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Associations of Subjective Social Status with Nondaily and Daily Smoking

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Abstract

Objectives—To explore associations between subjective social status (SSS) and smoking level among 2274 adult current smokers.

Methods—Associations were investigated using a covariate-adjusted proportional odds cumulative logit model. Moderation (via race/ethnicity or sex) and mediation (via depressive symptoms, social/emotional support, or life satisfaction) were explored in additional models.

Results—Higher SSS was associated with greater likelihood of nondaily versus light daily or moderate/heavy daily smoking ($p = .017$). Life satisfaction partially mediated the association of SSS and smoking level ($p = .003$).

Conclusions—Higher SSS was associated with greater likelihood of nondaily relative to light daily or moderate to heavy smoking, potentially via greater life satisfaction. Additional studies are needed to confirm these findings.

Keywords

subjective social status; smoking level; nondaily smoking

One of the most prominent predictors of smoking behaviors is socioeconomic status (SES) which is most typically measured by objective SES indicators such as income, education, and employment. For example, objective SES indicators are strongly associated with smoking prevalence,¹ smoking quit rates,² and smoking cessation during a specific quit

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Human Subjects Statement

All procedures were approved by the University of Minnesota Institutional Review Board and the University of Texas MD Anderson Cancer Center. Informed consent was obtained from screened eligible participants prior to data collection and was provided via reading and acknowledging an electronic statement.

Conflict of Interest Statement

The authors have no competing interests pertaining to this research.

attempt.^{3,4} Initial studies support the association between objective SES indicators and smoking levels among adult current smokers as well. One such indicator, higher education, has been shown to distinguish occasional smokers from daily smokers,^{5,6} nondaily smokers from other current smokers,⁷ very light nondaily smokers from very light daily smokers,⁸ intermittent smokers from light daily smokers,⁹ intermittent smokers from daily smokers,¹⁰ and long-term intermittent smokers from daily smokers.¹¹ Likewise, higher income has been associated with intermittent smoking relative to light daily⁹ and daily smoking,^{6,10} and very light nondaily smoking relative to very light daily smoking.⁸ However, despite estimates suggesting that nondaily smokers represent between 16%⁷ and 22%¹² of all adult current smokers, there has been relatively little research exploring the socioeconomic characteristics that differentiate them from light daily and moderate to heavy daily smokers within the context of a single study.¹³ Research in this area is important because as the overall prevalence of smoking decreases in the United States (US), the prevalence of nondaily smokers is increasing, particularly among racial/ethnic minority groups.¹³ Currently, 24% of African American and 36% of Latino smokers are nondaily smokers compared to 17% of non-Latino White smokers.¹⁴ Nondaily smoking carries significant health risks,^{15,16} and its concentration among racial/ethnic groups at elevated risk for smoking-related health disparities is a significant concern. Consequently, more research focused on delineating the characteristics associated with nondaily smokers relative to light daily and moderate to heavy daily smokers is needed, and this information may be helpful in guiding cessation interventions and better targeting treatment efforts directed toward nondaily smokers.

A related, but distinct construct from objective SES is subjective SES, also known as subjective social status (SSS). SSS refers to a person's perception of his/her relative position in the social hierarchy, and is typically measured relative to others in the US.¹⁷ Respondents primarily tend to consider material wealth, occupational status, and education in providing self-perceptions of SSS,¹⁷ and SSS tends to be highly correlated with these objective indicators of SES. The determinants of SSS, however, appear to extend beyond objective SES factors to include satisfaction with financial resources, social trust, beliefs about upcoming opportunities, acculturation, and the anticipation of future security.^{18,19} Consequently, even after accounting for objective SES factors, SSS remains a strong and incremental predictor of self-rated health,^{20–23} health indicators,^{24,25} and health behaviors.^{26,27} Likewise, SSS has been cited as an incremental predictor of health behavior change among smokers attempting to quit. Specifically, higher rankings of SSS predicted quit day abstinence among homeless smokers,²⁸ both short- and longterm smoking abstinence among a racially/ethnically diverse sample of smokers trying to quit,^{29,30} and smoking cessation among a sample of African American light smokers.³¹ Although SSS has been shown to be a robust predictor of smoking cessation, the association of SSS with smoking levels (nondaily, light daily, or moderate to heavy daily) has not been examined previously, but might be similarly relevant.

