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Subjective Social Status Predicts Smoking Abstinence Among Light Smokers

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Abstract

Objectives—To determine if community subjective social status (SSS) predicted smoking abstinence through 26 weeks postrandomization among 755 African American light smokers of low SES (socioeconomic status).

Methods—Participants were enrolled in a double-blind, placebo-controlled, randomized clinical trial, which examined the efficacy of nicotine gum and counseling for smoking cessation.

Results—Results indicated that SSS predicted smoking abstinence over time [$P=.046$; odds ratio (OR) =1.075 (1.001–1.155)] after adjusting for covariates.

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Participants provided written informed consent, and study procedures were approved and monitored by the University of Kansas Medical Center's human subjects committee.

Conclusions—Further research is needed to understand the effects of community SSS on smoking cessation among heavy smokers and other ethnic groups.

Keywords

community subjective social status; African American; smoking; smoking cessation

Although smoking rates have been declining since the mid-1990s, most of the decline has occurred among higher socioeconomic status (SES) groups.^{1,2} Conventionally, SES has been measured by assessing factors such as educational attainment, income, occupation, or a composite of these and related measures.³ Individuals with lower SES tend to have an increased risk of smoking initiation, increased risk for progression to regular smoking, and a reduced likelihood of smoking cessation.^{4–6,7}

The association between objective indicators of SES and health status has been well established. However, Wilkinson argued that inequality resulting from relative standing or perceptions of place in the social hierarchy is a more significant influence on health than actual level of SES.⁸ Recently, studies have focused on subjective social status as a predictor of health and health behaviors.^{9–11} Subjective social status (SSS) has been defined as an individual's perception of her or his relative position in the social hierarchy.¹² SSS has been found to be associated with a variety of health outcomes while controlling for other objective indicators of SES such as income, education, and occupational status.¹³ These different health-related outcomes include psychological and physiological wellness, fruit and vegetable consumption, depression, negative affect, and reduced grey matter volume in a brain area associated with emotional experience and regulation of stress reactivity.^{14–18} In addition, SSS has been associated with both short- and long-term smoking abstinence among a racially/ethnically diverse sample while controlling for SES and other demographic characteristics.^{10,11} However, the relationship between SSS and smoking abstinence has not previously been studied among an entirely African American sample or among a sample of light smokers.

To our knowledge, no previous research has examined the association between SSS and smoking abstinence among African American light smokers (ie, those smoking 10 cigarettes per day) using the community version of the SSS ladder. Examining these relationships among African American light smokers is particularly important, as about half of all African American smokers are light smokers, as compared with 20% of smokers in the general population.^{19,20} The purpose of this study was to address current gaps in the literature by examining the association between SSS (community ladder) and smoking abstinence among African American light smokers enrolled in a smoking cessation study. Improved understanding about the associations between community SSS and smoking cessation can inform treatment interventions designed to address tobacco use among low SSS smokers and reduce tobacco-related health disparities as it highlights the importance of network composition in socially disadvantaged populations.

METHODS

Participants and Recruitment Procedures

Data for the current study were derived from a double-blind, placebo-controlled, randomized clinical trial, which examined the efficacy of nicotine gum (vs placebo) and counseling (motivational interviewing vs health education) for smoking cessation among 755 African American light smokers [ie, 10 cigarettes per day (CPD)].²¹ Participants in this parent study provided written informed consent, and study procedures were approved and monitored by the University of Kansas Medical Center's human subjects committee.

Eligible individuals self-identified as African American or black, were at least 18 years of age, smoked 10 or fewer cigarettes a day for at least 6 months prior to enrollment, smoked at least 25 out of the last 30 days, were interested in quitting in the next 2 weeks, spoke English, and had a permanent home address and working telephone. Participants were excluded if they had a contraindication for nicotine gum (ie, jaw problems, irregular heartbeat, recent myocardial infarction, or stroke), used other pharmacotherapy for smoking cessation in the last 30 days, used other forms of tobacco within the last 30 days, were pregnant or planning to become pregnant within the next 6 months, were breastfeeding, or were planning to move out of the local area within the next 6 months. Individuals demonstrating marked inappropriate affect or behavior were excluded from the study.

