measurement error, which is especially important for mediating variable models such as the one tested here [*24*]. SEM also tests for the equality of one or more regression coefficients (or parameter estimates) across groups as well as tests both direct and indirect associations after adjusting for other variables.

In this analysis, the exogenous sociodemographic variables of age, gender, and household amenities were posited as having both direct and indirect associations with the community construct measures and the dependent variable of smoking behavior (Fig. 1).

As a preliminary step, exploratory principal-components analysis was used to develop the community social development constructs from a set of questions related to adult substance abuse behavior, community norms related to adolescent drug use, opinions about the community, and other community variables. Four correlated components were identified from this analysis: community affirmation, antisocial adult behavior, opinions of the neighborhood, and subjective adult norms. Each component was composed of three items with substantial factor loadings. Items that did not have substantial factor loadings were excluded from the constructs.

We hypothesized direct relationships between adolescent smoking and the community constructs of (a) community affirmation, (b) antisocial adult behavior, (c) opinions of the neighborhood, and (d) subjective adult norms. Adolescents who expressed favorable attitudes toward the community (e.g., liked the neighborhood, neighbors were encouraging, knew few adults who used or sold drugs) should be less likely to be smokers than those who did not express favorable attitudes.

In presenting the SEM results, each nested model is discussed as recommended by Bollen [*25*] and Joreskog [*26*], followed by an assessment of the goodness of fit. To account for the sensitivity of χ^2 to large sample sizes, we used three indices of practical fit to assess the models: rho [*27*,*28*], comparative fit index (CFI) [*29*], and Root Mean Square Error of Approximation (RMSEA) [*30*,*31*]. Multiple relationships between the demographic predictors, community constructs, and adolescent cigarette smoking behavior were investigated by testing the models for each RSCG in the following manner:

Model 1 allows all parameters (e.g., factor loadings and regression coefficients) to be estimated freely and compares them, without any assumptions about the equality of any parameter estimate, across the three groups.

TABLE 2

Sociodemographic Characteristics of Cape Town Students[a]

	% Black $n = 365$[b]	% Colored $n = 713$[b]	% White $n = 178$[b]	% all $n = 1256$[b]
Respondents' age				
12–14	19.0*	62.7*	18.4*	42.0*
15–17	26.1*	54.1*	19.8*	42.7*
18 or older	65.3*	30.0*	4.7*	15.3*
Gender				
Male	25.6	55.4	19.0	43.7
Female	31.4	52.7	15.8	56.3
Years living in city				
1–5 years	55.2*	27.9*	17.0*	9.6*
6–10 years	45.1*	34.4*	20.4*	10.9*
11 or more years	22.9*	60.0*	17.1*	79.5*
Repeated a grade				
No	26.3*	53.8*	19.9*	70.1*
Yes	33.6*	55.7*	10.6*	29.9*
Number of amenities				
Less than two	70.1*	25.0*	4.9*	9.2*
Two	54.5*	42.2*	3.2*	16.0*
Three	30.3*	59.1*	10.6*	26.7*
Four	12.3*	60.4*	27.3*	48.1*
Total	29.2	53.9	16.9	100.0

[a] Proportion of weighted sample.
[b] Unweighted sample size.
* χ^2 probability $P < 0.05$.

Model 2 constrains the factor loadings to be equal across the three RCSGs and makes the assumption that the four community constructs have the same meaning in the three groups. If the fit of Model 2 is as good as the fit of Model 1, we can conclude that the four community factors are interpreted in the same way in each group, thereby justifying a comparison of regression weights across the groups.

Model 3 places additional constraints on all paths that are *not* hypothesized to be different and assumes that the constrained paths are equal across groups. If the fit of Model 3 is as good as that of Model 2, we conclude that the constrained paths are equal. For the tests involving equality of regression weights, only the χ^2 difference test is used, as the part of Model 2 involving the regression weights is saturated.

