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Educational inequalities in smoking: The role of initiation versus quitting

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ABSTRACT

The existing literature on educational inequalities in adult smoking has focused extensively on differences in current smoking and quitting, rather than on differences in never smoking regularly (initiation) by education in the adult population. Knowing the relative contribution of initiation versus quitting is critical for understanding the mechanisms that produce educational gradients in smoking because initiation and quitting occur at different points in the life course. Using data from 31 waves of the U.S. National Health Interview Survey (N = 587,174), the analyses show the relative likelihood of being a never versus former smoker by education, sex, and age from 1966 to 2010 and for birth cohorts from 1920 to 1979. The analyses also describe differences in the cumulative probability of quitting over the life course, and the role of initiation versus quitting in producing educational gaps in smoking. The results show that educational gaps in never smoking explain the bulk of the educational inequality in adult smoking. Differences in former smoking play a small and decreasing role in producing these gaps. This is true across the life course, whether measured at age 25 or age 50, and for both men and women. While the prevalence and age patterns of former smoking by education converge across birth cohorts, differences in never smoking by education increase dramatically. At the population level, educational gaps in adult smoking are produced by the combination of inequalities in initiation and quitting, with differences in initiation playing a larger role in producing the observed gaps. The portion of the gap explained by differences in quitting is itself a function of educational differences in initiation. Thus, educational gradients in adult smoking are tethered to experiences in adolescence. These findings have important implications for both understanding and addressing disparities in this important health behavior.

Introduction

Smoking is the leading behavioral cause of death in the United States, with smoking-related illnesses accounting for nearly 20% of all deaths each year (Centers for Disease Control and Prevention (CDC), 2008). Given this toll, educational disparities in smoking represent one of the deadliest examples of social inequalities in health. In 2009, about a quarter of those with high school or less completed were current smokers compared to 20% of those with an associate degree, 11% of those with an undergraduate degree, and 5.6% of those with a graduate degree (CDC, 2010). Data from retrospective smoking histories, however, suggest that this pattern of smoking by education has changed dramatically over time (de Walque, 2010). The retrospective data suggest that, before the 1950s, smoking rates were relatively high among all education groups. Then, as information about the negative health effects of smoking diffused in the research literature and media, smoking rates declined for all education groups, but dropped especially rapidly for college graduates. Over the next 30 years, declines in smoking among college graduates outpaced those of other education groups, and a large educational gradient in smoking emerged (Gilpin & Pierce, 2002; Pampel, 2005, 2009; Pierce, Fiore, Novotny, Hatziandreu, & Davis, 1989; de Walque, 2010).

A large and multidisciplinary literature has examined trends in these educational inequalities in smoking. The existing literature has focused nearly entirely on differences in current smoking and quitting by education (Escobedo & Peddicord, 1996; Fiore et al., 1989; Garfinkle, 1997; Gilpin & Pierce, 2002; Pampel, 2005, 2009; Pierce et al., 1989; Reid, Hammond, Boudreau, Fong, & Siahpush, 2010; Sander, 1995a, 1995b; Smith & Fiore, 1999; de Walque, 2007, 2010). Very few studies, however, have examined the role of never smoking (initiation) in explaining educational gradients in adult smoking (Fiore et al., 1989; Pierce et al., 1989). This is an important gap in the literature because differences in smoking

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prevalence are a function of both differences in quitting and differences in smoking initiation (Fiore et al., 1989).

The causal pathways between education and smoking are both complicated and contested in the literature. Numerous confounding factors might produce the observed association between education and smoking. These factors might include differences in time preferences, aspirations, friends and social networks, risk preferences, and cognitive and noncognitive skills (Cutler & Lleras-Muney, 2010; Farrell & Fuchs, 1982; McDade et al., 2011; Tenn, Herman, & Wendling, 2010; U.S. Department of Health and Human Services, 2012; de Walque, 2010). The relationship between schooling and never smoking is even more difficult to disentangle. Never smoking regularly is a function of smoking initiation, which is a status that is determined early in life, most often in adolescence. Individuals who have never smoked regularly by age 20 have a very low likelihood of smoking at a later age (Chassin, Presson, Rose, & Sherman, 1996; Chen & Kandel, 1995; Lanz, 2003). This means that never smoking regularly is a status that is predominantly determined before education is completed. In contrast, current smoking and quitting are behaviors that occur across the life course (Gilpin & Pierce, 2002).

