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Women, Smoking, and Social Disadvantage over the Life Course: A Longitudinal Study of African American Women

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Abstract

We compare life course characteristics of a cohort of African American women (N=457) by their smoking status at age 42: never smoker (34.1%), former smoker (27.8%), or current smoker (38.1%). The Woodlawn population from which our sample is drawn has been followed from first grade (1966–67) to mid adulthood (2002–3) and is a cohort of children from a disadvantaged Chicago community.

Examination of the effects of cumulative disadvantage on smoking behavior showed that nearly half of women who first lived in poverty as children, dropped out of school, became teen mothers, and were poor as young adults currently smoked; less than 22% of women with none of these difficulties were current smokers. Regression analyses focusing on smoking and evidence of social disadvantage in childhood, adolescence, and young adulthood showed that women with more education were much less likely to be current smokers. Women reporting low parental supervision in adolescence and less frequent church attendance in young adulthood and those whose mothers' reported regular smoking were significantly more likely to be current smokers. Poverty and marital status in young adulthood varied significantly among smoking categories in bivariate relationships, but not in final multivariate regression models.

Few other studies have examined smoking careers with data from age 6 to 42, comparing social disadvantage characteristics over the life course. While marital status, church involvement and parental supervision are not usually included as measures of socioeconomic status, they represent advantages in terms of social capital and should be considered mechanisms for transmitting disparities.

Keywords

African Americans; smoking; life course; longitudinal study; SES; social disadvantage

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1. Introduction

Cigarette smoking continues to be the largest single preventable cause of death and disability in the United States (Mokdad et al., 2004; Schroeder, 2007), and is associated with a variety of negative health outcomes such as cancer, heart and lung disease, premature births, and infant mortality. Evidence suggests that women are especially susceptible to the health effects of smoking (U.S. Department of Health and Human Services [USDHHS], 2001). In fact, in 1987, smoking-attributable lung cancer unseated breast cancer as the top cause of cancer death in women (USDHHS, 2001). Smoking among women is also of special concern due to the health consequence of fetal smoke exposure, such as preterm birth, low birth weight, stillbirth, and perinatal and neonatal mortality (USDHHS, 2001). There is also compelling evidence that children of smoking parents are more likely to initiate smoking in adolescence than children of non-smoking parents, thus transmitting the greatest single cause of preventable death from generation to generation (Gilman, 2009).

Ethnicity and gender relate to smoking prevalence, with American Indians and Alaska Natives having the highest prevalence (32%), followed by Non-Hispanic Whites (21.9%) and African Americans (21.5%). Asians (13.3%) and Hispanics (16.2%) have the lowest rates (MMWR, 2006). A life course perspective suggests that while African Americans have an advantage in lower rates of smoking during the teen years compared to Whites, this advantage declines by mid-adulthood (Pampel, 2008). Using data from two nationally representative samples, Pampel argues that this convergence is due to higher rates of cessation among Whites compared to African Americans. Geronimus et al. (1993) compared White and Black women of childbearing age and reported similar findings—White women initiated smoking earlier, and were more likely to quit smoking and to do so at earlier ages. They suggest that these results should be taken into account in research and interventions, and that increased emphasis should be placed on interventions tailored to Black adults as well as adolescents. In addition, African American women are more likely to die of a smoking-related disease (Manton et al., 1989; King, 1998; USDHHS, 2001; King, 2006). Evidence suggests that African American women want to quit as much or more than their White counterparts, but fewer are able to successfully quit (Manfredi, 1992; USDHHS, 1998; King, 2004; Webb, 2008); they do not know where to go to find help quitting, and are more worried about how they will deal with stress after cessation (Manfredi, 1992).

The fundamental social cause hypothesis (Link and Phelan, 1995) suggests that an important reason that those with more resources (e.g., higher socioeconomic position, more social capital) have better health outcomes is because they are better able to take advantage of new knowledge about health, have more access to interventions, and have grown up in environments that foster good health. As applied to cigarette smoking, in the decades since the initial Surgeon General's report when it became clear that smoking was harmful to health (U.S. Department of Health, Education, and Welfare, 1964), those with more resources have been less likely to initiate as well as more likely to quit smoking than otherwise similar adults (Fagan et al., 2007; Centers for Disease Control and Prevention, 2008). Data suggest that education level is a major factor underlying this trend (Fagan et al., 2007), though race/ethnicity differences in cessation rates and health outcomes remain unexplained even after controlling for other socioeconomic (SES) measures (Novotny et al., 1988). In the social causation hypothesis, social resources that are instrumental in providing advantage are not limited to economic advantage, but extend to social capital (social relationships) and human capital, such as education.

In light of these concerns about women and about African American women in particular, we focus here on the smoking patterns of a population of African American women who started school in a disadvantaged community and who have been followed from age 6 to age 42. In this study, we compare the characteristics of three subgroups in this cohort of African American

women: those who never smoked; those who quit smoking, and current smokers. While there have been several longitudinal studies of antecedents to the initiation of smoking among adolescents and young adults, there has been much less focus on characteristics of those who as adults have never smoked compared to those who have quit and those who have been smokers for some time. More than 70 percent of the women in our study who currently smoked initiated before age 18.

1.1. Background

Examining pathways to smoking and smoking cessation between adolescence and young adulthood, Marcus et al. (2007) found that a positive relationship with one's parents, less smoking in the family, conventional personality attributes and little or no other substance use relate to smoking cessation in a sample of urban African American and Puerto Rican young adults. Results did not differ by ethnicity or gender, and socioeconomic resources were not included in the analyses. Comparing developmental trajectories of cigarette smoking from childhood into young adulthood, White et al. (2004) found significant racial differences in onset, levels and patterns of cigarette use among high risk males. Specifically, more whites were heavy/regular smokers and more African Americans never smoked. These differences remained after controlling for socioeconomic status, which was also related to smoking trajectories.