The final step (Model 4) in testing the predicted theoretical model entails constraining each of the nine hypothesized paths (Models 4A-4I) to be equal and comparing them to Model 3. If any version of Model 4 shows a statistically worse fit than Model 3, this is evidence that the constrained path is significantly different in at least two of the groups and it will be freely estimated in the three groups for the final model. If any version of Model 4 does not differ significantly from Model 3, this is evidence that the paths are not significantly different in the three groups and they will be constrained to be equal in the final model.

RESULTS

Descriptive Analysis

Colored students comprised the majority of the subsample (53.9%), followed by Blacks (29.2%) and Whites (16.9%, see Table 2). Overall, 57.8% of the students were female. More than one-third of Black students (36.2%) compared to 11.1% of Colored and 5.1% of White students were 18 years of age or older. The percentages of Black, Colored, and White students whose families possessed all four household amenities (i.e., television, electricity, telephones, and an automobile) were 20, 54, and 80%, respectively. About twice as many Black (33.9%) and Colored students (31.8%) as Whites (16.9%) had repeated a school grade.

The proportion of students who had never smoked a whole cigarette was approximately 60%, which means that about 40% of the students had smoked a whole cigarette (see Table 3). Slightly more than one-quarter of respondents reported smoking during the last year, and, of this group, 41.1% stated that they had smoked a whole cigarette within the last month (31 days). Colored students had the highest proportion (38.5%) of past-31-days smokers compared to White (30.1%) and Black (8.8%) students (see Table 3). This analysis found a very low rate of smoking (2.4%) among Black girls. On average, Black students who smoked were more likely to delay the onset of smoking by more than a year with the mean age of onset of smoking at 14.6

TABLE 3

Smoking Prevalence[a] among Cape Town Students

	% Black			% Colored			% White			% Total		
	Never $n = 297$[b]	Not recently $n = 15$[b]	Recently $n = 30$[b]	Never $n = 340$[b]	Not recently $n = 84$[b]	Recently $n = 265$[b]	Never $n = 92$[b]	Not recently $n = 29$[b]	Recently $n = 52$[b]	Never $n = 729$[b]	Not recently $n = 128$[b]	Recently $n = 347$[b]
Respondents' age												
12–14	26.9*	13.3*	6.7*	46.9*	39.3*	25.0*	44.0*	65.5*	21.3*	41.0	42.9	25.1
15–17	39.8*	40.0*	36.7*	43.4*	48.8*	58.3*	50.5*	34.5*	61.5*	41.6	43.6	56.7
18 or older	33.3*	46.7*	56.7*	7.1*	11.9*	16.7*	5.5*	—	7.7*	17.4	13.5	18.2
Gender												
Male	30.0*	71.4*	83.3*	46.2*	54.2*	39.4*	44.6	48.3	38.5	39.3	54.2	43.2
Female	70.0*	28.6*	16.7*	53.8*	45.8*	60.6*	55.4	51.7	61.5	60.7	45.8	56.8
Years living in city												
1–5 years	21.0	14.3	7.4	5.3	3.8	3.9	7.9	10.3	10.0	11.8	6.3	5.5
6–10 years	15.5	21.4	7.4	4.7	8.9	8.9	7.9	17.2	18.0	10.6	11.8	10.1
11 or more years	63.5	64.3	85.2	90.0	87.3	87.2	84.3	72.4	72.0	77.6	81.9	84.3
Repeated a grade												
No	68.8*	53.3*	40.0*	73.0*	79.5*	58.6*	80.4	79.3	88.2	72.2	74.2	61.3
Yes	31.2*	46.7*	56.7*	27.0*	20.5*	41.4*	19.6	20.7	11.8	27.8	25.8	38.4
Number of amenities												
Less than two	21.2	—	16.7	5.3*	8.3*	2.3*	4.3	6.9	1.9	11.6	6.7	3.3
Two	30.6	33.3	23.3	13.2*	6.0*	12.1*	2.2	3.4	5.8	19.4	9.0	12.0
Three	29.3	46.7	23.3	34.1*	21.4*	25.3*	15.2	6.9	11.5	29.1	23.1	24.2
Four	18.9	20.0	36.7	47.4*	64.3*	60.4*	78.3	82.8	80.8	39.9	61.2	60.4
Total	86.8	4.4	8.8	49.3	12.2	38.5	53.2	16.8	30.1	60.5	10.6	28.8