SSS may be incrementally associated with smoking behaviors over and above objective SES indicators because it incorporates the nuances of SES that might affect social standing (eg, educational quality, workplace prestige, job-related control), the experience of societal inequities (eg, discrimination),²¹ and the consideration of future prospects (eg, hope for a change in circumstances in the future), any of which might influence smoking behaviors through their relation with affective and other mechanistic variables. Research suggests that the mechanisms underlying associations between SSS and smoking behaviors might include positive affect, negative affect, social support,³² and depression.^{30,33} Specifically, lower SSS is associated with lower positive affect, greater negative affect, lower social support, and more depressive symptoms, which may engender smoking and inhibit cessation. Similar factors, including positive affect, stress, and depression, were shown to distinguish light daily from moderate to heavy daily smokers in one study,³⁴ and intermittent smokers from

light daily smokers in another study (depressive symptoms only).⁹ However, no previous research has addressed the mechanisms that might underlie associations between SSS and smoking levels among adult current smokers. More information about these mechanisms might suggest factors that can be targeted in cessation interventions for nondaily smokers.

Racial/ethnic differences in smoking levels are well documented, with minority smokers more likely to be non-daily or light daily smokers than non-Latino White smokers.^{13,14} Racial/ethnic differences also have been cited in the relations of SSS and health-related outcomes, as well as the extent of reliance on objective SES indicators in making SSS endorsements.^{22,35} Previous studies also have suggested that relations of SSS and health-related outcomes might differ by sex, as might the determinants of SSS,²³ but results have been mixed overall.³⁵ Although racial/ethnic and sex-based interactions have been examined and supported in several SSS and health studies, moderation by race/ethnicity or sex has not been supported in relation to SSS and smoking cessation.²⁹ No previous studies, however, have examined potential racial/ethnic or sex-based moderation of associations between SSS and smoking level.

The purpose of this exploratory study was to address extant gaps in the literature by examining the independent association of SSS and smoking level, while controlling for sociodemographics (age, sex, and race/ethnicity) and objective SES (employment status, education, and income). A complementary aim was to explore whether the relationship between SSS and smoking level differed by race/ethnicity and/or sex. Finally, the current study examined potential mechanisms that might underlie an association between SSS and smoking level (depressive symptoms, social/emotional support, and/or life satisfaction). This study builds on the literature linking SSS with smoking behaviors^{28–31} and is the first, to our knowledge, to explore how SSS might be associated with nondaily, daily light, and daily moderate to heavy smoking levels. A better understanding of the factors predicting smoking behaviors among historically understudied and underserved groups (eg, racial/ethnic minorities, women) would be helpful to inform and target smoking cessation interventions to affect rates of nondaily smoking. Based on the extant literature, it was anticipated that higher SSS rankings might be expected among nondaily smokers relative to their daily smoking counterparts. Given the mixed findings in the literature for SSS-related moderation by race/ethnicity and sex, and the lack of studies examining mediators of relations between SSS and smoking level, these aims were considered more exploratory in nature.

METHODS

Participants and Procedures

Data were collected as part of an Internet-based survey study designed to improve understanding of factors associated with smoking levels. Participants were recruited via Survey Sampling International (SSI), an online panel survey company. Recruitment was accomplished via daily e-mail invitations sent to SSI panelists numbering 1.5 million and targeted email invitations to SSI panelists known by SSI to meet some of the study criteria. Participants were required to be ≥25 years of age, self-identified African American, White, or Latino (of any race), self-identified current daily or nondaily smokers who smoked at least 100 cigarettes in their lifetime, had been smoking for at least one year, smoked at their current rate (ie, daily or nondaily) for at least 6 months, smoked on at least 4 days out of the past 30 days, and had not participated in any smoking cessation treatment in the past 30 days. Individuals who were pregnant, breastfeeding, or non-English speaking were excluded from study participation. A stratified sampling procedure was employed to obtain equal numbers of daily smokers and nondaily smokers for each racial/ethnic group.