Using data from the 2000 National Health Interview Survey (NHIS), a cross-sectional household survey representative of the non-institutionalized civilian US population, Barbeau et al. (2004) also found increasing smoking rates by social disadvantage. For example, prevalence of smoking was 24.6% for African American women without a college degree; 28.6% for those without a degree and in a lower occupational class, and 36.8% for those without a degree, in a lower occupational class and with income below 200% of the poverty level.

While many studies have examined how cross-sectional measures of socioeconomic position have related to smoking, fewer studies have focused on how combined measures of social disadvantage have affected the pathways to smoking over the life course. Graham et al. (2006) followed women in the United Kingdom aged 22–34 over a four-year period and found that smoking status was influenced not only by current social circumstances, but also by women's history of disadvantage in childhood. Women who had no childhood disadvantage (based on father's occupation), graduated from high school, were childless until the age of 22, and did not have adult disadvantage were much less likely to be smokers (33%) and were more likely to be former smokers (45%). In contrast, women with all four of these disadvantages were much more likely to be current smokers (76%) and less likely to be former smokers (17%). In a longitudinal prospective cohort study of those followed from birth to ages 30–39 from Providence, RI, Gilman et al. (2003) found a significantly increased risk of smoking among those with lower SES backgrounds. By both childhood and adult measures, lower SES was related to increased risk for progressing to regular smoking and decreased likelihood of cessation. Both studies suggest that not only do concurrent indicators of socioeconomic position influence smoking status, but that a socially disadvantaged background increases the risk of smoking.

In examining the impact of social disadvantage on smoking over the life course, it is also important to consider conditions that may be more likely to occur among those who are disadvantaged. Social capital at the individual level is defined as the resources available to individuals by virtue of their participation in groups and especially their participation in social networks (Portes, 1998). Social capital has been shown to be related to social disadvantages and may be instrumental in the continuity of disadvantage across the life course (Ensminger, et al., 2009).

In an earlier report on antecedents of smoking among young adults (age 32) in the Woodlawn study, Juon et al. (2002) found that never smokers differed most on social integration from the other three groups—former smokers, current late initiators, and current early initiators. Current smokers were more likely to be poor and unemployed than those who had never smoked. However, poverty in first grade did not relate to later smoking status. This current study extends the earlier work by continuing the analyses to age 42, focusing on women, and examining both economic and social capital disadvantage over the life course.

1.2. Research questions

This study builds on and extends the existing literature on social disadvantage in women's smoking in three important respects. First, we examine the impact of the accumulation of social disadvantages over the life course on smoking. These social disadvantages include childhood poverty, school drop out, early childbearing, and poverty as an adult. Second, we compare specific smoking trajectories: those who have never smoked by age 42, those who are former smokers who quit by age 42, and those who are current smokers. We examine in bivariate analyses the impact of academic achievement in both childhood and adolescence, level of parental supervision regarding smoking and other drug use in adolescence, frequent mobility in childhood and young adulthood, whether the woman's mother smoked regularly and level of school bonds in adolescence, and family (marital status) and community ties (church attendance) in adulthood. Academic achievement may be an important avenue to establishing social advantage and therefore would relate to smoking status. Parental supervision represents a family's social capital and may indicate a social advantage that children have. Frequent mobility may also indicate the family's lack of social capital in their neighborhood. Whether mothers smoked may be related to their daughters' smoking through a number of mechanisms—genetic links, modeling of behavior, or social norms within the family home. Family and community ties in adulthood, again, represent the social capital of the study participants. We would expect those with more social capital to be less likely to currently be a smoker. Finally, we develop multivariate regression models to examine the association between life course factors and smoking status at age 42. Through these analyses, we seek to 1) better understand the role of social disadvantage in the stages of cigarette use from a life course prospective, 2) identify factors that may promote cessation or prevent initiation of smoking in women, and 3) contribute to the literature on smoking by extending longitudinal research into mid-life.

2. Methods

2.1. Description of Woodlawn Study

Data for this paper come from a prospective, longitudinal study spanning more than 35 years and consisting of a cohort of 1,242 children (636 females, 51.2%) who began first grade in Woodlawn in 1966–67; only 13 families eligible to participate refused. Woodlawn is an inner city community on the South side of Chicago. In the middle 1960s, when this study began, the neighborhood community was one of the five poorest of the 76 Chicago communities, and over 95% of Woodlawn residents were African American (Council for Community Services, 1975). In the initial assessment, over 99% of the first graders were African American. Despite the overall rates of poverty, lingering racial segregation provided some socioeconomic variation in the community, with some blocks having high rates of employment, home ownership, and high levels of education.

Over the course of the study, data were obtained from multiple sources. In this paper we use data gathered from first grade teachers (child's academic achievement), mothers or mother surrogates (family background, poverty, mothers' education, mothers' smoking, and mobility), and the study participants themselves (smoking status, parental supervision, educational status, current poverty, and community ties).

In 1975–1976, ten years after the children had been in first grade, 939 (75%) of the mothers or mother surrogates were re-interviewed. Of the 939 teenagers of the re-interviewed mothers, 75% (n = 705) participated in the follow-up group assessment. They were assessed with a psychological self-report instrument and a questionnaire regarding family and school life, drug use, delinquency, sexual activity, and social bonds (Ensminger et al., 1983; Kellam et al., 1983; Ensminger, 1990). These two instruments were presented on audiotape to control for reading differences and were led by African American college students who were trained to discuss issues of trust and confidentiality.

In 1992–93, (at ages 32–34) about 80% (n = 952) of the original cohort were located and interviewed (44 were deceased and 3 were incapacitated); 39 (3.1%) were located but refused to participate; 204 (16.4%) of the cohort members were not found. The study population of young adults includes 456 males (47.8%) and 496 females (52.2%). Although similar proportions of males and females were interviewed, refused and unlocatable, males were more likely to be incapacitated or deceased than females (5.6% vs. 1.9%). In 2002–03, we located and reinterviewed the cohort at ages 42–43, using an assessment very similar to the one in 1992–93. A more detailed description of the study design can be found in earlier published work (see Ensminger et al., 1997; Juon and Ensminger, 1997; Crum et al., 2006; Fothergill et al., 2008). In the analyses reported here, we focus on the female study participants (n=457) who were interviewed in mid-life (age 42). About 37 percent of women were married, 86 percent were mothers, with 71 percent having children in the household. About 84 percent had a high school diploma (or a graduate equivalency diploma [GED]), and 73 percent were employed. Slightly over one quarter were living below the poverty level (28%) as defined by the U. S. government.