Eligible individuals were recruited using clinic, media, and community outreach efforts. Of the 1933 smokers screened, 1012 were eligible for the study and were invited to participate. Enrollment continued until 755 participants were randomized to treatment.²¹

At the randomization visit, all participants completed a battery of assessments and were randomly assigned to receive an 8-week supply of either active 2 mg nicotine gum or placebo gum. Participants were also assigned randomly to receive either motivational interviewing or health education counseling (3 in-person visits [randomization, week 1, and week 8] and 3 sessions administered via telephone [week 3, week 6, and week 16]). A final visit was scheduled at week 26 postrandomization. Each of these visits consisted of brief (~20 minutes) smoking cessation counseling sessions. Study promotional items were given to participants for every completed visit (eg, tote bag, magnet) as well as Wal Mart vouchers (\$40 at baseline and at the end of the study [week 26 postrandomization]) and \$20 each for weeks 1, 3, 6, 8, and 16 postrandomization. Detailed information about participant flow through the study is available in the primary outcome publication.²¹

Measures

All questionnaire items were read to, or along with, the participants by a trained research assistant. Items administered assessed participants' socio-demographics, as well as the constructs described below.

Socio-demographics—Socio-demographic variables were collected at baseline and included age, gender, marital status, income, employment, and education. Variables were dichotomized as follows: education into “less than high school” and “at least high school,”

marital status into “married or living with others” or “not married,” employment into “employed” and “unemployed,” and monthly family income into “> \$1800” and “ ≤ \$1800.”

Subjective social status—Subjective social status (SSS) was measured at baseline with the MacArthur Scale of Subjective Social Status, developed by the John D. and Catherine T. MacArthur Research Network on Socioeconomic Status and Health.²² The MacArthur community ladder version of the scale was used, which asks participants to select a rung on a 10-rung ladder that represents where they believe they stand in their community relative to others. Resulting endorsements of SSS range from 1 to 10 (continuous variable).

Depression—Depression was assessed at baseline with the 10-item Center for Epidemiological Studies-Depression scale (CES-D) and included as a covariate in analyses.²³

Perceived stress—The relationship between psychological stress and smoking has been well documented, and stress is also associated with smoking persistence and relapse.^{24,25} The 4-item Perceived Stress Scale (PSS) was used to measure global life stress at baseline on a 0-to 4-point scale with a total score ranging from 0 to 16 and scores of 12 or higher indicating significant perceived stress.²⁶ Participants’ PSS scores were included as covariates in analyses.

Menthol use—The primary use of mentholated cigarettes was gathered via self-report.

Smoking abstinence—Abstinence from smoking was assessed at weeks 1, 8, and 26 postrandomization and was defined as having smoked no cigarettes, not even a puff, during the previous 7 days at each respective time point. To confirm self-reported cessation, expired carbon monoxide was assessed at weeks 1, 8, and 26. An expired carbon monoxide level of 10 parts per million (ppm) was used.²⁷

Data Analysis

Participant characteristics—Descriptive statistics were used to summarize participant socio-demographics and psychosocial characteristics. Categorical variables were summarized using frequencies and percentages, and continuous variables were summarized using means and standard deviations. Regarding smoking abstinence, an all-available-data approach was used whereby participants might have up to 3 abstinence outcome data measurements.

Main analysis—A repeated measures logistic regression with generalized estimating equations (GEE) was used to examine the association between SSS and abstinence over time (at week 1, week 8, and week 26) adjusting for time variable, participant socio-demographics (age, gender marital status, education, income), menthol use status, psychosocial characteristics (depression and stress), and intervention group.^{28,29} An interaction term between the SSS variable and time variable was also included in the model to check whether the association of SSS and abstinence changed over time. The GEE logistic regression model accounts for correlations among the within-subject outcome variables of abstinence across time and provides consistent estimates of the parameters and

consistent estimates of the standard errors using robust “sandwich” estimators. Analyses were conducted in SAS version 9.2 using PROC GENMOD (SAS Institute, Cary, NC) with the Logit link function and an unstructured working correlation matrix specified.

RESULTS

Table 1 presents baseline socio-demographic characteristics and psychosocial characteristics of the study participants. Participants (N=755) ranged in age from 19 to 81 years with a mean age of 45.1. Their SSS scores (N=749) ranged from 1.00 to 10.00 with a mean of 6.37 (SD=2.18). This mean and range seem similar to those in the few published studies using this ladder.^{30,31} Most participants were female, not married, had a monthly family income of < \$1800, and had at least a high school diploma. At baseline, participants smoked an average of 7.5 (SD=3.2) cigarettes per day for an average of 21.2 years (SD=6.9), with 12.8% smoking 5 or fewer cigarettes per day and 82% smoking mentholated cigarettes. Of the total sample, 20.7 % were confirmed to be carbon monoxide (CO) -verified abstinent at week 1, 29.4% at week 8, and 24.7% at week 26 postrandomization.