Whatever the underlying relationships, never smoking regularly plays an important but understudied role in the relationship between education and adult smoking. First, as the prevalence of current smoking decreases, the prevalence of never and former smoking increases. Thus, educational inequalities in current smoking are linked to inequalities in never and former smoking. An important but currently unanswered question is: how much of the educational gap in current smoking is explained by differences in never smoking (initiation) versus former smoking (quitting)? Second, differences in quitting can only explain educational gradients in smoking when the share of ever smokers is large for all education groups. But as the fraction of never smokers among the highly educated grows, the fraction of those who have ever smoked shrinks. As a result, differential quit ratios, no matter how large, apply to a shrinking part of the population, at least for the highly educated. The analyses below demonstrate this point both mathematically and empirically.

The current study examines the contribution of educational differences in never smoking regularly to educational gradients in adult smoking. The analyses examine differences in never smoking and quitting across the life course and trends in these patterns over time and by birth cohort. The analyses also describe the relative role of initiation versus quitting in explaining educational inequalities in smoking. The study shows that educational gradients in current smoking and quitting are tethered to educational inequalities in never smoking regularly (initiation). This has important implications both for understanding the potential mechanisms linking education and smoking and where in the life course inequalities in this important health behavior emerge.

Data & methods

Data

The analyses use data from 31 waves of the U.S. National Health Interview Surveys (NHIS) from 1966 to 2010 (CDC, 2012). Samples from each individual year are cross-sectional, large, and representative of the non-institutionalized civilian population of U.S. residents. The NHIS samples households. From each household, the NHIS collects a limited set of information on all household members and conducts detailed interviews with one randomly selected adult and child member. NHIS interviews are conducted in person, and the survey has an annual response rate of nearly 90% of eligible households sampled. Ethics approval was not required because these data are de-identified and in the public domain, and the author has no access to any private or identifying information on the respondents.

The survey waves containing both education and smoking information are numerous but not contiguous (1966, 1970, 1974, 1976–1980, 1983, 1985, 1987, 1988, 1990–1992, 1994, 1995, 1997–2010). These 31 data waves provide an overall sample of 587,394 individuals age 25–59. The smallest year-specific sample is from 1980 ($N = 6156$) and the largest is from 1966 ($N = 54{,}465$). Twenty of the 31 waves also contain data on when individuals started and quit smoking (1978–1980, 1987, 1988, 1995, 1997–2010). Using these smoking histories, one can determine the age-specific smoking status of individuals for a set of birth cohorts from the 1920s through the 1970s.

In the analyses that follow, education is categorized in levels, using either a four level grouping (0–11, 12, 13–15, and 16+ years completed) or as a college degree versus less than college completed dichotomy. The college degree dichotomy describes the predominant pattern of educational inequalities in smoking in the U.S. (Pampel, 2009; Pierce et al., 1989; de Walque, 2010). This dichotomy also helps with two other limitations of the more detailed categories. First, in recent decades, the lowest education category (0–11 years) has increasingly become a heterogeneous mix of immigrants and native-born adults with quite different smoking patterns (Pampel, 2009). Second, the education distribution in the U.S. has increased dramatically in the past 50 years, which means that the lowest education group has become increasingly negatively selected over time. The college degree dichotomy helps address both these compositional concerns.

The most consistent way to measure smoking across the survey waves is to use a question asking if the respondent has smoked at least 100 cigarettes. This question is available in nearly all waves. When it was not asked, the survey instead asked respondents to categorize themselves as present, former, or never smokers. For consistency, the analyses use the 100 cigarette question whenever possible and the answer to this latter question when the former was not asked. In the analyses below, smokers are defined as those who report having smoked at least 100 cigarettes in their lifetime and respond “yes” to smoking at the time of the survey. Former smokers are those who have smoked at least 100 cigarettes but respond “no” to smoking currently. Never smokers are defined as those who have not smoked 100 cigarettes or more and are not smoking at the time of the survey. The analyses do not control for the frequency of smoking among current and former smokers because this information is not consistently available in all data waves. Using the data on current and former smokers, I compute the probability of quitting as the ratio of former smokers to ever smokers for a given group, cohort, or period.

All analyses use the NHIS year-specific probability weights to adjust for the sampling design and produce results that generalize to the U.S. population. Overall, the data are quite complete. Education and smoking status are missing for 1% and 1.7% of the sample, respectively. In the waves containing smoking histories, age of smoking initiation is missing for 3.7% of ever smokers. Age of smoking cessation is missing for 3.1% of former smokers. Respondents with missing values on key variables are deleted from the analysis.

Samples are restricted to individuals age 25–59 to capture completed schooling at the younger cutoff and reduce biases produced by differential mortality by education and smoking status at older ages. Analyses are estimated separately for men and women because smoking prevalence differs considerably by sex, both in levels and patterns over time (Fiore et al., 1989). All analyses are also disaggregated by age because smoking behavior changes over the life course and these life course patterns may show inequalities by education as well. Smoking patterns bear a strong birth cohort imprint (Harris, 1983; de Walque, 2010). A cohort pattern is