2.2. Attrition

As in all prospective studies, the Woodlawn Study has experienced attrition. Eighty-five percent of the study population was assessed in adulthood at one or both time-points. Mortality by the time of the mid adult assessment was 86 individuals (7.0%). Because smoking status is derived from the adult data, we tested for attrition biases by comparing those who had at least one adult interview (N=1054) with those who did not (N=188). We found no differences on such key variables as gender (86% of females and 83% of males were interviewed), socioeconomic status (e.g., mother's education, welfare participation in 1965), adolescent drug use (e.g., alcohol, cigarettes, marijuana, cocaine), early childhood behavior (e.g., teacher-reported aggression and shyness in first grade), adolescent problem behavior (e.g., self-reported suspension, fighting with parents, carrying a weapon), adolescent self-reported delinquency (e.g., violent crime, property crime), information from adult criminal records (e.g., age of first arrest, arrest for a property crime), and such 1970 and 1980 census variables as percent white collar workers, percent unemployed, percent below poverty and percent Black. Cohort members with a criminal record for a violent or drug-related crime were more likely to have an adult interview than not. Those interviewed in adulthood were also more likely to have graduated from high school and less likely to have lived in poverty in first grade or adolescence. Those who had died by the midlife assessment were more likely to be male, to have dropped out of high school, to have an arrest record for a violent crime, and to have smoked heavily during adolescence.

2.3. Historical and political backdrop

Several significant historical and political events occurred as the cohort aged that may be related to the smoking rates of the cohort. Most of the cohort was born in 1960 at the end of the migration of African Americans from the rural south to northern cities such as Chicago. About half of the mothers had been born in the South (mostly Mississippi) and then moved to Chicago. The Civil Rights movement was at its height during the 1960s—concerns about voting and

school integration were high on the political agenda. Martin Luther King's assassination occurred in 1968 when the children were in 3rd or 4th grade. During the time of the cohort's childhood and adolescence, Woodlawn had very high rates of delinquency and crime (Council for Community Services, 1975). The street gang the Blackstone Rangers, based in Woodlawn, came to the attention of the local and national press during the late 1960s and the 1970s. The Blackstone Rangers evolved into the El Rukins which continued as a youth gang and matured into an adult gang. Chicago elected its first African American mayor Harold Washington in 1983—cohort members would have been about 23 years old, and this election may have been the first election in which many of them voted. In terms of smoking, the first Surgeon General's report on smoking was published in 1964, when cohort members were four years old, although by 1973 only three percent of the American public was familiar with this report. The highest number of cigarettes was sold in the United States in 1980, when cohort members were age 20. It was during the decade when cohort members were in their 30s that changes in the social context of smoking became evident. U.S. President Clinton mandated smoke-free government workplaces in 1997. In 1998, forty-six states and six US territories won the Master Settlement Agreement, in which tobacco companies agreed to pay states 365.5 million dollars for Medicaid costs associated with providing healthcare to smokers. A large portion of this award was used to create the American Legacy Foundation in 1999. Although the effects of these events cannot be studied because they do not vary for the cohort, they do provide the context in which cohort members have matured to adulthood.

2.4. Measures

2.4.1. Smoking status—Smoking status was established at the mid-life interview (age 42) by asking the women whether they had ever smoked and, if so, how old they were the very first time, whether they smoked now, and if not, how long it had been since they last smoked regularly. Women were classified as non-smokers, former smokers, and current smokers. More than a third (34.1%) reported that they never smoked, 27.8% were former smokers, and 38.1% currently smoked.

2.4.2. Social disadvantage—The impact of cumulative social disadvantage was examined over time by establishing a four-tiered burden of deprivation as shown in Table 1. First, in this negative trajectory was living in poverty in childhood (100% or more below the Federal poverty level in 1965), which impacted more than half of the women (n=236). Adding to the burden of this early poverty group, an additional 45 also dropped out of school, three quarters of who (n=34) went on to become mothers in their teen years. Finally, adding the last of the negative conditions, more than 70 percent (n=24) of those teen mothers also reported living in poverty as young adults (age 32). Women in this final group were deemed to be the most socially disadvantaged subset in our study (n=24, 5.3%) with all four of the problematic trajectory conditions. Seventy-four (16.2%) of the women reported none of the social disadvantages.

2.4.3. Other influences over the life course – first grade—In addition to poverty status, several other early measures were considered as possible influences on smoking. See Table 2. *Academic Achievement*: 1) Math grades in the second semester of first grade provided a measure of academic success and were dichotomized as fair or unsatisfactory=1 vs. satisfactory or good=0. Math grades and reading grades were highly correlated ($r=.79$) and we arbitrarily chose math grades as the measure. *Socioeconomic Status*: 2) In addition to poverty, we included whether the first grader's mother had completed high school. 3) Finally, we assessed residential mobility during the period from birth to first grade (3 or more moves=1 vs. 0 to 2=0).

2.4.4. Other influences over the life course – adolescence—Five measures from adolescence (age 15) were considered. *Family Influences*: 1) we asked each mother whether

she was a regular smoker (this measure was not available earlier). 2) Also, the adolescent provided self reports on their experience of parental supervision, which comprised three items about the strictness of rules their parents established about use of beer and wine, drugs, and cigarettes. Responses ranged from absolutely forbidding use to leaving the decision to the adolescent. These three items were summed to make a parental supervision scale from 3 to 18 (Cronbach's $\alpha=.64$). Scores one-half standard deviation above the mean were considered to indicate high parental supervision (low=1 vs. high=0). *School and Academic Achievement* included 3) school bonds, assessed as the sum of five items on a scale of 1–6 reflecting the teenager's attachments and commitments to school (how important is doing well in school, how do your teachers think you are doing, how satisfied are you with your teachers' opinion, how far would you like to go in school, and how far do you think you will go in school) (Cronbach's $\alpha=.65$). Mean scores were further categorized as medium=1 or low=2 vs. high=0. 4) Academic achievement was indicated by 7th and/or 8th grade standardized math scores (range 52 to 131) with higher scores indicating higher achievement.