[a] Smoking prevalence recently refers to smoking within the "last month" and is a weighted-proportion.
[b] Unweighted sample size.
* χ^2 probability $P < 0.05$.

years for Blacks compared to 13.3 years for Coloreds and 13.0 years for Whites.

Structural Equation Modeling Analysis

Indices of model fit are reported in Table 4. The progression of model testing we outlined in our hypotheses is followed in this table. First we report the fit of our basic model and test for factor invariance (Models 1–3). Once we have established model fit, we proceed to test the hypothesized paths (Models 4A–4I). Each hypothesized path is represented by a row in Table 4. If the constraint placed on the hypothesized path made a

TABLE 4

Test of the Structural Equation Model

Model	χ^2	*df*	rho	CFI	RMSEA
Null model	5381.77	360	—	—	—
Model 1 (all parameters free)	395.93	240	0.953	0.969	0.022
Model 2 (factor loadings constrained)	433.33	256	0.950	0.965	0.023
Model 3 (un-hypothesized paths constrained)	460.76	276	0.938	0.951	0.025
Test of hypothesized paths	**χ^2**	**χ^2 change**	***df***	***df* change**	***P***
Model 4A (age to AAB[a])	467.35	6.59	278	2	0.04
Model 4B (gender to AAB)	466.08	5.32	278	2	0.07
Model 4C (amenities to AAB)	475.53	14.77	278	2	<0.0001
Model 4D (amenities to CA[b])	469.82	9.06	278	2	0.01
Model 4E (gender to smoke)	495.21	34.45	278	2	<0.0001
Model 4F (CA to smoke)	462.14	1.38	278	2	0.50
Model 4G (AAB to smoke)	474.48	13.72	278	2	0.001
Model 4H (OON[c] to smoke)	464.03	3.27	278	2	0.19
Model 4I (SAN[d] to smoke)	460.87	0.11	278	2	0.95

[a] Antisocial adult behavior.
[b] Community affirmation.
[c] Opinions of neighborhood.
[d] Subjective adult norms.

significant difference in model fit (as noted in the χ^2 and degrees of freedom change), it was was freely estimated in the final model.

With regard to the SEM results, the analysis revealed a statistically significant increase in χ^2 from Model 1 ($\chi^2 = 395.93$) to Model 2 ($\chi^2 = 433.33$), which would be expected given the substantial sample size. However, the indices of practical fit showed no meaningful difference between Model 1 (rho = 0.953, CFI = 0.969, RMSEA = 0.022) and Model 2 (rho = 0.950, CFI = 0.965, RMSEA = 0.023). Thus, we concluded that students in the three groups perceived the community construct similarly. The results also showed that Model 3 fit no worse than Model 2 (see Table 4), which indicates that nonhypothesized paths did not differ between the three RCSGs.

Beginning with the paths between the demographic predictors and community constructs (see bottom of Table 4), the first constrained path was from age to antisocial adult behavior (Model 4A). When compared to Model 3, we found a significant change in χ^2 (6.59, $P < 0.05$) and concluded that this path differed between the groups. The path between gender and antisocial adult behavior (Model 4B) revealed a χ^2 value that was marginally different from that of Model 3 (5.32, $P = 0.07$). Models 4C and 4D tested the hypothesized paths predicting an association between amenities and the antisocial adult behavior and community affirmation constructs, respectively. Each of these paths was significantly different (change in $\chi^2 = 14.77$, $P < 0.001$; 9.06, $P < 0.01$), indicating that the effect of the SES variable on community affirmation is different across RCSGs.

