

Racial, ethnic, and gender differences in smoking cessation associated with employment and joblessness through young adulthood in the US

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Abstract

The dynamics of labor force participation and joblessness during young adulthood influence access to social and material resources and shape exposure to different sources of psychosocial strain. Differences in these dynamics by race, ethnicity, and gender are related to changes in a behavioral determinant of poor health (tobacco use) for young adults aging into midlife. Using discrete-time hazards models, we estimate the relationship between labor force participation in the past year and smoking cessation for US adults (ages 14–21 years in 1979) followed in a population-representative sample until 1998 (i.e. the National Longitudinal Survey of Youth). We assess the unique role of racial, ethnic and gender differences in exposure, vulnerability, and reactivity to employment and joblessness by controlling for social and economic resources obtained through working and by controlling for early life factors that select individuals into certain labor force and smoking trajectories. There are three main findings: (1) joblessness is more strongly associated with persistent daily smoking among women than among men; (2) fewer social and economic resources for women out of the labor force compared to employed women explains their lower cessation rates; and (3) lower cessation among unemployed women compared to employed women can only partially be explained by these resources. These findings illustrate how differential access to work-related social and economic resources is an important mediator of poor health trajectories. Contextual factors such as social norms and psychosocial strains at work and at home may play a unique role among European American men and women in explaining gender differences in smoking.

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Introduction

As young adults age and progress into midlife, the dynamics of labor force participation and joblessness structure their access to material resources and health-related innovations (Link, Northridge, Phelan, & Ganz, 1998; Lynch, Kaplan, & Salonen, 1997). Employment

and joblessness also shape individuals' experience of psychosocial strain and health-related norms and regulations (Jahoda, 1982; Karasek & Theorell, 1990; Link et al., 1998; Lynch et al., 1997; Siegrist, 2000; Sorensen, Barbeau, Hunt, & Emmons, 2004). Research on work and health has not adequately explored the differences in the role of employment, unemployment and exit from the labor force for health and health-related behaviors across differing subpopulations (Van Der Doef & Maes, 1999; Kasl & Jones, 2000;

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McDonough & Amick, 2001). We contrast these relationships for sub-populations that have shown particularly striking differences in both long-term health and labor force behavior (e.g. European American, African American and Hispanic men and women). The relationship between life course patterns in labor force participation and life course patterns in health behaviors offers one mechanism through which the social stratification of resources and stressors can be linked to the social stratification of health.

Smoking has long been identified as one of the most important behavioral determinants of poor health, disability, and premature death (USDHHS, 2004). Unfortunately, disparities in smoking between men and women and between African Americans and European Americans have widened over the last century (Fiore et al., 1989; Chapman Walsh, Sorensen, & Leonard, 1995). Tobacco use is now more prevalent among individuals with the lowest educational levels, the least amount of income, the highest levels of poverty, and lowest occupational status (Winkleby, Jatulis, Frank, & Fortmann, 1992; Flint & Novotny, 1996; Barbeau, Krieger, & Soobader, 2004). During the same period when social disparities in smoking have widened, economic and social changes have drawn renewed attention to the stratification of labor market prospects for men and women in various racial and ethnic subpopulations (Danzinger & Gottschalk, 1995; Massey, 1996). Since the late 1970s, technological change, skill shifts, and changes in the available job-mix have worsened employment conditions and increased joblessness, particularly for impoverished minorities isolated in the inner-cities (Massey, 1996; Simpson, 2000). Similarly, despite the increases in the participation of women in the labor force and reductions in occupational segregation by gender over the 1980s and 1990s, women have continued to work in jobs that offer less stability, lower pay, and which involve higher psychosocial demands (Reskin, 1993; Gittleman & Howell, 1995; Kilbourne, England, & Beron, 1994). The temporal correspondence between smoking trends and labor force trends by race, ethnicity and gender suggests that these patterns could be correlated (Schalick, Hadden, Pamuk, Navarro, & Pappas, 2000; Preston & Elo, 1995), thereby connecting widening disparities in health to gradients in socio-economic privilege.

An initial premise of our research is that over-arching cultural, social, economic, and political processes cause subpopulations to have different exposure to health risks and different access to health-promoting resources (Amick III., Levine, Tarlov, & Chapman Walsh, 1995; Link et al., 1998). Previous research has explored how men and women experience these contextual processes differently and how these different experiences relate to behavioral determinants of health such as tobacco use

(Chapman Walsh et al., 1995). Past research has also delineated the relative role of exposures, vulnerability, and reactivity to health challenges in explaining gender differences in health (Denton & Walters, 1999; McDonough & Walters, 2001; Denton, Prus, & Walters, 2004). We extend these frameworks to consider the differences by race and ethnicity—as well as by gender—in social role construction, social exclusion, and discrimination which have emerged through the last several decades of labor market changes in the US, and which have unequally determined health-related risks and resources.

Our research highlights how these contextual changes shift life course processes that guide men and women, members of different social classes, and people with different ethnic origins through different educational and occupational pathways to adulthood (Elder, 1999; Shanahan, 2000). The first full-time job is an important marker of an individual's entry into adult social roles because it signifies the ability to financially support a family. This change in perceived role status has been theoretically linked with socialization towards 'conventional' behavior in adulthood and has been empirically linked with reductions in health-compromising behaviors (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997; Yamaguchi & Kandel, 1985; Jessor, 1991).