2.4.5. Other influences over the life course – young adulthood—In addition to poverty status, as described earlier, three other characteristics at age 32 were examined: 1) *social integration*: church attendance, less than a few times per month=1 vs. more often=0; 2) *marital status*: single/divorced/widowed=1 or never married=2 vs. married=0; and 3) *residential mobility*: three or more moves in the past five years=1 vs. fewer moves=0.

2.4.5. Educational attainment– mid-adulthood—From the interview at age 42, in addition to smoking status, we included the women's ultimate educational attainment – given that some cohort members continued their education well into adulthood. We categorized education as: not completing high school or GED=2, high school or GED completion=1, and any college=0.

2.5. Analyses

After we described the relationship between cumulative social disadvantage and smoking behavior, we conducted preliminary bivariate analyses: 1) cross tabulation (for categorical variables) or oneway ANOVA (for continuous variables) to provide descriptive data by smoking status for life course SES, academic achievement, mobility, role model effects, and social bonds and concurrent educational attainment. Then, we included in overall multinomial multivariate logistic regression models all variables that related to smoking trajectories with a *p*-value less than 0.25 in the bivariate analyses, following the rationale of Hosmer and Lemeshow (2000).

Multinomial logistic regression is the statistical method of choice for our three-category outcome, allowing for estimation of the effects of the early and specific risk factors associated not only with the continued use of cigarettes, but also with the discontinuation of smoking. This method can specifically contrast all smoking classifications. Analyses were conducted using the statistical package STATA (StataCorp, 2007), which provides maximum likelihood logit coefficients and relative risk ratios (odds ratios) with 95% confidence intervals while automatically checking identification and collinearity.

Analyses using list-wise deletion of cases with missing data would have limited our sample to *N*=189. About 59 percent of cases had some missing variables within the four waves of our subset of data (mainly due to the high rate of missing at the adolescent assessment; 9 percent of cases had 4 or more missing variables). To estimate information from participants with missing data, we used the STATA ICE (imputation by chained equations) module (Royston, 2005), creating 10 imputed datasets for the 457 cases who reported their smoking status at age 42. All variables within our conceptual framework were included in the imputation procedure

regardless of their bivariate relationship with smoking. These imputed datasets were combined within the module for the final multinomial multivariate logistic regression analyses.

3. Results

3.1 Multiple social disadvantage

Table 1 shows the burden of multiple social disadvantages on smoking behavior. Women with none of the disadvantages were the most likely to be never smokers and most likely to be former smokers (and least likely to be current smokers) while those with two or more disadvantages were similar in their higher rates of smoking and lower rates of being in the never smoking category. The disadvantage that seemed to matter the most was education, with over half of high school dropouts being current smokers—adding other disadvantages did not increase the likelihood of current smoking.

3.2 Bivariate relationships

We examined the bivariate relationships of all the hypothesized variables with the smoking outcomes. See Table 2. The only variable from first grade related at the $p < .05$ level to smoking status at age 42 was having low math grades, although, all variables selected from this time period had distributions shifted toward the smoking states, particularly current smoking. Of the women who had fair or unsatisfactory grades in math in first grade, 45 percent were current smokers, 32 percent never smoked and 23 percent were former smokers ($p = .006$ in chi-square analysis).

Adolescent measures related to later smoking status included achievement test scores, parental supervision, and mother's regular smoking. At the time of young adulthood, poverty, marital status, and church attendance related to smoking status. In terms of social disadvantage, poverty level in childhood was marginally related to adult smoking ($p = .08$) but not so in adolescence. Mothers' education was not associated with the later smoking status of their daughters; however, the women's own educational achievement as measured in first grade, adolescence, and mid adulthood was related to their smoking status.

As suggested by Hosmer and Lemeshow (2000), we included only those predictors with p -values of less than .25 in the subsequent multiple logistic regression models. Variables that did not relate to smoking at this p -value level were: in first grade -- mother's education and number of moves before first grade; and in adolescence -- family poverty, and in young adulthood -- number of moves in the past five years. These variables were not included in the overall multiple regression models. See Table 2 for those variables related to smoking status at $p < .25$.

3.2 Multinomial multiple regression

In the multinomial multivariate logistic regression, we made three comparisons: former smokers to never smokers, current smokers to never smokers, and current smokers to former smokers (in Table 3).

We found that former and never smokers differed only on church attendance; infrequent church attendees were almost twice as likely to be former smokers compared to never smokers ($OR = 1.9$, $CI = 1.08-3.46$). Marginal associations were noted for marital status and education attainment.

Odds of being a current versus never smoker were 2.8 times greater for those with low versus high parent supervision of adolescent substance use ($CI = 1.64-4.75$). Infrequent church attendees in young adulthood had 2.6 times the odds of being current versus never smokers ($CI = 1.49-4.54$). Education attainment was very highly related. The odds of being a current

smoker versus never smoker were 4.3 times greater for dropouts compared to those with some college (CI=1.76–10.61) and twice the odds for women who completed high school or GED (CI=1.12–3.48) versus those with some college. (Table 3).

Regression results for current versus former smokers showed that the women's mothers being regular smokers during their adolescence conferred nearly twice the odds of being a current smoker rather than a former smoker (CI=1.05–3.13), as did low parental supervision around substance use (CI=1.07–3.74) and less education (having a diploma or GED vs some college, CI=1.05–3.63). (See Table 3).