The next paths tested were the associations linking demographic and community constructs to smoking behavior. The path between gender and smoking (Model 4E) indicated a χ^2 change of 34.45 ($P < 0.001$), suggesting that recent cigarette smoking behavior differed between groups depending on gender. The path (Model 4F) from community affirmation to recent smoking behavior was not statistically significant in the χ^2 change from Model 3, and thus this path did not differ across adolescent groups. When we examined the path between antisocial adult behavior and smoking (Model 4G), we found a change of 13.72 ($P < 0.001$) in the χ^2 value and determined that this path differed across groups. The paths (Models 4H–4I) from opinions of the neighborhood and from subjective adult norms to smoking behavior showed no statistically significant difference in χ^2 when compared to Model 3; therefore, these paths were not likely to differ across groups.

The final model places equality constraints on all paths, including the hypothesized paths that were not significantly different across groups (Fig. 2). The final SEM showed that the strongest association with smoking within the last 31 days was personal knowledge of adults who engaged in antisocial adult behavior (i.e., the number of adults who used or sold drugs or engaged in criminal activity). To a lesser extent, subjective adult norms (i.e., how wrong adults would view adolescent consumption of alcohol, cigarettes, or marijuana) and community affirmation of positive adolescent behavior were significantly related to recent youth smoking.

DISCUSSION

This analysis is the first to document the association between attitudes about one's community and cigarette smoking among students in Cape Town, South Africa. Although other studies have also shown that Colored and White high school students had higher rates of smoking than their Black counterparts, our findings indicate that these rates varied according to their status as occasional or regular smokers.

The specific hypotheses examined in this paper were formulated to study the influence of the "community" as an important theoretical construct in empirical research on adolescent smoking behavior. Central to this formulation is the concept of community health linking community institutions, organizations, and social relations to health and risk behavior [*4–6,32*]. This study suggests that the community concept is a viable empirical dimension in global health research and that the impact of sociological forces on youth smoking behavior may be mediated through antisocial adult behavior, subjective adult norms, and community affirmation. The results of this analysis are similar to some other findings of community influences on adolescent tobacco and drug use as pertaining to perceived behavior and attitudes of adults [*18,33–35*].

Despite similar findings among the RCSGs there was one notable exception. Antisocial adult behavior exerted a significantly stronger direct influence on smoking among White Cape Town youth than among Colored youth and a greater influence on Colored youth than on Black youth. That is, knowing of or witnessing adults use or sell drugs or engage in criminal activity had a stronger effect on the likelihood of White students being recent smokers than their Colored counterparts and a stronger influence on Colored students than on Black students. Speculatively, this finding may suggest a pattern that begins in early adolescence and may indicate a link between parental or adult and adolescent smoking behavior that is related to strong social and cultural practices. In this sense, a social diffusion model may be operative in which youth are emulating the smoking behavior of adults or role models in their communities.

The relatively low rate of smoking among Black female adolescents is in keeping with the smoking rate of their female adult counterparts [*36*]. Cigarette smok-