Reviews of the literature on gender, work and health have not supported earlier assumptions about sex role differences in the social implications of work in which employment is considered more primary to the health of men than women (Annandale & Hunt, 2000; Klumb & Lampert, 2004). Research on joblessness suggests that men and women may experience different social role configurations but their experience of psychological distress in these roles is similar (Ensminger & Celentano, 1990). In fact, research in which community levels of unemployment were only found to affect tobacco use among women (Hammarstrom & Janlert, 1994; Novo, Hammarstrom, & Janlert, 2000; McKee, Maciejewski, Falba, & Mazure, 2003) suggests that employment and joblessness may actually be more important for women than men. This may be related to the greater contribution of joblessness and the associated material deprivation to the health of women than men (Cooper, 2002). Our analyses of racial, ethnic and gender differences in the continuation of daily smoking through adulthood are directed towards understanding behavioral mechanisms linking the social stratification of work to the social stratification of health.

In addition to links between work and health that are based on ideas about role performance, some argue that the psychosocial benefits of employment may promote healthy behavior by enhancing workers' self-esteem and sense of purpose; providing social status, power, and identity; producing economic independence; and by

increasing access to social support and opportunities for recognition (Jahoda, 1982; Ross & Mirowsky, 1995). Employment can also impose structural conditions which reduce the likelihood of certain health-related behaviors (such as smoking bans at work) and provide economic benefits which help to encourage healthier behaviors through employee health programs, health insurance, and a stable income. Finally, as one of the predominant locations for social interaction among adults, work determines the types of norms and values an individual is exposed to from peers, friends, and coworkers associated with the workplace¹ (Ames & Rebhun, 1996; Stronks, vandeMheen, Looman, & Mackenbach, 1997; Ames, Grube, & Moore, 2000).

In contrast, those who are not working because they are currently unemployed or have exited the labor force² do not have access to the resources of the work environment. This affects the types of material, programmatic, and social resources available for supporting health-related behavior changes. Simultaneous with the loss of resources, these individuals may experience multiple stressful events ranging from the anticipation of job loss, to the job loss itself, financial insecurity, identification of new job opportunities, the interview process, potential rejection or retraining for a new job, and the adjustments to a new job (Dooley, Fielding, & Levi, 1996). Not only do these men and women lose the adult social role status associated with employment, but the existence of financial dependents can mean that stresses associated with their performance in other roles (i.e. that of a parent) is affected as well. Lower rates of cessation may thus derive from people's unwillingness to take on the stress of giving up smoking at a time when they are coping with high psychosocial strain (Wilis & Shiffman, 1985; Bancroft, Wiltshire, Parry, & Amos,

2003; Mckee, Maciejewski, Falba, & Mazure, 2003), as well as diminished social, cultural and material resources.

We recognize that workplaces can vary dramatically in social and material rewards, structural organization (e.g. degree of autonomy, substantive complexity, monotony, etc.), psychological strain, external hazards, and physical strain (Kohn & Schooler, 1983; Karasek & Theorell, 1990; Tausig, 1999; Siegrist, 2000). Furthermore we acknowledge that there are 'spill-over' effects of workplace stressors in home and family life (Grzywacz & Marks, 2000). Differences in the division of labor in the home for men and women imply that the resources and stresses determined by work may differ between men and women (Hochschild & Machung, 1989) and thereby influence smoking patterns. Moreover, race and ethnicity may intersect with gender to shape health behavior related to the conditions of the workplace in a manner yet unexplored.

Gender specific coping strategies have been identified elsewhere in the literature on work and health (Ames & Rebhun, 1996), and qualitative research has documented that, for women with few social and economic resources, coping with the daily life hassles involved with unemployment, poor work conditions, and lack of resources makes smoking cessation difficult (Graham, 1993; Manfredi, Lacey, Warnecke, & Petraitis, 1998; Bancroft et al., 2003). Racial, ethnic, and gender differences in the effect of employment and joblessness that cannot be explained by work-related social and material resources highlight the potential role of differences in social, psychological, and cultural conditions experienced by working men and women from various racial and ethnic backgrounds.

We explore the role of racial, ethnic, and gender differences in *exposures* to poor health determinants (such as the greater likelihood of material deprivation among jobless African American and Hispanic women), hypothesizing that the exposures and resources related to employment will explain much of the differences in its effect on smoking cessation. We also examine differences in the *reactivity* to these determinants, hypothesizing that differences in the social, material and psychological experience of being in and out of the labor force will shape racial, ethnic and gender differences in cessation. Finally, we consider the role of *vulnerability* or selection into or out of the labor force, hypothesizing that early life precursors to educational and occupational attainment are part of the life course processes connecting labor force participation with smoking. In summary, we have the following hypotheses:

1. Joblessness will have stronger effects in impeding women to quit smoking than men.

¹The term "workplace" is used to refer to the environments experienced by those in the labor force. We apply it to broadly address the potential for disparities in material, social and psychological conditions across work environments defined by such determinants as economic sector, industry, occupation, and even branch or rank.