4. Discussion

In studying smoking among this cohort of Woodlawn women, it is worth noting that they have been at high risk for smoking over the life course. According to Monitoring the Future (Johnson et al., 2007), a national annual survey of substance use among high school students, highest rates of daily cigarette smoking among twelfth graders occurred from 1976 to 1978. Members of the Woodlawn cohort would have been seniors in 1978, if they were “on-time” in their school careers. Further evidence is that Woodlawn women's past year smoking prevalence is higher than that of either White or African American women of similar age from both the National Epidemiological survey of Alcohol and Related Conditions (NESARC) (Grant et al., 2003) and the National Household Survey of Drug Use and Health (NHSDUH) (Substance Abuse and Mental Health Services Administration, 2005).

The relationship of smoking to social disadvantage among these women is shown in the cumulative disadvantage over the life course. Women with no disadvantages over the life course were not only more likely to be never smokers than others, they were also more likely to be former smokers. This is consistent with the “fundamental cause explanation” that argues that those with more resources are more able to change their behaviors when information becomes available indicating adverse health affects to behaviors (Link and Phelan, 1995). So, advantage is important not only for the lack of initiation of smoking but also for the likelihood of quitting smoking once one has begun. These differences are also borne out in Table 2 and Table 1 in the multivariate analyses that show that former smokers are more similar to the never smokers than to the current smokers, and have more initial advantages than the current smokers.

Those with more education were much less likely to be current smokers, and more likely to be never smokers or former smokers. While poverty in young adulthood varied among different categories of smoking in the bivariate analysis, this relationship was not statistically significant in the final multivariate models. It may be that educational attainment mediates this relationship. Further, neither poverty during childhood nor poverty during adolescence related to smoking even in bivariate analyses.

There may be several reasons for the lack of findings with childhood and adolescent poverty. First, all the Woodlawn cohort of women lived in a disadvantaged community when they were in first grade. While there certainly were differences in family background among the children the implications of these differences may have been overshadowed by the characteristics of the community where they lived. Second, the fundamental social cause hypothesis (Link and Phelan, 1995) argues that socioeconomic differences in health and health behaviors arise after knowledge and information are available for those to change their behaviors or otherwise avert the risks. It may be that for this cohort the knowledge of the relationship between cigarette smoking and health is too recent for these SES differences to be apparent, especially as measured in early childhood. The first Surgeon General's report was issued in 1964, but considerable time passed before its effects were felt on smoking behavior in the majority of

the population. Younger cohorts from Woodlawn (or similar areas) may differ more in their smoking by SES than did our cohort.

Third, several other studies that have examined cigarette use over the life course have differed in either their data or analyses compared to ours. For example, Barbeau et al. (2004) show that social disadvantage is related to smoking status, but their data were cross sectional rather than longitudinal, so we do not know how earlier disadvantages relate to smoking in their research. Graham et al. (2006) examine the relationship of disadvantaged pathways on smoking careers in the United Kingdom. While they show that the burden of accumulated social disadvantage does relate to higher smoking prevalence, as we also show, they do not examine these relationships in a full multivariate model with other life course characteristics.

The analyses and data that are most similar to ours are those of Gilman et al. (2003), who investigate the association between multiple indicators of socioeconomic status over the life course and cigarette smoking initiation, regular use, and cessation. In their multivariate models, educational attainment is strongly related to cessation and progression to regular smoking, while other SES variables drop away (except for maternal education, which is related to regular smoking). Our findings are similar, especially with regard to the importance of education.

Few other studies have examined the career of smoking with data from childhood to mid adulthood, comparing social disadvantage with other characteristics in the life course. Our findings are unique and point to the importance to women's smoking careers of education, parental supervision and mothers' smoking during adolescence, and church involvement in adulthood. While parental supervision and church involvement are not usually included as measures of socioeconomic status, they do represent advantages in terms of social capital (Portes, 1998). In other analyses, we (Ensminger, et al., 2009) have found measures of disadvantage to be key predictors of social involvement at age 32. Portes emphasizes the role of social capital in social control, family support, and benefits mediated by extra-familial networks. These may be more abstract terms for the findings reported here; parental supervision, church involvement, marriage and educational attainment may be important indicators of social control, family support, and access to extra-familial networks. The importance of educational attainment has been found repeatedly in studies examining health. As a variable education may represent several important constructs—socioeconomic status and knowledge, as well as social capital.

It is also noteworthy that parental supervision, church involvement, and education are, for the most part, events that took place much earlier in the women's lives than age 42 when smoking status was established. Parental supervision during adolescence regarding smoking and other substance use had significant lasting effects on the women's smoking status at age 42. Whether this impact had to do with the delay of smoking, the transmission of smoking norms from parents, or the general importance of social control of parents on children cannot be determined from these results, but its impact over more than two and a half decades is impressive. The importance of church involvement may reflect religious norms and values, although smoking has not been a central issue for the beliefs of most religions. It may also reflect a selection effect—those women who do not smoke may be more pro-social and may be more likely to attend church.

Marriage seemed to be somewhat protective for women in terms of cessation of smoking. Marriage is often used in the literature as a measure of social integration or social involvement (Berkman and Syme, 1979; Umberson, 1992). Women who were married were more likely to be former than current smokers; women who never married had nearly twice the prevalence of current smoking compared to either those who were married or those who were separated, divorced, or widowed. In regression analyses, women who were separated, divorced, or

widowed compared to married women were marginally more likely to be former smokers than never smokers ($p=.052$). Often marriage is described as providing support in terms of health behaviors—not only do spouses seem to support good behaviors, but they also are critical of bad behaviors (Umberson, 1992). In other Woodlawn analyses, the advantage of being married has been evident for the men regarding their substance use and crime, but this advantage has not been evident for women (Ensminger and Juon, 1998). Here we see the benefit of marriage for women as well.

In terms of the Woodlawn women's career of smoking, it is noteworthy that most current smokers at age 42 began before the age of 18; only 30 percent initiated smoking after the age of 18. This emphasizes the potential importance of delaying smoking during adolescence, the hypothesis being that if young people do not begin smoking as teenagers, they may be much less likely to initiate later in the life course. This is true in a population of African Americans, who may be less likely to begin smoking as a teenagers compared to Whites. These findings indicate that the teen years are of significant importance in this population for tobacco-use prevention efforts.