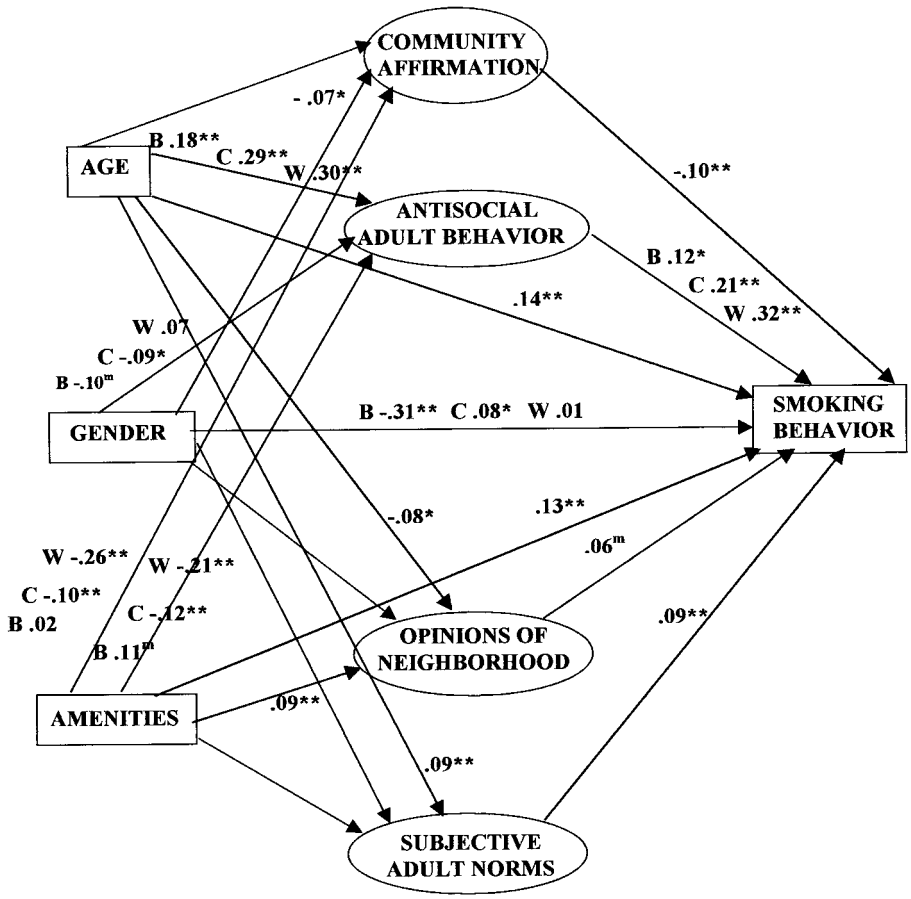

FIG. 2. Final model with standardized regression weights. *P = ≤.05. **P = ≤.01. ***P = <.001. M = marginally significance.

ing by African females has traditionally been considered socially unacceptable, although social taboos on their smoking appear to be abating and thus cigarette smoking could increase. It is also possible that antisocial adult behavior (e.g., drug use or sales, other criminal activity) serves to undermine stable or traditional community values and social behavior within each RCSG. Such a consequence could stretch the margins of acceptable behavior (e.g., cigarette smoking as a lesser evil) or diminish the sanctions for unacceptable or less egregious behavior (i.e., cigarette smoking).

Black schoolchildren in South Africa face the largest potential increase of cigarette use in the future because they presently have a low rate of smoking, especially among girls. Increased patterns of migration from rural to urban areas may result in the diminished influence of family, community, or cultural ties, which in turn could increase the chances of experimental use and subsequent tobacco addiction. Moreover, cigarette promotion by multinational tobacco companies, either directly or indirectly, represents a major threat to the current and long-term health, social, and economic interests of South Africa as a developing country [*37*]. This threat is especially foreboding in light of current strains on the health care and social systems due to the high rate of HIV/AIDS infection in South Africa.

With regard to prevention, these results suggest that to reach the vast majority of youth in South Africa and in many other developing countries it is essential that prevention programs be integrated with or address various dimensions of the community. These considerations may include cultural or tribal traditions, beliefs, and norms, fostering positive opinions and images about the neighborhood, and working with community organizations. Also, adult antisocial behavior should be a target for intervention, since there appears to be a substantive association between adolescent smoking and perceptions of adult antisocial behavior.