²It is important to note that men and women who have exited from the labor force are a heterogeneous group (albeit somewhat less so when the population is stratified by age). We have described how poor access to resources among young adults out of the labor force will predominantly be associated with lower cessation; however we recognize that for some men and women, exit from the labor force may be associated with environmental conditions that encourage smoking cessation. Among women of childbearing age in particular, exit from the labor force may be precipitated by actual or anticipated pregnancy, child care, and elder care. This may encourage smoking cessation in light of normative pressures against smoking during pregnancy and the health impacts of second hand smoke. Similarly, among those exiting due to poor health, interaction with health professionals may encourage cessation.

- Economic resources will partially explain some of the difference in the effects of joblessness on smoking, by gender, race, and ethnicity.

Methods

Data

The data are from the US Bureau of Labor Statistics (BLS), National Longitudinal Survey of Labor Market Experience, Youth Survey 1979–1998 (NLSY79). This is a nationally representative sample of young men and women who were 14–22 years old when they were first surveyed in 1979 and who have been personally interviewed annually or biennially for over 20 years (BLS, 2004). The NLSY79 is one of the primary US government sponsored longitudinal surveys on individuals' labor force experiences, labor market attachment, and investments in education and training (BLS, 2004). It contains a number of supplements that have addressed issues beyond the scope of the BLS, such as the substance use supplements conducted in 1992, 1994 and 1998 for the National Institute on Alcohol Abuse and Alcoholism and the National Institute on Drug Abuse (BLS, 2004).

Due to the over-sample of selected minority sub-populations, there is sufficient power to contrast men and women of African American, European American and Hispanic ethnic origin, but contrasts cannot be made between other racial and ethnic groups in light of their small sample sizes. The baseline sample includes 8648 African American, European American and Hispanic men and women. From this initial sample, we exclude 628 respondents who were not present at either the 1992, 1994 or 1998 surveys when smoking data was collected or had unreliable smoking data (7% of the baseline sample) and 3746 non-smokers who had never "smoked more than 100 cigarettes" and never smoked daily (43% of the baseline sample).³ The cohort of 4050 daily smokers was followed for as long as 20 years from 1979 through the end of 1998. During this period 1912 daily smokers quit smoking (47%).

We used retrospective and prospective survey data on smoking and on the covariates of interest in the study to create a person-year dataset for every year between 1979 and 1998. Only the years in which the respondents were daily smokers and were between the ages of 15–40 years are included in the analyses. Each smoker contributes one year of observation between 1979 and 1998 for each age they retrospectively reported daily smoking –from

the age they initiated smoking (or age 15 if initiation is prior to age 15) until the age that they last smoked daily, age 40, or the age they were last observed in the survey (whichever comes first).⁴ The person-year dataset is comprised of 58,334 person-years of "regular smoking" and "cessation".

Measures

Yearly smoking status. We updated retrospective reports, made in 1992, on whether or not respondents ever smoked daily and the age that they initiated daily smoking prospectively in 1994 and 1998.⁵ We combined the initiation ages with reports on the time since the interview that respondents last smoked regularly to identify the ages during which they were daily smokers. We created time-varying smoking indicators as follows.

We excluded respondents from the analysis for the years prior to the year in which they initiated daily smoking. In the year that they begin daily smoking, smoking status is zero. In every year until the year in which they reported first quitting, smoking status is zero. In the year in which a respondent first reports first quitting, smoking status is changed to one, and in the following years, he or she is excluded from the analysis. Respondents who are lost to follow-up before quitting contribute to the analysis (with a smoking status of zero) until that date. This is also the case for respondents who turn 40-years old before 1998 or who complete the observation period without quitting.

We included respondents who quit and then relapsed from the age that they first began smoking until when they quit for the first time. They are excluded for every age following the first cessation. Analyses in which we excluded the respondents who relapsed produced similar findings to those reported here. (Analyses not provided, but available from authors upon request.) We thus determined that for the purposes of this study it was appropriate to consider smoking cessation as the first transition from daily to never smoker, regardless of whether relapse occurred.

Labor force participation and work-limiting health condition. Respondents provided detailed work histories at each survey, and this information was compiled by the Bureau of Labor Statistics into weekly employment

⁴For example, a respondent who reported that she began smoking daily in 1981 when she was 24-years old and reported in 1992 that she had quit 2 years prior in 1990, would contribute 10 person-years of smoking to the dataset. She contributes an observation for each year between 1981 and 1990 (inclusive of this year).

⁵The 1994 and 1998 data allow us to capture the smoking experience of people who were missing responses in 1992 and new daily smokers who initiated between 1992 and the end of the survey.

³For most respondents, we determined whether or not they ever smoked daily in 1992, but respondents who were not smoking daily in 1992 and later reported smoking in 1994 or 1998 are also included in the analysis.

information. The employed included those who reported that they were working and those who had a job but were not at work. The unemployed are those who were not currently working, but were currently looking for work or waiting to be rehired after a lay-off, and the respondents who are out of the labor force are those who reported not currently working and who were not currently looking for work (BLS, 1976). We classified each respondent as employed, unemployed, or out of labor force for each year of the survey based on the most frequent category of labor force participation they reported in weekly data for that year. For the analyses, we regressed smoking status in each year on the labor categorization for the prior year, or in other words, the labor variable is lagged by 1 year.

Individuals were also asked whether they had experienced a health condition which limited their ability to work. This indicator is coded yes, no, or missing for every year of the survey and is lagged by 1 year.