In this study, we have examined the smoking careers of lower SES women. An important issue is whether we should consider women differently from men. Many examinations have not found gender differences in the antecedents of smoking status (e.g., Juon et al., 2002, Marcus et al., 2007). However, we recognize the important role that women play in childbearing and childrearing when their choice to smoke is likely to negatively affect not only their own health, but, that of their children. There also may be differences in how males and females respond to interventions that warrant their separate examination. We also chose to focus on women because of the literature that emphasizes the importance of the negative impact of social disadvantage on the well-being of women.

There are several limitations of this study to acknowledge. First, the population under study is a specific cohort of a specific age coming from a specific community. While this has the advantage of defining precisely who is being studied and to whom the findings apply, the generalization of these results can be accomplished only by comparing the results with other studies. We have cited other studies and made comparisons with our own work as one way of overcoming this limitation. Second, we have analyzed three different smoking categories using measures from across the life course. We may not have sufficient power to detect some relationships in the data. Third, as with nearly all longitudinal studies, we have attrition in the data. While we have found few important differences between cohort members who were followed and those we could not follow, some bias may remain. We have used state-of-the-art methods to impute data, giving us the advantage of using all the available data which list-wise deletion of cases does not provide.

Despite these limitations, the study has considerable strengths that also should be mentioned. First, the data is from an important population in terms of smoking. The cohort of 42–43 year-old women grew up in a time when smoking among young people was at its highest. Further, health disparities between Blacks and Whites are especially evident in the age decade of the forties, so the attention to smoking, still the most preventable cause of morbidity and mortality, is very salient in this population. Finally, the extent and multiple sources of information add credibility to the analyses. We have used information from first grade teachers and from mothers as well as from the study participants themselves. Reporting of the smoking history is not confounded with the reporting of earlier SES or achievement.

In conclusion, we found support for the important effects of SES on women's smoking, especially in terms of educational achievement. Further, we found that other indicators of social

resources, such as family support during adolescence, church involvement, and marriage are important antecedents to both smoking initiation and smoking cessation.

References

- Barbeau EM, Krieger N, Soobader M-J. Working class matters: Socioeconomic disadvantage, race/ethnicity, gender, and smoking in NHIS 2000. *Am. J. Public Health* 2004;94(2):269–278. [PubMed: 14759942]
- Berkman L, Syme S. Social networks, host resistance and mortality: A nine-year follow-up study of Alameda County residents. *Am. J. Epidemiol* 1979;109:186–204. [PubMed: 425958]
- Centers for Disease Control and Prevention. Percentage of adults who were current, former, or never smokers, overall and by sex, race, Hispanic origin, age, education, and poverty status. National Health Interview Surveys, Selected Years, United States, 1965–2006. 2008http://www.cdc.gov/tobacco/data_statistics/tables/adult/table_2.htm. Accessed April 20, 2008
- Council for Community Services in Metropolitan Chicago. Chicago: Council for Community Services in Metropolitan Chicago; 1975. Community analysis project. Report No. 1: Chicago Problem Analysis.
- Crum RM, Juon HS, Green KM, Robertson JA, Fothergill K, Ensminger ME. Educational achievement and early school behavior as predictors of alcohol use disorders: 35-year follow-up of the Woodlawn study. *J. Stud. Alcohol* 2006;67:75–85. [PubMed: 16536131]
- Ensminger ME. Sexual activity and problem behaviors among black, urban adolescents. *Child Dev* 1990;61:2032–2046. [PubMed: 2083510]
- Ensminger ME, Anthony JC, McCord J. The inner city and drug use: initial findings from an epidemiological study. *Drug Alcohol Depend* 1997;48:175–184. [PubMed: 9449016]
- Ensminger, ME.; Juon, HS. Transition to adulthood among high risk youth. In: Jessor, R., editor. *New Perspectives on Adolescent Risk Behavior*. New York, NY: Cambridge University Press; 1998.
- Ensminger ME, Juon HS, Lee R, Lo SY. Social connections in the inner city: Examination across the life course. *Longitudinal and Life Course Studies* 2009;1(1):11–26.
- Ensminger, ME.; Kellam, SG.; Rubin, BR. School and family origins of delinquency: Comparisons by sex. In: Van Dusen, KT.; Mednick, SA., editors. *Prospective Studies of Crime and Delinquency*. Boston: Kluwer-Nijhoff Publishing; 1983. p. 73-97.
- Fagan P, Moolchan E, Lawrence D, Fernander A, Ponder P. Identifying health disparities across the tobacco continuum. *Addiction* 2007;102(Suppl2):5–29. [PubMed: 17850611]
- Fothergill KE, Ensminger ME, Green KM, Crum RM, Robertson J, Juon HS. The impact of early school behavior and educational achievement on adult drug use disorders: A prospective study. *Drug and Alcohol Depend* 2008;92:191–199.
- Geronimus AT, Neidert LJ, Bound J. Age patterns of smoking in US Black and White women of childbearing age. *Am. J. Public Health* 1993;83(9):1258–1264. [PubMed: 8363001]
- Gilman SE, Abrams DB, Buka SL. Socioeconomic status over the life course and stages of cigarette use: Initiation, regular use, and cessation. *J. Epidemiol Community Health* 2003;57:802–808. [PubMed: 14573586]
- Gilman SE, Rende R, Boergers J, Abrams DB, Buka SL, Clark MA, et al. Parental smoking and adolescent smoking initiation: An intergenerational perspective on tobacco control. *Pediatrics* 2009;123(2):e274–e281. [PubMed: 19171580]
- Graham H, Inskip HM, Francis B, Harman J. Pathways of disadvantage and smoking careers: Evidence and policy implications. *J. Epidemiol Community Health* 2006;60(Suppl):117–1112.
- Graham, JW.; Hofer, SM.; Piccinin, AM. Analysis with missing data in drug prevention research. In: Collins, LM.; Seitz, L., editors. *Advances in Data Analysis for Prevention Intervention Research*. Washington, D.C: National Institute on Drug Abuse; 1994. p. 13-63.
- Grant, BF.; Moore, TC.; Kaplan, K. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism; 2003. Source and accuracy statement, Wave 1 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).
- Hosmer, DW.; Lemeshow, S. *Applied Logistic Regression*. Vol. Second edition. New York: Wiley;