Table 2 presents results of our main analyses. Results indicated that community SSS was associated with smoking abstinence [P=046; odds ratio (OR) =1.075 (1.001–1.155)] after adjusting for time and other covariates (depression, perceived stress, gender, age, marital status, education level, income, employment, menthol use status, and intervention group). The SSS and time variable interaction was not significant, indicating that the effect of SSS on abstinence did not vary significantly over time.

Discussion

To our knowledge, this study was the first to examine whether the community measure of SSS predicted smoking abstinence through week 26 postrandomization among African American light smokers enrolled in a smoking cessation study. The majority of studies assessing the effects of SSS on health-related outcomes and behaviors, including smoking abstinence, have assessed SSS using the SES version of the ladder, which asks participants to rank their social standing relative to others in the United States using traditional SES indicators.^{10,16} In contrast, relatively few studies have used the community version of the SSS ladder, asking for standing within a self-defined social environment (“one’s community”).^{8,12,30,31} However, some researchers have suggested that the community ladder might be relatively more meaningful as a measure of social standing among members of socioeconomically disadvantaged communities because they are likely to endorse less variability on traditional SES indicators such as income and education and more variability in response to other social factors, such as leadership positions within the community.^{12,32} Results indicated that community SSS was a significant predictor of smoking abstinence over time among this sample, even after controlling for age, gender, marital status, SES (education, employment, income), depression, and perceived stress. Thus, SSS may be considered an important predictor of long-term smoking abstinence among African American light smokers. The current work replicates previous research findings that SSS predicted long-term smoking abstinence and extends this to African American light smokers of low SES.^{10,11}

The use of the community SSS ladder in this study highlights the potential importance of networks within disadvantaged communities and confirms its effects on health outcomes.³² This relatively new instrument when used with other traditional measures of SES (such as the traditional ladder) may help broaden the analysis of the effect of social status on smoking cessation, thanks to its ability to explore and identify different social reference groups within low-income populations.

This study is part of a novel line of research investigating social determinants of tobacco consumption among African American smokers. The use of community SSS ladder may seem of particular importance among African Americans as it has also been shown to be significantly related to self-rated health in this group.^{3,33} It seems to support the use of the community SSS as part of comprehensive cessation interventions for light African American smokers. Specifically, smokers endorsing low community SSS scores may be at elevated risk of smoking relapse and may be in need of more intensive or additional cessation services to achieve smoking abstinence. Future research should focus on improving cessation interventions for low-SSS African American smokers.

The current study has some limitations. First, a selection bias may have occurred through the use of a single community health center, which may make the findings not generalizable to all African American light smokers. Moreover, the characteristics of the current sample (predominantly female, low SES, etc) may also limit the generalizeability of findings to other African American groups of treatment-seeking smokers. Second, the use of participants with both a telephone and an address likely excluded people who were homeless or without a telephone, strong markers for very low SES. Third, the use of mono-ethnic sample may limit the generalization of these results to smokers of other race/ethnicities, as African American smokers predominantly smoke mentholated cigarettes. Fourth, the presence of a significant association between age and SSS suggests a greater understanding of the relationship between these 2 variables is needed. Finally, the SES variables in this study were dichotomized due to the skewed distributions of the raw data. Future research in this area might seek samples with more normal distributions of SES so that maximum data can be preserved among these covariates in analyses.

In summary, the present study found that community SSS predicts cessation outcome among African American light smokers. Further research is needed to understand the mechanisms by which subjective perceptions of social status within the African American community affect health and create health differentials. In addition, future evaluation should examine the effects of community SSS and smoking cessation in different ethnic groups and among heavy smokers.