Social and Material Resources. We included a categorical measure of the individual's income as well as an indicator of whether the individual is covered by health insurance. The BLS assessed these measures at each age, so we were able to include them as time-varying covariates lagged by 1 year. We also include a lagged time-varying indicator of educational attainment. It is categorized using standard categories, collapsing adjacent cells when the coefficients for the association with cessation were similar and the sample size in one cell was insufficient to reach statistical significance. For shorthand elsewhere in the text, we describe this process as categorizing to "best fit the data". Marital status is summarized by three categories (married, never married, and separated, divorced or widowed) reported at each year of the survey, and included as a lagged time-varying variable. An indicator of whether or not the respondent has become a parent is coded as yes, no, or missing and included as a lagged time-varying covariate. By using the marital and pregnancy histories assessed at each survey (that specify the exact ages of childbearing and entry and exit from each marital status), we were able to eliminate all missing information from the marital status indicator and substantially reduce the amount of missing information on parenthood.

Sociodemographics. Age, gender, and ethnic origin are self-reported. Age is included in continuous years with an age-spline at age 20 (i.e. there are two age terms: age if <20 years and age if ≥ 20 years). Exploratory analyses revealed that to capture the declining effect of age on cessation at older years, a quadratic function of age should be included for all individuals at least 20 years old (i.e. age*age, for respondents ≥ 20 years). We found this parameterization to best capture the relationship between age and cessation. We included age of initiation into smoking as an indicator of addiction and exposure.

We categorize ethnicity from a series of questions on ethnic origin in which the respondent could identify multiple ethnic origins and then specify the group with which she or he most strongly identified. If the respondent did not self-report an ethnic origin, we assigned the race or ethnicity originally assigned when the BLS drew the sample.

Psychological predisposition. The measure of self-esteem is the Rosenberg Self-Esteem Scale assessed in 1980 (Rosenberg, 1965), and the measure of locus of control is Rotter's scale assessed in 1979 (Rotter, 1966). We measured ability to learn with the Armed Forces Qualifications Test score (AFQT). This four-test subscale of the Armed Services Vocational Aptitude Battery (ASVAB) involves word knowledge, paragraph comprehension, mathematical reasoning, and math knowledge and the BLS administered it to respondents in 1981.

Adolescent conditions. In order to reduce the effects of resources available in adolescence, we include controls for family structure at age 14 years, mother's education, father's education, and whether or not a foreign language was spoken at home. All of the indicators are assessed in 1979 and categorized to best fit the data. Region of residence (i.e. North East, North Central, South, or missing) is assessed at each year of the survey and is included as a time-varying covariate.

Model

We use a discrete-time hazards model to assess the relationship between employment and the likelihood of smoking cessation. This model is an extension of log-rate models in which hazard rates are estimated for discrete time intervals (which typically capture 1 year of age) (Yamaguchi, 1991). Since the effects of the covariates are not required to be constant over the measure of time (which is age in this analysis) and can be estimated with most standard statistical packages, the discrete-time hazards model is often used in life course research.

Individuals are modeled as having quit smoking at discrete time points (e.g. t_1, \dots, t_j) that correspond with the age after which they last smoked daily. The quit indicator y_{ij} for individual ' i ' at age ' j ' is 1 if the individual stops smoking and 0 at all ages prior. We denote that $p(y_{ij} = 1)$ as the conditional probability of cessation at time ' j ' for individual ' i ', given that the individual was a regular smoker at age ' $j-1$ '. This is related to a set of coefficients as follows:

$$p(y_{ij} = 1) = p_j(\alpha_i, \beta, x_{ij-1}), \quad (1)$$

where β is a vector of regression coefficients that correspond with the vector of fixed or time-varying independent variables x_{ij-1} . Any link function for binary data, such as the logit, can be used to model the

relationship. We use a logit link function as follows:

$$\text{logit}(p(y_{ij} = 1)) = \beta_{0j} + \beta \mathbf{x}_{ij-1} + \alpha_i. \quad (2)$$

The equivalence of the pooled logistic model with time-varying covariates to the Cox Proportional Hazards Model has been shown, given the conditions (which are observed here) of short time intervals and a small probability of the event in the interval (D'Agostino et al., 1990). Individuals contribute observations until cessation or censoring, thus, the person-years for the models are larger than the number of observations in the sample. Nonetheless, the standard errors of the regression coefficients, and thus their levels of significance are correctly estimated and are convergent with those of a Cox Proportional Hazards Model (Cupples, D'Agostino, Anderson, & Kannel, 1988; D'Agostino et al., 1990).

We relax the assumption that employment has similar effects over age by testing age interactions with unemployment and exit from the labor force. These interactions were not statistically significant. Robust standard errors are used for more conservative inferences about the significance of variables in light of potential model misspecification (Huber, 1967; White, 1982). All logistic models for the discrete-time analyses are estimated using Stata Statistical Software (StatCorp, 2003).

Analysis

We first establish the basic trends between smoking cessation and labor force statuses (testing for differential effects of labor force participation by gender and by race and ethnicity), social and material resources, and early life precursors of employment. Then, we determine whether these relationships persist when the precursors and resources associated with employment are assessed simultaneously.