- Johnson, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. National Institute on Drug Abuse. Bethesda, MD: 2007. Monitoring the Future national survey results on drug use, 1975–2006: Volume 1, Secondary school students (NIH Publication No. 07–6205).
- Juon HS, Ensminger ME, Sydnor KA. A longitudinal study of developmental trajectories to young adult cigarette smoking. *Drug and Alcohol Depend* 2002;66:303–314.
- Juon HS, Ensminger ME. Childhood, adolescent and young adult predictors of suicidal behaviors: A prospective study of African Americans. *J. Child Psychol Psychiatry* 1997;38:553–563. [PubMed: 9255699]
- Kellam, SG.; Branch, JD.; Agrawal, KC.; Ensminger, ME. Chicago: The University of Chicago Press; Mental Health and Going to School: The Woodlawn Program of Assessment, Early Intervention and Evaluation.
- Kellam, SG.; Brown, CH.; Rubin, BR.; Ensminger, ME. Paths leading to teenage psychiatric symptoms and substance use: developmental epidemiological studies in Woodlawn. In: Guze, SB.; Earls, FJ.; Barrett, JE., editors. *Childhood Psychopathology and Development*. New York: Raven Press; 1983. p. 17-51.
- King G, Bendel R, Delaronde SR. Social heterogeneity in smoking among African Americans. *Am. J. Public Health* 1998;88:1081–1085. [PubMed: 9663158]
- King G, Polednak A, Bendel RB, Vilsaint BA, Nahata SB. Disparities in smoking cessation between African Americans and Whites: 1990–2000. *Am. J. Public Health* 2004;94(11):1965–1971. [PubMed: 15514238]
- King G, Polednak A, Fagan P, Gilreath T, Humphrey E, Fernander A, Bendel RB, Noubary F. Heterogeneity in the smoking behavior of African American Women. *Am J. Health Behavior* 2006;30(3):237–246.
- Link BG, Phelan J. Social conditions as fundamental causes of disease. *J. Health Soc. Behav. (Extra Issue)* 1995:80–94.
- Manfredi C, Lacey L, Warnecke R, Buis M. Smoking-related behavior, beliefs, and social environment of young black women in subsidized public housing in Chicago. *Am. J. Public Health* 1992;82:267–272. [PubMed: 1739162]
- Manton, KG.; Patrick, CH.; Johnson, KW. Health differentials between Blacks and Whites: Recent trends in mortality and morbidity. In: Willis, DP., editor. *Health Policies and Black Americans*. New Brunswick, NJ: Transaction Publishers; 1989. p. 129-199.
- Marcus SE, Pahl K, Ning Y, Brook J. Pathways to smoking cessation among African American and Puerto Rican young adults. *Am. J. Public Health* 2007;97:1444–1448. [PubMed: 17600250]
- Moffitt T. Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review* 1993;100:674–701. [PubMed: 8255953]
- Morbidity and Mortality Weekly Report. Tobacco use among adults—United States 2005. *MMWR Weekly* 2006;55(42):1145–1148. October 27, 2006.
- Mokdad A, Marks J, Stroup D, Gerberding J. Actual causes of death in the United States, 2000. *JAMA* 2004;291(10):8.
- Novotny TE, Warner KE, Kendrick JS, Remington PL. Smoking by Blacks and Whites: Socioeconomic and demographic differences. *Am. J. Public Health* 1988;78(9):1187–1189. [PubMed: 3407817]
- Pampel FC. Racial convergence in cigarette use from adolescence to the mid-thirties. *J. Health and Social Behavior* 2008;49(4):484–498.
- Portes A. Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology* 1998;24:1–24.
- Royston P. Multiple imputation of missing values: Update of ice. *The Stata Journal* 2005;5(4):527–536.
- Schroeder SA. We can do better—improving the health of the American people. *N. Engl. J. Med* 2007;357:1221–1228. [PubMed: 17881753]
- StataCorp. Stata Statistical Software: Release 10. StataCorp LP: College Station, TX; 2007.
- Substance Abuse and Mental Health Services Administration. Results from the 2004 National Survey on Drug Use and Health: National Findings (Office of Applied Studies, NSDUH Series H-28, DHHS Publication No. SMA 05-4062). Rockville, MD: 2005.

- Umberson D. Gender, marital status and the social control of health behavior. *Soc. Sci. Med* 1992;34:907–917. [PubMed: 1604380]
- U.S. Department of Health and Human Services. Rockville, MD: Author, Public Health Service, Office of the Surgeon General; Woman and smoking: A report of the surgeon general.
- U.S. Department of Health, Education, and Welfare. Smoking and Health: Report of the Advisory Committee to the Surgeon General of the Public Health Service. Washington: U.S. Department of Health, Education, and Welfare, Public Health Service, Center for Disease Control; 1964. PHS Publication No. 1103.
- Webb MS. Treating tobacco dependence among African Americans: A meta-analytic review. *Health Psychol* 2008;27(3 Suppl):S271–S282. [PubMed: 18979980]
- White HR, Nagin D, Replogle E, Stouthamer-Loeber M. Racial trajectories of cigarette use. *Drug Alcohol Depend* 2004;76(3):219–227. [PubMed: 15561473]

Table 1

Smoking status of women in the Woodlawn Study at age 42 by cumulative disadvantage over the life course

	N	Never Smoker	Former Smoker	Current Smoker
Total Sample of Women	457	34.1%	27.8%	38.1%
<u>Cumulative Disadvantage:</u>				
Poverty at age 6	236	32.6%	24.6%	42.8%
+High school dropout	45	22.2%	26.7%	51.1%
+Motherhood before age 20	34	20.6%	29.4%	50.0%
+Poverty at age 32	24	25.0%	29.2%	45.8%
None of the above	74	41.9%	36.5%	21.6%

Table 2

Life course factors and smoking among women in the Woodlawn Study: Bivariate analysis of variables from the conceptual framework.^a Ns and percentages are distributions of each life course factor across smoking categories (row percentages).