Additionally, South Africa can serve as a model in multinational efforts to promote empirical research and to control tobacco proliferation through public policies (e.g., Tobacco Products Control Amendment Act) on tobacco and legislative bans protecting youth from tobacco advertisements and promotion. This would be especially important in areas of Africa where the problem of tobacco use among youth is increasing rapidly [*38*]. Another possible implication of this finding is the need to communicate systematically to adults that ad-

olescents, despite their apparent disregard, are aware of and influenced by subjective adult norms. The need to reinforce and support community smoking prevention and cessation strategies is also important in light of the increased danger that children who begin smoking at an early age are more likely to become habitual smokers [*39*].

From the perspective of international research on adolescent smoking behavior, this study suggests some topics for additional investigation. First, multinational longitudinal studies comparing similar dimensions of community influence on adolescent smoking behavior and other risk behavior would be valuable. In this regard, some studies of adolescent youth smoking prevalence in the United States and other countries could provide insights to possible trends and research agendas [*40,41*]. Second, this research should be combined with prevention strategies to reduce smoking prevalence, especially among youth in developing countries. Third, it is crucial to conduct research on non-school-based adolescents to determine comparable community influence. Finally, we encourage more qualitative studies to enhance scientific understanding of communities and adolescent smoking.

The limitations of this study include the possible underestimation of recent smoking behavior among adolescents (e.g., Black males) in Cape Town who were not enrolled in school. As the authors are unaware of any computer program which computes the standard errors of complex survey designs using the SEM statistical technique, it was not possible to adjust for the effects of cluster variances in our SEM analysis. Another limitation is that data on antisocial behavior were based on the reports of adolescents whose perceptions may not have been completely accurate. Also, the validity of reporting of smoking behavior is difficult to assess, as some adolescents may not have accurately indicated their current smoking status. Finally, these findings may differ slightly from SACENDU studies which use the full student sample (n = 2,946), and some nonsignificant results could have been due to relatively small sample sizes for some groups or categories.

We also point out that although theoretical formulations based on studies in the United States can be valuable in explaining adolescent tobacco use, they should not be applied without full consideration of the complexity of sociological, political, and cultural forces that exist in developing countries. For example, regarding research on adolescent smoking and "race" in the United States, this study helps to highlight three main points. First, the generalization of American studies to South Africa in strictly racialist terms would be simplistic and inappropriate. The classification of "race" in the United States and South Africa as a phenotypic basis for social categorization, although similar (e.g., skin color), is complex and may not have the same conceptual comparability due to history, culture, social class, political orientation, and "sense of community." Second, the history of apartheid in South Africa and segregation and discrimination in the United States represent structural forms of social stratification that have resulted in the social dominance of Whites as a RCSG, thus more strikingly illustrating the view of "race" as a social variable. Third, smoking research focusing on genetic differences between RCSGs may reinforce negative and unacceptable conceptions of "race" as a physiologic stigma purporting to be universal, biologic, and immodifiable. As employed in this study, references to RCSGs convey the significance of social forces that have influenced the formation of community identity, allegiance, and norms in relation to adolescent cigarette smoking.

Understanding how community norms, social reinforcements, and adult behavior affect adolescent health behavior (i.e., recent cigarette smoking) is an important part of community health. Thus, in addition to powerful influences on adolescent smoking behavior such as tobacco industry advertisement, peer group influences, and risk seeking behavior, the broader social context involving specific aspects of the normative order and social influence of the community must be considered in preventing and reducing adolescent smoking behavior.

Communities are not static entities and represent more than the responses of individuals. Within communities, social change occurs at different levels and the pace is greatly affected by external forces. In a society such as South Africa in which fundamental transformations in the social structure (e.g., postapartheid changes in the "racial order," political and economic empowerment) and relations (e.g., greater social equality, integration) between communities are occurring, measuring the influence of community on adolescent tobacco use will require repeated empirical observation. In this regard, typical Western models of community influence will likely prove inadequate if they fail to give substantive consideration to the impact of historical factors, secular changes, and external social forces promoting social cohesion within communities and the multicultural character of South African society.

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