Results

Bivariate Relationships

Table 1 reports the racial, ethnic and gender differences in the bivariate relationship between smoking cessation and the following variables: labor force participation, health limitations, social and material resources, indicators of social position, psychological predisposition to health and work outcomes, and adolescent conditions. The odds ratios reported in Table 1 and in the tables which follow are interpreted as relative changes in the ratio of the probability of quitting smoking, over the probability of not quitting smoking, for the group of interest compared to the reference group. For example an odds ratio of less than one for

unemployment versus employment reveals that the probability of quitting smoking is lower among the unemployed than the employed. A lower probability of cessation means that quitting occurs at an older age or it is less like to occur at all in the observation period.

Among European American women, the unemployed and those out of the labor force are less likely to quit smoking than the employed; the contrast between the unemployed and the employed is quite dramatic. For both African American women and Hispanic women, those out of the labor force are less likely to quit than the employed. Having a work-limiting health condition increases the likelihood of cessation for all women; however, the relationship is only statistically significant among Hispanic women. Models with a sample that pooled men and women from all of the racial and ethnic groups—but used dummy variables for gender, race and ethnicity interacted with labor force status—confirm that the lower likelihood of quitting for the unemployed and for those out of the labor force are significantly different across race, ethnicity and gender. (Models not shown but are available from the authors upon request.)

Regardless of race, ethnicity, or gender, greater education has a consistently significant and positive association with cessation. The effect of education is stronger for European Americans than for other subpopulations, and the differentiation by education is strongest among European American women. European American women also have the widest differences in cessation by income categories, with greater income having a more positive increase in cessation. Increased income has a statistically significant and positive relationship with cessation for European American men and African American men and women, but there are no statistically significant effects of income on cessation among Hispanic men or women.⁶ Health insurance is significantly related to increased cessation among European American men, but not among other subpopulations. Marital status is a stronger predictor of increased cessation than parenthood across race, ethnicity, and gender. Marriage is statistically associated with increased cessation for European Americans and African Americans. Different marital statuses are more strongly related to lower cessation compared to marriage for European Americans and for African Americans. Among European Americans, divorce, widowhood and separation are more strongly related to cessation than not being married, while among African Americans it is only marriage which differs from not being married.

The indicators of psychological predisposition, which were measured in adolescence, have the strongest and most consistent effects on cessation among European

⁶These findings are robust to other specifications of income (e.g. a continuous measure).

Table 1
 Bivariate discrete hazards of cessation for young adults by race, ethnicity & gender^a

	European American		African American		Hispanic	
	Men ^b n = 13479	Women n = 14711	Men n = 11112	Women n = 9366	Men n = 5461	Women n = 4205
<i>Time-varying variables</i>						
Labor force participation						
Employed	1.000	1.000	1.000	1.000	1.000	1.000
Unemployed	0.763	0.158***	1.303	0.751	0.749	1.052
Out of the Labor Force	0.902	0.598***	1.019	0.743*	0.87	0.687**
Missing	0.746	0.727*	0.579**	0.892	0.747	0.721
Work-limiting Health Condition						
None	1.000	1.000	1.000	1.000	1.000	1.000
Yes	1.304	1.121	1.158	1.11	0.771	1.597*
Marital status						
Married	1.000	1.000	1.000	1.000	1.000	1.000
Never married	0.882	1.223*	0.611***	0.680**	0.82	0.82
Separated, divorced or widowed	0.725**	0.652***	0.938	0.929	0.843	0.969
Parent ^c						
Yes	1.000	1.000	1.000	1.000	1.000	1.000
No	1.001	0.974	1.049	1.276	1.063	0.995
Health insurance						
No	1.000	1.000	1.000	1.000	1.000	1.000
Yes	1.460***	1.124	1.139	1.141	1.233	1.111
Income						
Less than \$10,000	0.856	0.658***	0.632**	0.621**	0.909	0.835
\$10,000–\$19,000	0.738**	0.784*	0.814	0.71	0.996	1.013
\$20,000–\$34,000	1.000	1.000	1.000	1.000	1.000	1.000
At least \$35,0000	1.225	1.333**	0.782	1.153	1.292	0.766
Education						
Less than High school	0.724**	0.512***	0.713**	0.967	0.724**	0.729*
High School	1.000	1.000	1.000	1.000	1.000	1.000
Greater than High school	1.596***	1.922***	1.24	1.300*	1.364*	1.569**
Region						
South	1.000	1.000	1.000	1.000	1.000	1.000
North East	1.143	1.264*	0.748	0.861	1.284	1.45
North Central	0.915	1.089	1.088	0.706*	1.396*	1.142
West	1.018	1.027	0.800	0.608**	0.732	1.025
<i>Time-invariant variables</i>						
Self esteem						
Rosenberg scale in 1980	1.030**	1.029***	0.996	1.018	1.039**	1.008
Locus of control						
Rotter scale in 1979	1.061**	1.040*	0.983	1.015	1.027	1.035
Aptitude						
AFQT percentile in 1981	1.009***	1.017***	1.003	1.007**	1.007***	1.007**
foreign language in the home (vs. no)						
No	1.000	1.000	1.000	1.000	1.000	1.000
Yes	1.115	0.996	1.060	0.952	0.944	0.906
Mom's education (vs. high school)						
Less than high school	1.099	1.183	1.014	1.02	1.056	1.178
High school	1.000	1.000	1.000	1.000	1.000	1.000
Greater than high school	1.059	1.11	0.932	0.97	1.043	0.778
Dad's education (vs. high school)						
Less than high school	0.995	1.041	1.001	1.044	1.004	1.143
High school	1.000	1.000	1.000	1.000	1.000	1.000
Greater than high school	1.047	0.919	1.157	0.92	1.293	0.831

Table 1 (continued)

	European American		African American		Hispanic	
	Men ^b n = 13479	Women n = 14711	Men n = 11112	Women n = 9366	Men n = 5461	Women n = 4205
Age 14 family structure: (vs. single-parent)						
Single parent	1.000	1.000	1.000	1.000	1.000	1.000
Two-parent	1.036	0.974	0.922	0.941	1.04	0.823
Two-parent, step	1.23	0.836	0.757	0.695	0.788	0.515**
Other	1.075	1.57	0.562	1.382	1.418	0.462*

*** $p < 0.01$;

** $p < 0.05$;

* $p < 0.10$.

