Cohort changes in educational disparities in smoking: France, Germany and the United States

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ABSTRACT

This study investigates the evolution of educational disparities in smoking uptake across cohorts for men and women in three countries. Nationally representative surveys of adults in France, Germany and the United States in 2009–2010 include retrospective measures of age of uptake that are compared for three cohorts (born 1946–1960, 1961–1975, and 1976–1992). Discrete logistic regressions and a relative measure of education are used to model smoking histories until age 34. The following patterns are found: a strengthening of educational disparities in the timing of uptake from older to younger cohorts; an earlier occurrence of the strengthening for men than women and for the United States than France or Germany; a faster pace of the epidemic in France than in the United States, and; a divide between the highest level of education and the others in the United States, as opposed to a gradient across categories in France. Those differences in smoking disparities across cohorts, genders and countries help identify the national and temporal circumstances that shape the size and direction of the relationship between education and health and the need for policies that target educational disparities.

As a major determinant of chronic disease and premature mortality, tobacco use remains central to individual and population health. The WHO estimates that in 2004 25% of male deaths and 7% of female deaths in the European region and 23% of deaths for both men and women in the United States came from tobacco use (WHO, 2012). Smoking and exposure to tobacco smoke harms people at all ages, causing respiratory diseases during childhood, increased cardiovascular disease in middle age, and higher rates of cancer at older ages. It remains the leading risk for disease in high-income North America and Western Europe (Lim et al., 2012).

Given its importance for health, the substantial decline in the prevalence of tobacco use in Western Europe, the United States, and many other countries throughout the world has been encouraging (Fiori and Baker, 2009) and in part reflects the success of anti-tobacco campaigns and public health programs (Joossens and Raw, 2006; Wilson et al., 2012). At the same time, smoking has increasingly become concentrated among lower socioeconomic status (SES) groups in high-income nations (Cavelaars et al., 2000; Giskes et al., 2005; Huisman et al., 2005; Pampel, 2002a). Of particular importance, the decline in smoking has occurred fastest among high educational groups, thus widening the gap with lower educational groups and contributing to growing educational disparities in mortality more generally (Jha et al., 2006). Widening inequality in tobacco use and its harm present a public health problem in protecting those who can least afford its financial or health costs.

Educational disparities in smoking reflect the lack of resources among disadvantaged groups but involve a diverse set of mechanisms (Cutler and Lleras-Muney, 2010). The fewer resources of disadvantaged groups produce a set of cumulative consequences: they increase stress that makes smoking an attractive coping strategy, limit access to health information, give groups with high mortality risks overall less incentive to avoid the harm of smoking, are associated with more limited time horizons, reduce the social capital available for help in avoiding smoking, and make it harder to

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quit (Pampel et al., 2010). Yet, arguments for these mechanisms involve more in the way of theorizing than empirical evidence.

Macro-level variation across time and nations in the size and direction of disparities in smoking may give some insight into the relationship between education and health. Rather than an invariant feature of populations that consistently reflects the advantages of having more resources, educational disparities show surprising diversity. Even among nations with similarly high income, education is sometimes associated with greater rather than lower smoking (Huisman et al., 2005). This variation implies that the resources of highly educated groups can be used for unhealthy as well as healthy activities and that the risks to populations with low education can change substantially.

A framework based on the concepts of a smoking epidemic and diffusion of innovations has been used to make sense of cross-national and temporal variation in the relationship between education and tobacco use. The epidemic model of smoking (Lopez et al., 1994; Thun et al., 2012) posits a four-stage process of population change in tobacco use and associated mortality. The epidemic involves an initial but slow rise in smoking prevalence (stage 1) that is followed by a rapid rise in prevalence and a growing number of smoking-related deaths (stage 2). With the increase in smoking-related deaths, smoking prevalence begins to drop (stage 3), and continues to drop in larger numbers (but not disappear altogether), eventually reducing smoking-related deaths (stage 4). Perhaps because of gender inequality, traditional restrictions on activities of women, and ascription to gendered social roles and behaviors (Amos and Haglund, 2000), males adopt cigarettes first and females are affected by the epidemic of smoking after a lag (Harman et al., 2006; Pampel, 2002b).