The parent project enrolled 2376 eligible daily and nondaily smokers between July and August of 2012 with valid survey responses. Incentives for participation consisted of entry into the SSI quarterly drawing for \$12,500 and points that could be redeemed for cash using Paypal.

Variables of Interest

Sociodemographics—Sociodemographics included age, sex, race/ethnicity (African American, Latino, or White), employment status (unable to work/other, not currently working, or currently working), educational level (high school degree/GED, some college/technical school, or college degree), and monthly household income before taxes (<\$1800, \$1800–\$4199, or \$4200).

Subjective social status—SSS was measured with the US version of the MacArthur Scale of Subjective Social Status.¹⁷ The SSS-US ladder consists of a pictorial 10-rung ladder that represents where people stand in the US, with higher rungs indicating higher status (ie, more money, more education, and better jobs).¹⁷ Participants select the rung that best represents where they think they stand relative to others in the US, resulting in a continuous variable with 10 possible levels. The SSS-US ladder has been used in several studies with racially/ethnically diverse participants and has demonstrated adequate reliability and validity.^{17,18,22,35}

Depressive symptoms—The 2-item Patient Health Questionnaire (PHQ-2) was used to assess depressive symptoms.³⁶ Items asked participants to rate the degree to which they had been bothered by “little interest or pleasure in doing things” and “feeling down, depressed, or hopeless” over the past 2 weeks. Potential response options for each item were: 0=not at all, 1=several days, 2=more than half the days, and 3=nearly every day. Responses to both items were summed for a total PHQ-2 depressive symptoms score.

Social/emotional support—Social /emotional support was assessed using a single item reading: “How often do you get the social and emotional support you need?”³⁷ Response options were: 1=always, 2=usually, 3=sometimes, 4=rarely, and 5=never.

Life satisfaction—Life satisfaction was assessed using a single item reading: “In general, how satisfied are you with your life?”³⁷ Response options were: 1=very satisfied, 2=satisfied, 3=dissatisfied, and 4=very dissatisfied.

Smoking level—Smokers were recruited into groups based on their self-reported smoking rate. Nondaily smokers (NDS) smoked at least one cigarette on 4 to 24 days in the past 30 days. Daily smokers smoked 25 to 30 days in the past 30 days and were further subdivided for recruitment into light daily smoking [LDS; 10 cigarettes per day (CPD)] and moderate to heavy smoking (M-HDS; >10 CPD) groups.

Data Analyses

Preliminary analyses included examining participant characteristics using descriptive statistics, and assessing differences among NDS, LDS, and M-HDS using chi-square tests for categorical variables and one-way Analyses of Variance (ANOVA) for continuous variables. Main analyses examined associations between SSS and smoking level using a proportional odds cumulative logit model (POM)³⁸ adjusted for age, sex, race/ethnicity, employment status, education, and income. The POM holds the odds ratio (OR) for the predictor constant across all possible combinations of the dependent variable, and results represent a summary of ORs from separate binary logistic regressions modeled with cumulative logits. The score test for the proportional odds assumption was used to evaluate

the parallelism of the logit surfaces.³⁹ Moderation of associations by sex and race/ethnicity was explored with 2 additional models using interaction terms (SSS×race/ethnicity and SSS×sex, respectively). These analyses were followed by a series of single mediation models to assess the indirect effects of SSS on smoking level through depressive symptoms, social/emotional support, and life satisfaction. Each model was adjusted for age, sex, race/ethnicity, employment status, education, and income. Indirect effects were examined using a non-parametric, bias-corrected bootstrapping procedure.⁴⁰ The bootstrapping procedure generates an empirical approximation of the sampling distribution of the product of the estimated coefficients in the indirect paths using 2000 resamples from the data set.