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REFERENCES

1. Chilcoat HD. An overview of the emergence of disparities in smoking prevalence, cessation, and adverse consequences among women. *Drug Alcohol Depend.* 2009; 104(Suppl 1):S17–S23. [PubMed: 19632070]
2. CDC. Cigarette smoking among adults–United States, 2007. *MMWR.* 2008; 57(45):1221–1226.
3. Ostrove JM, Adler NE, Kuppermann M, et al. Objective and subjective assessments of socioeconomic status and their relationship to self-rated health in an ethnically diverse sample of pregnant women. *Health Psychol.* 2000 Nov; 19(6):613–618. [PubMed: 11129365]
4. Fiore MC, Novotny TE, Pierce JP, et al. Trends in cigarette smoking in the United States. The changing influence of gender and race. *JAMA.* 1989 Jan 6; 261(1):49–55. [PubMed: 2908994]
5. Pierce JP, Fiore MC, Novotny TE, et al. Trends in cigarette smoking in the United States. Projections to the year 2000. *JAMA.* 1989 Jan 6; 261(1):61–65. [PubMed: 2908996]
6. Wetter DW, Cofta-Gunn L, Irvin JE, et al. What accounts for the association of education and smoking cessation? *Prev Med.* 2005 Apr; 40(4):452–460. [PubMed: 15530598]
7. U.S. Department of Health and Human Services. The Health Consequences of Smoking :A Report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2004.
8. Wilkinson RG. Health, hierarchy, and social anxiety. *Ann N Y Acad Sci.* 1999; 896:48–63. [PubMed: 10681887]
9. Singh-Manoux A, Adler NE, Marmot MG. Subjective social status: its determinants and its association with measures of ill-health in the Whitehall II study. *Soc Sci Med.* 2003 Mar; 56(6): 1321–1333. [PubMed: 12600368]
10. Reitzel LR, Mazas CA, Cofta-Woerpel L, et al. Subjective social status affects smoking abstinence during acute withdrawal through affective mediators. *Addiction.* 2010 May; 105(5):928–936. [PubMed: 20219054]
11. Reitzel LR, Businelle MS, Kendzor DE, et al. Subjective social status predicts long-term smoking abstinence. *BMC Public Health.* 2011; 11:135. [PubMed: 21352534]
12. Adler NE, Epel ES, Castellazzo G, et al. Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy white women. *Health Psychol.* 2000 Nov; 19(6):586–592. [PubMed: 11129362]
13. Kopp M, Skrabski A, Rethelyi J, et al. Self-rated health, subjective social status, and middle-aged mortality in a changing society. *Behav Med.* 2004 Summer;30(2):65–70. [PubMed: 15648126]
14. Mendelson T, Thurston RC, Kubzansky LD. Affective and cardiovascular effects of experimentally- induced social status. *Health Psychol.* 2008 Jul; 27(4):482–489. [PubMed: 18643006]
15. Ghaed SG, Gallo LC. Subjective social status, objective socioeconomic status, and cardiovascular risk in women. *Health Psychol.* 2007 Nov; 26(6):668–674. [PubMed: 18020837]
16. Demakakos P, Nazroo J, Breeze E, et al. Socioeconomic status and health: the role of subjective social status. *Soc Sci Med.* 2008 Jul; 67(2):330–340. [PubMed: 18440111]
17. Reitzel LR, Vidrine JI, Li Y, et al. The influence of subjective social status on vulnerability to postpartum smoking among young pregnant women. *Am J Public Health.* 2007 Aug; 97(8):1476–1482. [PubMed: 17600249]
18. Gianaros PJ, Horenstein JA, Cohen S, et al. Perigenual anterior cingulate morphology covaries with perceived social standing. *Soc Cogn Affect Neurosci.* 2007 Sep; 2(3):161–173. [PubMed: 18418472]
19. Okuyemi KS, Cox LS, Nollen NL, et al. Baseline characteristics and recruitment strategies in a randomized clinical trial of African-American light smokers. *Am J Health Promot.* 2007 Jan-Feb; 21(3):183–191. [PubMed: 17233236]
20. CDC. Cigarette smoking among adults–United States, 2003. *MMWR.* 2005; 54(20):509–513. [PubMed: 15917735]