Characteristics	Never Smoker 156 (34.1%)	Former Smoker 127 (27.8%)	Current Smoker 174 (38.1%)	<i>p</i> -value
First Grade (N=457)				
Poverty (100% or more below Federal level)	77 (32.6%)	58 (24.6%)	101 (42.8%)	<i>p</i> =0.082
Mother not a high school grad	84 (33.6%)	63 (25.2%)	103 (41.2%)	<i>p</i> =0.280
Academic achievement: fair/unsatisfactory math grade	68 (32.2%)	48 (22.7%)	95 (45.0%)	<i>p</i> =0.006
Moved 3 or more times from birth to age 6	60 (35.9%)	39 (23.4%)	68 (40.7%)	<i>p</i> =0.297
Adolescence (N=280)				
Poverty (100% or more below Federal level)	61 (33.2%)	53 (28.8%)	70 (38.0%)	<i>p</i> =0.958
Academic achievement: mean std math grade, std dev	90.7, 11.0	91.5, 14.0	86.5, 11.8	<i>p</i> =0.003
School bonds:				
High	44 (37.0%)	40 (33.6%)	35 (29.4%)	<i>p</i> =0.074
Medium	29 (35.4%)	16 (19.5%)	37 (45.1%)	
Low	23 (31.1%)	18 (24.3%)	33 (44.6%)	
Parental supervision low for smoking, substance use	46 (28.6%)	38 (23.6%)	77 (47.8%)	<i>p</i> <0.001
Mother is a regular smoker	48 (35.6%)	26 (19.3%)	61 (45.2%)	<i>p</i> =0.012
Young Adulthood (N=382)				
Poverty (100% or more below Federal level)	37 (25.5%)	27 (18.6%)	81 (55.9%)	<i>p</i> <0.001
Moved 3 or more times in the past 5 years	27 (28.7%)	27 (28.7%)	40 (42.6%)	<i>p</i> =0.071
Marital status:				
Married/living as married	47 (35.9%)	47 (35.9%)	37 (28.2%)	<i>p</i> =0.009
Sep/Div/Widowed	36 (37.1%)	18 (18.6%)	43 (44.3%)	
Never married	54 (30.7%)	44 (25.0%)	78 (44.3%)	
Church attendance less than every 2 weeks	30 (22.4%)	38 (28.4%)	66 (49.3%)	<i>p</i> =0.001
Mid Adulthood				
(N=457) Educational attainment:				
Any college	93 (41.2%)	76 (33.6%)	57 (25.2%)	<i>p</i> <0.001
Diploma or GED	50 (32.3%)	34 (21.9%)	71 (45.8%)	
No diploma or GED	12 (16.2%)	17 (23.0%)	45 (60.8%)	

^a Chi square analysis for categorical data and oneway ANOVA for one continuous variable (math achievement standardized score in adolescence)

Table 3

Odds of former and current smoking by indicators of disadvantage and social capital across the life course among women in the Woodlawn Study^a

	Former Smoker vs Never Smoker Odds Ratio (95% CI)	Current Smoker vs Never Smoker Odds Ratio (95% CI)	Current Smoker vs Former Smoker Odds Ratio (95% CI)
First Grade			
Poverty index ≤100% (0=no, 1=yes)	0.84 (0.51–1.39)	1.07 (0.65–1.76)	1.27 (0.76–2.14)
Academic performance (0=A/B, 1=C/D)	0.91 (0.51–1.65)	1.45 (0.84–2.53)	1.59 (0.87–2.91)
Adolescence			
Mother is a regular smoker (0=no, 1=yes)	0.63 (0.35–1.16)	1.15 (0.63–2.09)	1.81 (1.05–3.13) [*]
School bonds (0=High)	reference	reference	reference
Medium	0.82 (0.42–1.62)	1.37 (0.64–2.91)	1.66 (0.77–3.59)
Low	0.83 (0.39–1.77)	1.04 (0.41–2.66)	1.25 (0.55–2.87)
Parental supervision smoking, substance use (0=high, 1=low)	1.39 (0.74–2.61)	2.79 (1.64–4.75) ^{***}	2.00 (1.07–3.74) [*]
Academic performance (higher=better)	1.00 (0.98–1.03)	1.00 (0.97–1.03)	1.00 (0.97–1.03)
Young Adulthood			
Poverty index ≤100% (0=no, 1=yes)	0.74 (0.33–1.64)	1.21 (0.57–2.57)	1.65 (0.84–3.23)
Marital status: (0=Married, living as married)	reference	reference	reference
Separated/Divorced/Widowed	0.47 (0.22–1.01) [†]	0.93 (0.46–1.85)	1.95 (0.92–4.13) [†]
Never Married	0.83 (0.44–1.56)	1.23 (0.65–2.33)	1.48 (0.76–2.91)
Church attendance (0=frequent, 1=less)	1.93 (1.08–3.46) [*]	2.60 (1.49–4.54) ^{***}	1.34 (0.78–2.31)
Mid Adulthood			
Educational attainment: (0= Any college)	reference	reference	reference
Diploma or GED	1.01 (0.56–1.82)	1.97 (1.12–3.48) [*]	1.95 (1.05–3.63) [*]
No diploma or GED	2.59 (0.96–6.98) [†]	4.32 (1.76–10.61) ^{***}	1.66 (0.69–4.04)

[†]
p<.10

^{*}
p<.05

^{**}
p<.01

^{***}
p<.001

^a Multinomial, multivariate logistic regression using multiple imputations (STATA ICE module) to account for missing data (overall N=457).