All analyses, with the exception of the mediation analyses, were performed using Statistical Analysis Software version 9.3 (SAS Institute, Cary, NC). Mediation analyses were performed using R.⁴¹

RESULTS

Participant Characteristics and Interrelations

The sample included for these analyses (ie, no missing values on the variables of interest) was 2274 (1133 NDS, 556 LDS, and 585 M-HDS), with excluded observations attributable to missing income data (N = 102). More than half of participants were women (57.7%). Participants were 43 years of age (± 12.4) on average and representative of the 3 largest ethnic groups in the US (33.6% African American, 32.8% Latino, 33.6% White). The average SSS endorsement among NDS was 5.46 (± 2.1) versus 5.33 (± 2.1) among LDS and 5.10 (± 2.1) among M-HDS. Table 1 displays all participant characteristics, including comparisons by smoking level. There were significant differences in age, SSS, social/emotional support, life satisfaction, sex, education, employment, and income between smoking level groups. SSS was significantly associated with employment status ($r=0.29$, $p < .001$), education ($r=0.27$, $p < .001$), and income ($r=0.39$, $p < .001$).

Main Analyses

Results indicated that higher SSS was associated with greater likelihood of being a NDS relative to a LDS or M-HDS in adjusted analyses ($\beta=0.05$, $SE=0.02$; $\chi^2=5.73$; $p = .017$). There was a violation of the proportional odds assumption attributable to the covariates of sex and income ($p = .007$); however, this is known to be a sensitive test with potential for false positives.³⁹ To address this concern, we fit a partial proportional odds model to the data, which loosens the constraint that all covariates have a common parameter across response logits (ie, sex and income were modeled as nominal effects), and results were consistent with the original model. The association between SSS and smoking level was not moderated by either race/ethnicity ($p = .69$) or sex ($p = .34$).

In single mediator models, life satisfaction was a significant mediator of the total effect of SSS on smoking level [$CI_{.95} = 0.002, 0.010$, $p = .003$]; Figure 1]. Higher SSS ratings were associated with greater life satisfaction, which was associated with greater likelihood of being a NDS relative to a LDS or M-HDS. There were no significant indirect effects between SSS ratings and smoking level for depressive symptoms ($p = .36$) or emotional/social support ($p = .68$). Figure 1 displays the overall conceptual model and each mediational path with the associated effect estimates.

DISCUSSION

This study was designed to examine the associations between SSS and smoking levels among a sample of African American, Latino, and White nondaily, daily light, and daily

moderate to heavy smokers. Based on previous literature, significant associations between education and smoking levels,^{5–11} and income and smoking levels,^{6,8–10} were anticipated and found within our sample. However, the current results indicated that SSS conveyed unique variance in its association with levels of smoking even when accounting for the variance attributable to objective indicators of SES and demographic variables, with higher SSS ratings being significantly associated with a greater likelihood of being a nondaily relative to a light daily or moderate to heavy daily smoker. The current study was the first to explore associations of SSS with smoking levels, and results add to the literature broadly linking SSS with health behaviors,^{26,27} and with smoking behaviors more specifically.^{28–31} Results suggest that although SSS is strongly correlated with SES, the unique aspects of social standing that it captures are associated with the level at which smokers smoke. This study also examined whether relations of SSS and smoking level varied by race/ethnicity or sex, which was not the case in the current sample. Results complement a previous study in the smoking literature, which also failed to support racial/ethnic or sex-based interactions in the relation of SSS and smoking cessation.²⁹

Current conceptual models linking objective SES to smoking behaviors^{3,42} and health behaviors more generally^{43,44} have proposed several key psychosocial mechanistic variables that underlie these relations, including depression and social support. Similar mechanisms have been proposed to underlie relations between SSS and smoking behaviors,^{30,32,33} and also have been shown to distinguish among smokers of various smoking levels in other studies.^{9,34} The current study links these literatures by examining whether depressive symptoms, social/emotional support, and/or life satisfaction were potential mechanisms underlying the associations of SSS and smoking level. Results indicated that higher SSS was associated with greater life satisfaction, and that life satisfaction was associated with lower levels of smoking, suggesting that life satisfaction was a partial mediator of the associations of SSS and smoking level. On the other hand, depressive symptoms and social/emotional support did not yield significant indirect effects. It may be that the smoking motives of nondaily smokers are more recreational/situational in nature than those of daily smokers, and therefore, more influenced by positive affect (eg, life satisfaction) than negative affect (eg, depressive symptoms).⁴⁵ The current results were cross-sectional, however, and causation cannot be inferred. Replication of these results using longitudinal data is needed, and future research should assess the degree to which life satisfaction is capturing constructs more frequently implicated in smoking (eg, positive affect) and in SSS-related research (eg, optimism and hopefulness). Such research might provide relevant targets for cessation interventions, particularly among smokers endorsing low SSS, who might benefit from a focus on increasing positive affect and other factors that potentially contribute to greater life satisfaction.