To extend the epidemic model and account for variation by SES, a diffusion of innovations mechanism can be posited to underlay the patterns of change (Mackenbach et al., 2004). The temporal process begins with adoption of smoking by innovative, high SES groups, which tend in general to be the first to use innovations (Rogers, 2003). Diffusion of the innovation to lower SES groups follows, which tends to eliminate the initial positive SES-smoking gradient. A later innovation, rejection of smoking and adoption of healthy behaviors, again begins with high SES groups and leads to the initial emergence and subsequent growth of a negative SES-smoking gradient in the most recent decades. Thus, a positive SES gradient in smoking at the very early stages of the epidemic is replaced by a weak gradient and later by a negative gradient at the latest stages of the epidemic (van der Heyden et al., 2009). Although it will take many more decades (Fiori and Baker, 2009), rejection of smoking may eventually diffuse throughout the population.

In this paper, we use a comparative approach to examine patterns of cohort change in smoking uptake by education across France, Germany, and the United States, three nations with different histories of tobacco use and policy contexts. The approach is used to address three questions: How does the educational gradient evolve across cohorts? Do the cohort-based changes vary for men and women? And do the patterns of change vary across nations? Previous studies have described the overall pattern of change in the epidemic but have done less to understand how it varies across contexts. In answering our questions, we add to the literature by considering country differences in the timing of the epidemic, the speed of change, and the structure of the educational inequality. Better describing the country-specific evolution of the smoking epidemic can improve the understanding of the relationship between education and health. Attending to the macro determinants of the relationship complements the more typical study of individual-level characteristics and can give some insight into the policies needed in different contexts to reduce disparities.

1. Study framework

The temporal pattern of change posited by the epidemic and diffusion model implies variation across cohorts, genders, and countries. The adoption of smoking is strongly influenced by cohort membership and the smoking environment at the time a cohort reaches late adolescence and early adulthood (Preston and Wang, 2006). High education groups appear more likely to take up the habit when it is relatively rare but reject the habit when it is relatively common, whereas low education groups tend to do the opposite (Legleye et al., 2011a; Pampel, 2005). Hence, older cohorts should show a weak positive SES-smoking gradient and, reflecting a reversal in the direction of disparities, newer cohorts should show a strong negative SES-smoking gradient. Moreover, since women tend to adopt smoking later than men, the cohort shift in the gradient should occur more recently among females than males.

Arguments about the diffusion of tobacco use apply to both uptake dynamics and cessation dynamics as contributors to smoking prevalence inequalities. However, the two processes differ substantially, with cessation proving more difficult and requiring more resources than initiation. Although educational disparities in cessation are strong (Reid et al., 2010), initiation is an important contributor to the patterns of educational inequality in adult smoking (Maralani, 2013). Despite calls for more study of initiation (Schaap and Kunst, 2009), however, most studies examine disparities in uptake for one nation (e.g., (Legleye et al., 2011a; Schulze and Mons, 2006)). We focus on cross-national comparisons of the timing of initiation, an event that precedes cessation in temporal order and provides a context for other studies of the timing of cessation.

The focus on initiation across cohorts, genders, and nations adds to the more typical study of educational disparities in smoking prevalence. Studies of prevalence find greater disparities among younger than older cohorts in single nations (e.g. Pampel, 2005) and in international comparisons (Cavelaars et al., 2000; Giskes et al., 2005; Huisman et al., 2005; Pampel, 2002). While prevalence mixes initiation and cessation, measures of the age of initiation capture additional information on timing.

Cross-national studies of smoking typically rely on education as a measure of socioeconomic position (Cavelaars et al., 2000; Giskes et al., 2005; Huisman et al., 2005), as education more strongly predicts smoking than income or occupation (Barbeau et al., 2004). Since smoking begins early in life, uptake should be more influenced by success in school, academic goals, and completed education than by later occupational and income attainment. While education remains stable for most after young adulthood, occupation and income change greatly over the life course and are less easily measured for those not working. Further, the International Standard Classification of Education (ISCED) allows for meaningful comparisons across nations (UNESCO, 2006).

2. Research hypotheses

Specific hypotheses may be formulated in relation with the relative degree of advancement in the epidemic of the three countries subjected to comparison.

1. Timing of emergence of a negative gradient and size of disparities.

Based on the timing of the smoking epidemic, countries differ in cohort changes in smoking disparities (van der Heyden et al., 2009). The sooner the epidemic begins in a country, the farther it advances over time and the larger the disparities will be. Given its location as a source of tobacco farming, the invention of machines to mass