^aAll models include an age-spline at age 20 years, a quadratic term for ages ≥ 20 years, the age of initiation of daily smoking, and controls for missing data on covariates.

^bAll 'n' are person-years.

^cNote that parenthood does not necessarily imply co-residence with children.

Americans. The extent to which cessation is increased by higher levels of self-esteem is similar among European American men and women and Hispanic men. An internal locus of control increases the likelihood of cessation for both European American men and women. In every subpopulation other than African American men, a higher AFQT percentile is associated with an increase in the likelihood of cessation. This relationship is similar across race, ethnicity and gender. In contrast, nearly all of the indicators of the social and economic environment in adolescence fail to predict the odds of cessation. Only among Hispanic women is family structure (in specific having a two-parent family) associated with higher cessation.

Multivariate Regression Model

We assess current labor force participation in conjunction with health limitations, social and economic resources, psychological predisposition, and adolescent conditions. This allows us to identify whether these aspects of employment, unemployment and exit from the labor force can account for differences in smoking cessation. In light of the significant interactions between race and ethnicity and work, and gender and work reported earlier, we stratify the analyses by race, ethnicity, and gender. The final multivariate regression models are reported in Table 2.

The negative effects of unemployment and exit from the labor force that we observed among women in the simple models only persist among European American women. For European American women, the likelihood of cessation remains dramatically lower among the unemployed than the employed, and exit from the labor force lowers the odds of cessation compared to employment. In addition, in the full multivariate model, the qualitatively greater likelihood of cessation (observed in

the bivariate analysis) among unemployed African American men compared to those who are employed becomes a statistically significant difference. Work-limiting health conditions are significantly associated with an increase in cessation for European American men and women and Hispanic women after controlling for social and material resources.

For African American women and Hispanic women, the negative effects of exit from the labor force are no longer significant once the social and material resources, psychological predisposition, and adolescent conditions are included as controls. The resources which were significant among these controls are marital status, parenthood, and education. This suggests that—from the variables included in our model—these three variables best capture the factors related to smoking cessation that differ for women out of the labor force and women who are employed.

Discussion

We have three main findings:

1. First, joblessness is more strongly associated with persistence in smoking among women than it is among men.
2. Second, multivariate models suggest that the lower likelihood of cessation among women who have exited the labor force (observed in the bivariate models) is due to the associated reductions in social and economic resources. When we adjust for these resources, the magnitude of the effect is reduced among all women and the significance of the difference is eliminated for African American and Hispanic women.

Table 2

Multivariate discrete-time hazards model of the odds of cessation for young adults, by race, ethnicity and gender^a

	European American		African American		Hispanic	
	Men ^b <i>n</i> = 13300	Women <i>n</i> = 14586	Men <i>n</i> = 10904	Women <i>n</i> = 9277	Men <i>n</i> = 5358	Women <i>n</i> = 4180
<i>Time-varying covariates</i>						
Labor force participation						
Employed	1.000	1.000	1.000	1.000	1.000	1.000
Unemployed	0.940	0.209***	1.534**	0.885	0.970	1.210
Out of the labor force	1.058	0.727**	1.288	0.842	1.224	0.917
Work-limiting health condition						
No	1.000	1.000	1.000	1.000	1.000	1.000
Yes	1.502*	1.357	1.254	1.215	0.836	1.744**
Marital status						
Married	1.000	1.000	1.000	1.000	1.000	1.000
Never married	0.871	1.076	0.629***	0.748*	0.816	0.660**
Separated/ divorced/ Widowed	0.794	0.750*	0.953	0.982	0.781	0.782
Parent ^c						
No	1.000	1.000	1.000	1.000	1.000	1.000
Yes	0.995	0.985	1.092	1.380**	1.112	0.978
Health insurance						
No	1.000	1.000	1.000	1.000	1.000	1.000
Yes	1.303*	0.945	0.964	1.032	1.123	1.103
Income						
Less than \$10,000	1.000	1.000	1.000	1.000	1.000	1.000
\$10,000–\$19,000	0.785	0.913	1.362	0.980	0.922	0.861
\$20,000–\$34,000	0.959	1.104	1.521**	1.274	0.846	0.788
At least \$35,000	1.068	1.279	1.173	1.456	1.019	0.570*
Education						
Less than high school	1.000	1.000	1.000	1.000	1.000	1.000
High school	1.194	1.557**	1.458**	0.958	1.334*	1.348
Greater than high school	1.653**	2.307***	1.938***	1.126	1.621**	2.091***
Region						
South	1.000	1.000	1.000	1.000	1.000	1.000
North east	1.010	1.099	0.783	0.837	1.206	1.587*
North central	0.852	1.066	1.050	0.714*	1.309	1.129
West	0.992	1.118	0.711*	0.580**	0.716	1.090
<i>Time-invariant covariates</i>						
Self esteem score	1.006	0.984	0.981	1.001	1.009	0.992
Locus of control score	1.032	0.994	0.975	0.994	1.023	1.031
AFQT percentile	1.003	1.011***	0.998	1.002	1.001	1.003
Age 14 family structure						
Single-parent	1.000	1.000	1.000	1.000	1.000	1.000
Two-parent	1.024	0.921	0.889	0.875	1.055	0.775
Two-parent	1.169	0.798	0.816	0.666	0.774	0.502**
Two-parent, step	1.036	1.637	0.482*	1.285	1.531	0.379**