Our findings linking SSS with smoking levels may have implications for guiding cessation efforts directed toward nondaily smokers. Higher SSS has been associated with greater odds of smoking abstinence during a quit attempt among daily smokers,^{28–31} and may confer similar advantages to nondaily smokers that can be capitalized on to increase cessation rates, and possibly, inhibit a transition to heavier levels of smoking. For example, higher SSS has been linked to better self-rated health and engagement in other desirable health behaviors in general,^{20–27} which might indicate that higher SSS smokers are more likely to attend to their health and be receptive to information on health improvement than smokers of lower SSS and/or that they are better able to access health-facilitating resources. However, studies have found nondaily smokers are less likely than daily smokers to be counseled to quit smoking by their care providers, and may be less likely targets of other cessation intervention efforts as well.^{46,47} So, although higher SSS smokers may be amenable targets for cessation efforts based on their health-related attitudes and resources, efforts to encourage smoking cessation may not be directed toward nondaily smokers. Previous research has indicated that nondaily

smokers were more likely to attend to health information presented by radio, television, magazines, and newspapers than daily and/or former smokers.¹⁰ Therefore, these may be relevant modalities with which to reach this population of smokers, as well as via health provider visits. However, nondaily smokers may not attend to information about smoking cessation from these outlets because they do not self-identify as regular smokers at risk of health problems who need intervention.⁴⁸ Appropriate message tailoring may be essential to capturing the attention of nondaily smokers and appropriately conveying smoking risks and information about quitting resources. This might include training health care professionals to ask about patients' smoking status in ways that will elicit endorsement of nondaily smoking among those who do not self-identify as smokers; for example, reporting objective smoking behaviors. These are suppositions that require additional research.

Interestingly, recent research suggests the potential for bidirectional effects between SSS and health status whereby health declines are associated with reductions in SSS.²⁰ Nondaily smokers tend to be younger than their daily smoking counterparts,⁶ and although at risk for smoking-related health problems, it might be that they have yet to experience the significant health consequences of smoking. Therefore, links between higher SSS, greater life satisfaction, and nondaily smoking may be influenced to some degree by the relatively good health of nondaily smokers. Consequently, education and other intervention aimed at increasing awareness of the health risks associated with (even nondaily) smoking, including the typically concomitant reductions in life satisfaction that accompany eventual declining health status, both within the context of general public health messages as well within targeted interventions, may be helpful in building intrinsic motivation for cessation among nondaily smokers. However, the extent to which this was the case in the current sample is unknown.

The current study benefitted from a large sample of African American, Latino, and White nondaily, light daily, and moderate to heavy daily smokers from across the US, and a focus on moderational and mediational processes that might be important to understanding why SSS is associated with smoking levels. Strengths are balanced by limitations, which include the use of cross-sectional data, precluding assumptions of causality, and leaving open the possibility of bidirectional effects.²⁰ Future studies in this area would benefit from the ability to address causal processes and bidirectional effects. In addition, study participants were members of an online survey panel and may not be representative of the larger US population of smokers. Therefore, it is possible that objective SES factors might contribute more variance in their association with smoking levels within a nationally representative sample of smokers than was the case in the current sample. Because the survey procedures were provided in English only, results may lack generalizability to non-English speakers (eg, less acculturated Latino smokers). Other limitations included the items and measures administered in the parent project, which limited the focus of the current paper to only 3 of several potential mechanism variables that could underlie associations between SSS and smoking levels, leaving potentially promising variables such as negative affect and positive affect^{32,34} unexplored. In addition, mechanism variables examined in this study were based on single or dual item measures, and may not have been thoroughly representative of the constructs they were presumed to assess. The current study relied on participants' self-reported smoking behaviors and may be subject to memory, or other biases. Finally, this study was conducted among 3 racial/ethnic groups, and results may not generalize to other racial/ethnic minorities in the US (eg, Asians, Pacific Islanders, and Native Americans/Alaskan Natives) whose smoking motives and psychosocial experiences may differ from those of the included racial/ethnic groups. More studies that include racially/ethnically diverse samples are needed in this area.