21. Ahluwalia JS, Okuyemi K, Nollen N, et al. The effects of nicotine gum and counseling among African American light smokers: a 2×2 factorial design. *Addiction*. 2006 Jun; 101(6):883–891. [PubMed: 16696632]
22. MacArthur F, The John D, Catherine T. MacArthur Foundation website. 2011 Available at: www.macfound.org.
23. Irwin M, Artin KH, Oxman MN. Screening for depression in the older adult: criterion validity of the 10-item Center for Epidemiological Studies Depression Scale (CES-D). *Arch Intern Med*. 1999 Aug 9–23; 159(15):1701–1704. [PubMed: 10448771]
24. Manning BK, Catley D, Harris KJ, et al. Stress and quitting among African American smokers. *J Behav Med*. 2005 Aug; 28(4):325–333. [PubMed: 16049631]
25. Balk E, Lynskey MT, Agrawal A. The association between DSM-IV nicotine dependence and stressful life events in the National Epidemiologic Survey on Alcohol and Related Conditions. *Am J Drug Alcohol Abuse*. 2009; 35(2):85–90. [PubMed: 19199167]
26. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983 Dec; 24(4):385–396. [PubMed: 6668417]
27. SRNT Subcommittee on Biochemical verification of tobacco use and cessation. *Nicotine and Tobacco Research*. 2002;149–159. [PubMed: 12028847]
28. Liang K-Y, Zeger SL. Longitudinal data analysis using generalized linear models. *Biometrika*. 1986 Apr 1; 73(1):13–22. 1986.
29. Zeger SL, Liang KY. Longitudinal data analysis for discrete and continuous outcomes. *Biometrics*. 1986 Mar; 42(1):121–130. [PubMed: 3719049]
30. Goodman E, Adler NE, Kawachi I, et al. Adolescents' perceptions of social status: development and evaluation of a new indicator. *Pediatrics*. 2001 Aug;108(2):E31. [PubMed: 11483841]
31. Cohen S. Social status and susceptibility to respiratory infections. *Ann N Y Acad Sci*. 1999; 896:246–253. [PubMed: 10681901]
32. Jackson PB. Health inequalities among minority populations. *J Gerontol B Psychol Sci Soc Sci*. 2005 Oct; 60(Spec No 2):63–67. [PubMed: 16251593]
33. Williams DR, Collins C. US Socioeconomic and racial differences in health: patterns and explanations. *Annual Review of Sociology*. 1995; 21:349–386.

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Think of this ladder as representing where people stand in their communities.

People define community in different ways; please define it in whatever way is the most meaningful to you. At the **top** of the ladder are the people who have the highest standing in their community. At the bottom are the people who have the lowest standing in their community.

Where would you place yourself on this ladder?

Please place a large "X" on the rung where you think you stand at this time in your life relative to other people in your community.

Source: <http://www.macses.ucsf.edu/research/psychosocial/commladder.php>

Figure 1.

MacArthur SSS Community Ladder

Source: <http://www.macses.ucsf.edu/research/psychosocial/commladder.php>

Table 1

Baseline Socio-demographic and Psychosocial Data for All Participants (N=755)

Characteristics	
Age, mean (SD)	45.06 (10.67)
Female, n (%)	505 (67)
Male, n (%)	250 (33)
Married or living with partner, n (%)	284 (38)
Not married, n (%)	471 (62)
Monthly family income <\$1800, n (%)	433 (59)
Monthly family income \$1800, n (%)	322 (41)
Education at least high school, n (%)	630 (84)
Education less than high school, n (%)	125 (16)
CES-D Scale, ^a mean (SD)	3.46 (2.57)
Perceived Stress Scale, mean (SD)	8.69 (2.06)
Subjective Social Status, mean (SD)	6.37 (2.18)

Note.

^a CES-D indicates the 10-item Center for Epidemiological Studies Depression Scale.

Table 2

Results of Adjusted Regression for SSS Predicting Carbon Monoxide (CO)-Verified Smoking Status

Variables	Odds Ratio	95% CI		P value
Treatment 1				
(Ref: Nicotine gum)	1.141	0.839	1.551	0.400
Treatment 2				
(Ref: Motivational Interviewing or Health Education)	1.682	1.235	2.292	0.001
Week 8				
(Ref: Week 1)	1.556	1.275	1.900	<.0001
Week 26				
(Ref: Week 1)	1.263	1.017	1.568	0.034
SSS	1.075	1.001	1.155	0.046
Gender				
(Ref: Female)	0.742	0.534	1.031	0.076
Age	1.021	1.005	1.038	0.009
Marital Status				
(Ref: Married or living with others)	1.302	0.926	1.830	0.130
Education				
(Ref: School<=HS)	0.927	0.604	1.422	0.728
Family Income				
(Ref:> \$1800/month)	1.428	1.012	2.016	0.042
Employed	1.114	0.790	1.570	0.538
CES-D ^a	0.983	0.922	1.048	0.598
Perceived Stress	0.988	0.915	1.068	0.761
Currently Smoking Mentholated Cigarettes	0.909	0.618	1.337	0.627

Note.

Ref = Reference group

^a = CES-D indicates the 10-item Center for Epidemiological Studies Depression Scale