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

^aAll discrete-time hazards models include an age-spline at age 20 years, a quadratic term for ages ≥ 20 years, the age of initiation of daily smoking, and controls for missing data on covariates. Non-significant time-invariant covariates in the model also include: foreign language at home, mom's education, and dad's education.

^bAll 'n' are person-years. Note that sample sizes are slightly smaller due to perfectly estimated failure to quit smoking among respondents with missing data on childhood variables (e.g. foreign language and family structure).

^cNote that parenthood does not necessarily imply co-residence with children.

3. Third, for European American women, the social and economic resources associated with employment partly contribute to the differences in cessation between the unemployed and the employed (i.e. the magnitude of the effect is reduced in the multivariate model); however, the reduction in the odds of cessation associated with unemployment remains large and significant even after the indicators for these resources are addressed.

The finding that joblessness (either through unemployment or exit from the labor force) has a stronger effect on smoking cessation among women is consistent with previous research. In a study of Swedish students who left school and entered the workforce in the 1980s, Novo and colleagues (2000) found that the effect of long-term unemployment was significantly associated with higher smoking rates among women but not men. Similarly in a follow-up survey of US adults (over age 25 years) in the 1980s, McKee and colleagues (2003) recently found that women were more likely than men to have continued smoking after experiencing an adverse financial event. Our study builds on this research by examining cessation patterns over nearly 20 years in a population-representative dataset. Our discrete-time hazard methods allow us to more clearly associate differences in labor force experiences with differences in smoking than can be achieved with prevalence analyses. This has enhanced our ability to identify the conditions that encourage or discourage changes in health-related behavior.

We will first address the question of why joblessness may have stronger effects on health determinants among women. As noted above, in the multivariate models, the differences in cessation among women out of the labor force and women who are employed are no longer statistically significant after controlling for the lower income, lower education, and lower likelihood of marriage that accompanies joblessness. One explanation for the lower likelihood of cessation among jobless women, thus, may be the combined strains of material deprivation and parenthood, to which women are unwilling to add the stress associated with smoking cessation.

Other research has found that women are more likely than men to expect that smoking will improve their mood (Brandon & Baker, 1991), they are more likely to report smoking in response to stress (Livson & Leino, 1988), and they are more likely to relapse at home when they report a negative mood (in contrast to men who are more likely to report relapses outside of the home, when their mood is positive) (Borland, 1990). The use of smoking as a coping mechanism to deal with material deprivation has been explored through interviews with low income single mothers in the UK and disadvantaged

men and women in Scotland (Graham, 1993; Bancroft et al., 2003). Common themes for continuing smoking have been that: “it calms you down”; “its part and parcel of resting; “the only pleasure I have is smoking”; “(otherwise) I get uptight with the children”; “they’re (cigarettes) the only stable thing in my life” (Graham 1993, pp. 31–36). For some women, this contrasts with the experience of boyfriends and husbands who have available to them other forms of relaxation (such as drinking and socializing with friends) (Graham, 1993).

This previous qualitative research supports the conclusion that strains and social isolation related to parenthood may be particularly relevant to women with low resources because of a greater likelihood of single parenthood. Furthermore, even when these women are married, they may be more likely to experience traditional gender roles with sole responsibility for the care of children. Studies have historically identified stricter adherence to traditional gender roles about housework, caretaking, and the use of leisure time among couples with lower education and income (Komarovskiy, 1962; Halle, 1984; Nelson & Smith, 1998). Our findings reinforce this literature and suggest that one explanation for the lower cessation among women out of the labor force may be related to their poorer psychological wellbeing and use of tobacco as a coping-mechanism.

We now address the finding that European American women demonstrate a markedly different smoking pattern associated with employment and unemployment than Hispanic or African American women. Whereas the discussion about gender differences related most explicitly to differences in *exposure* to resources and strains, this finding relates more directly to the differences in the experience, or *reactivity*, to the exposures associated with different labor force positions. Why might some subpopulations react more strongly to employment or joblessness? Psychosocial conditions such as segregation and discrimination may differentially shape these conditions. For example, if men and women from different racial and ethnic backgrounds are distributed unevenly across occupations, and this differential distribution exposes them unequally to conditions supporting or discouraging cessation, then the observed racial, ethnic and gender differences in the effect of employment compared to unemployment may be attributable to gender differences in the distribution across workplaces.