In summary, the study was the first to examine associations between SSS and cigarette use patterns among a sample of African American, Latino, and White current smokers. Results supported the incremental associations of SSS with smoking level even after controlling for objective SES indicators and demographic variables. Results suggest that higher SSS is associated with a greater life satisfaction, which is associated with a greater likelihood of being a nondaily smoker relative to a light daily or moderate to heavy daily smoker. Future studies in this area will benefit from longitudinal designs and potentially more representative samples, but the current exploratory results provide additional information about characteristics that discriminate nondaily smokers from other (daily) smokers. Nondaily smokers are a growing yet understudied segment of the smoking population. The current results add to the literature in this area and provide speculation for hypothesis generation in future studies.

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Figure 1.

Hypothesized Conceptual Model of the Total (*c* path) and Indirect Effect (*ab* paths) of Subjective Social Status on Smoking Level through Proposed Mediators Examined in Single Mediator Models

* $p < .05$, ** $p < .01$

Note.

Higher scores on social / emotional support and life satisfaction indicate less endorsement of these constructs, whereas higher scores on depressive symptoms indicate greater depressive symptoms. The *c'* path represents the association between subjective social status and smoking level when the mediator is included in the model.

Participant Characteristics

Table 1

Participant characteristics	Total sample (N = 2274) M(SD)/N[%]	NDS (N = 1133) M(SD)/N[%]	LDS (N = 556) M(SD)/N[%]	M-HDS (N = 585) M(SD)/N[%]	p values
Age	43.0 (12.4)	41.4 (12.3)	43.6 (12.6)	45.4 (12.0)	<.001
Subjective social status	5.3 (2.1)	5.5 (2.1)	5.3 (2.1)	5.1 (2.1)	.004
Depressive symptoms	2.0 (1.8)	2.0 (1.8)	1.8 (1.8)	2.1 (1.9)	.136
Social / emotional support	2.6 (1.1)	2.6 (1.1)	2.6 (1.1)	2.7 (1.2)	.062
Life satisfaction	2.1 (0.8)	2.1 (0.8)	2.1 (0.7)	2.3 (0.8)	<.001
Sex					.006
Men	961 [42.3]	506 [44.7]	203 [36.5]	252 [43.1]	
Women	1313 [57.7]	627 [55.3]	353 [63.5]	333 [56.9]	
Race/ethnicity					.991
African American	764 [33.6]	382 [33.7]	185 [33.3]	197 [33.7]	
Latino	745 [32.8]	375 [33.1]	182 [32.7]	188 [32.1]	
White	765 [33.6]	376 [33.2]	189 [34.0]	200 [34.2]	
Education					<.001
High school/GED	593 [26.1]	268 [23.7]	165 [29.7]	160 [27.4]	
Some college/Tech school	861 [37.9]	400 [35.3]	220 [39.6]	241 [41.2]	
College degree	820 [36.1]	465 [41.0]	171 [30.8]	184 [31.5]	
Employment					.004
Unable to work/Other	238 [10.5]	111 [9.8]	57 [10.3]	70 [12.0]	
Not currently working	766 [33.7]	345 [30.5]	209 [37.6]	212 [36.2]	
Currently working	1270 [55.8]	677 [59.8]	290 [52.2]	303 [51.8]	
Monthly income					.012
<\$1800	841 [37.0]	419 [37.0]	228 [41.0]	194 [33.2]	
\$1800–\$4199	868 [38.2]	421 [37.2]	217 [39.0]	230 [39.3]	
>\$4200	565 [24.8]	293 [25.9]	111 [20.0]	161 [27.5]	

Note.

NDS = Nondaily smokers, LDS = Light daily smokers, M-HDS = Moderate to heavy daily smokers. M (SD) = Mean (Standard Deviation). Higher scores on social / emotional support and life satisfaction indicate less endorsement of these constructs, whereas higher scores on depressive symptoms indicate greater depressive symptoms. Differences between smoking level groups were assessed using chi-square or one way ANOVA tests.