Ames and colleagues (Ames & Janes, 1987) have shown that workplaces differ with respect to the social norms about the appropriateness of alcohol use, the policies related to drinking, adherence to these policies, and the relationship between socialization activities and drinking on and off the job. They have shown that these conditions tend to more adversely affect women, increasing alcohol use (Ames & Rebhun, 1996). More-

over, they have used this qualitative research to demonstrate quantitatively that these aspects of occupational culture are important for understanding occupational differences in alcohol use (Ames et al., 2000). Although some worksite health prevention programs have addressed occupational policies (Sorensen, Emons, Stoddard, Linnan, & Avrunin, 2002; Sorensen et al., 2002), the research that has been used to support the relationship of contextual factors to smoking patterns has not directly measured norms, policies, and the role of socialization processes at work (Serxner, Catalano, Dooley, & Mishra, 1991). To our knowledge, the broader relationship between occupational structure, colleagues' norms and values about smoking, and the relationship between smoking and socialization practices on the job (e.g. "going for a smoke break") has not been explored.

Differences in the environmental conditions of the workplace, as described by job demands and job control or occupational effort and the reward imbalance, has provided an important framework for understanding the social health disparities and may be relevant in this context as well (Theorell, 2000). Research has suggested that job demands and job latitude are associated with current smoking and reductions in smoking (Landbergis et al., 1998; Niedhammer et al., 1998; Kuper & Marmot, 2003). Further research may find that gender, racial and ethnic differences in the stresses and demands associated with different workplaces are related to racial, ethnic and gender differences in smoking cessation patterns among workers, and thus by extension gender, racial and ethnic differences in smoking cessation patterns between the employed and unemployed.

We recognize that our study is not without limitations. Our primary concern is the issue of reverse causality or "social drift" which complicates the specification of the relationship between labor market outcomes and health-related behavior (Manning, Osland, & Osland, 1989; Dooley, Catalano, & Hough, 1992; Leigh, 1995; Ryan, Zwerling, & Jones, 1996). Studies provide at least weak evidence linking poor health-related behaviors to absenteeism, low job satisfaction, and unemployment (Bush & Wooden, 1995; Janlert, 1997). Further evidence for a potential reverse-causal relationship may be inferred from the studies that link smoking to work disability and thereby premature exit from the labor force (Lund, Iversen, & Poulsen, 2001; Lund & Csonka, 2003).

We use two strategies to address the role of selection in the relationship between employment and cigarette smoking. First, we have selected a study population in which there is detailed information on the adolescent social and economic environment, as well as psychological and behavioral predisposition of the individual, predating the period addressed in the analyses. Smoking cessation can be a highly individual process and there

are likely numerous unobservable factors involved in determining who changes behavior and (most importantly for the study) who quits smoking before entering midlife. Nonetheless, it is a strength of this study that we do have controls for such potentially biasing confounders as self esteem, locus of control, and aptitude, which have been related to successful behavior change (such as smoking cessation) as well as occupational attainment and economic success (Blau & Duncan, 1967; Andrisani, 1977; USDHHS, 1994).

Second, as noted earlier, we employ a hazards model which assesses the likelihood of a change in smoking (from daily smoking to quitting) with respect to a lagged indicator of labor force participation, thereby developing stronger inferences about the direction of the effects. Additionally, by incorporating information on work-limiting health conditions in the models, we are able to assess with greater confidence whether those out of the labor force have distinct smoking patterns because of health conditions which precipitated their labor force exit. Although neither of these techniques is perfect, the fact that our findings persist after using them gives us more confidence in our interpretation of the results.

We would also like to highlight that our analyses address how racial, ethnic, and gender differences in the transition into adulthood through work relates to delays in transition out of daily smoking. This is important because we analyze *first* quit attempts for smokers who quit successfully together with quit attempts for smokers who did not quit successfully and later relapsed. It is possible, and likely, that the types of individuals who later relapse are different than those who are able to successfully quit. In fact, research suggests that minorities and women may have different smoking patterns than do European American smokers and men (Geronimus, Neidert, & Bound, 1993; Hassmiller, Warner, Mendez, Levy, & Romano, 2003; Weden, 2004). It is beyond the scope of this analysis to consider whether the forces that shape *first* cessation also shape relapse. Our findings, however, do suggest that the timing and likelihood of smoking cessation in these groups are shaped by their experiences through different life course transitions in work, childbearing, and partnering. Future analyses will need to address whether the differences in labor force participation and the associated differences in resources, psychosocial strains, and cultural contexts which we have associated with smoking cessation in early adulthood also explain differences in relapse and cessation in later life. We suspect that the stratification of resources which we have found to be associated with the patterns of tobacco use from initiation to first cessation are also related to the likelihood of relapse and the patterns of tobacco use thereafter.

Differences in smoking patterns over the life course for minority subpopulations have been highlighted by

other researchers concerned with inappropriate age targeting in tobacco control practice (Moon-Howard, 2003). Our research suggests that progress in reducing inequalities in smoking cessation may resume when societal underprivileges among young women and minorities are reduced.

Conclusion

This study has provided new insights about the role of labor force participation in determining life course changes in health-related behavior. The findings on gender differences highlight the need for further research on the conditions of the workplace which drive the disparate experience of employment between men and women. The relationship between social and economic resources and low cessation among women out of the labor force underscores the importance of continued efforts to address health prevention among individuals who have been particularly subject to the widening economic disparities of the last several decades. Research following from this study can help to further elucidate how work operates over the life course to determine long-term differences in health-related behaviors, health, disability, and longevity.

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