

A Cross-Country Analysis of Tobacco Control Policies
and Smoking Over the Life-course

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ABSTRACT: We adopt a life-course perspective to study smoking behavior in Great Britain, Russia, and the United States. Given their different mixes of policies, it is intriguing that the cross-sectional prevalence of smoking in Great Britain and the U.S. is similar, while in Russia men's smoking rates are very high. Our results reveal other similarities and differences that are not apparent in cross-sectional data. For example, we find that the timing of smoking initiation is very similar in most cohorts across the three countries. Another interesting pattern is that the very high smoking prevalence among cohorts of Russian men reflects both high smoking initiation and an almost total lack of smoking cessation. Future research is needed to address a host of questions about the determinants of life-course smoking behavior, including the separate impacts of tobacco control policies on initiation and cessation.

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1. INTRODUCTION

The World Health Organization [WHO] (1999) predicts that worldwide mortality from tobacco is likely to rise from about four million deaths a year in 1998 to about 10 million deaths a year by 2030. Although much of this increase will occur in low income countries (Murray and Lopez, 1996), the large stock of current smokers in both the formerly socialist economies and the established market economies makes smoking a continuing and critical public health issue worldwide. The European Partnership to Reduce Tobacco Dependence (2001) warns that "Unless more is done to help the 200 million European adult smokers stop, the result will be 2,000,000 European deaths a year by 2040."

Previous public health research on smoking prevalence and health economics research on cigarette demand has usually relied on cross-sectional data that provides an incomplete picture of the impact of public policies on life-course smoking. The current rate of smoking and current cigarette demand reflect the accumulated history of youth initiation and adult cessation decisions. For example, the current smoking prevalence in a population may be due to a high youth smoking initiation rate combined with a high adult smoking cessation rate or a lower but steadier pattern of life-course smoking. To complicate the picture, successive birth cohorts appear to follow different life-course smoking patterns of initiation and cessation. From a public policy perspective, it is important to understand whether and how policies have separately influenced smoking initiation and cessation decisions.

In this paper, we depart from the standard cross-sectional approach and instead present evidence to illustrate the power of adopting a life-course perspective to study smoking behavior. We use retrospective measures of life-course smoking from comparable longitudinal data sets from three countries: Great Britain, the Russian Federation, and the U.S. With these data, we

can separate initiation and cessation decisions and investigate life-course smoking behavior under different mixes of tobacco control policies over long periods of time. This long time period is especially valuable because the tobacco control policies differ substantially within and across the three countries we study.

In the rest of the paper, we first summarize available information on tobacco control policies in each country and discuss the implications for research on life-course smoking. We then introduce the data and present illustrative results about life-course smoking behavior. After noting basic similarities and differences in smoking prevalence rates across the three countries, we explore the similarities and differences in smoking initiation and cessation behavior. The last section concludes with a brief discussion of priorities for future research.

2. TOBACCO CONTROL POLICIES

In this section, we broadly review four categories of tobacco control policies in Great Britain, the Russian Federation and the U.S.: prices and taxation; legal restrictions on advertising and sales; direct restrictions on smoking in public places; and regulation of smoking cessation products. The information is mainly taken from the *Tobacco Control Country Profiles* project (Corrao *et al.* 2000), supplemented by other sources.

Prices

Figure 1 shows trends in the relative price of cigarettes in Great Britain and the U.S. since 1955. In both Great Britain and the U.S. cigarette prices have increased fairly steadily since about 1980. Although we do not have historical price data for the Russian Federation, in 2001 the price of cigarettes was far lower there than in the other two countries. In 2001 the price of cigarettes ranged from a low of \$0.98 in Russia to a high of \$6.24 in Great Britain with the US price in between at \$3.71 (Guindon *et al.*, 2002). Most of the cross-country and inter-temporal

differences in the price of cigarettes reflect differences in the excise taxes imposed on cigarettes. The U.S. price also includes a surcharge of about \$0.45 per pack to cover the cost of the 1998 legal settlement between the tobacco industry and the States' Attorneys General.

Because average wages are so much lower in the Russian Federation than in the U.S., the relative ranks of these countries reverse when one assesses tobacco affordability by examining how many minutes of labor are required to purchase a pack of cigarettes. Guindon *et al.* (2002) estimate that to buy a pack of Marlboros a smoker earning an average wage must work 71 minutes in the Russian Federation, 40 minutes in Great Britain, and 17 to 20 minutes in the U.S.

Restrictions on Advertising and Sales

All three countries restrict when and how cigarettes may be advertised and to whom they may be sold. Great Britain and the United States completely ban television and radio advertising of cigarettes; Great Britain's ban has been in place since 1964 and the U.S. ban has been in place since 1971. In 1995, Russia enacted a ban on advertising on television from 07:00 to 22:00. Russia has subsequently enacted a complete ban on television advertising, and partially restricts radio advertising. All three countries also require that print advertisements include a health warning. In Great Britain the warning must cover 20 percent of the total advertising area; in Russia the warning must cover at least five percent of the advertisement's surface.

All three countries further require health warnings directly on tobacco packaging. Great Britain adopted the European Union directive on labeling, but adopted a stronger requirement that the health warnings on cigarette packs to cover a minimum of four percent of the surface on which they were printed. Russia requires domestically produced cigarettes to carry a health warning label, but labels are not required on imported cigarettes. The U.S. requires that cigarette packages display one of four rotating health warning labels.

Although all three countries prohibit the sale or distribution of cigarettes to minors, the effectiveness of these bans has been questioned. For example, Townsend (1998, p. 189) observes that underage sales in Great Britain are “widespread,” and WHO (1997, p. 373) notes that Russia’s ban on sales to minors “is reportedly not enforced.” Until recently, many observers felt there was lack of enforcement in the U.S. as well. Recent policy initiatives in all three countries have sought to make the bans more effective. One step to increase the effectiveness of bans of sales to minors is to regulate or ban cigarette vending machines. In Great Britain, owners of vending machines are required to prevent the machine from being used by persons under the age of 16. Russia now bans vending machines completely. In the U.S., 41 States and DC place some restrictions on vending machine sales, and 19 States and DC ban vending machines in areas available to minors (Rigotti 2001, p. 152).

Direct Restrictions on Smoking in Public Places

The Russian Federation and the U.S. ban smoking in workplaces and many other public places, but Great Britain does not. The Russian bans were enacted between 1996 and 1999. In the U.S., most States enacted “indoor clean air laws” in the late 1980s and early 1990s. As of 2000, half of the States restrict smoking in private workplaces, 42 States restrict smoking on public transportation, and 35 States restrict smoking in restaurants (Jacobson and Zapawa 2001, Table 8.1).

Regulation of Smoking Cessation Products

Although smoking cessation products are available in all three countries we study, the availability of these products varies substantially. The U.S. restricts the sale and advertising of smoking cessation products least. For example, in the U.S. nicotine gum and nicotine patches are allowed to be sold over-the-counter. In Great Britain 2 mg nicotine gum is available over-

the-counter, while 4 mg nicotine gum and the nicotine patch are available only in pharmacies (“behind the counter”). In Russia nicotine gum and patches are available only in pharmacies or by prescription. Advertising of nicotine gum and nicotine patches is allowed in all three countries. Bupropion, originally marketed as an anti-depressant but later marketed as a smoking cessation therapy, is available only by prescription in the U.S. and the U.K.; its status in Russia is not reported in Corrao *et al.* (2000). Only the U.S. allows Bupropion to be advertised as a smoking cessation therapy.

Although smoking cessation products are more easily available in the U.S, they apparently cost more. Novotny *et al.* (2000, Table 12.4) report that, in 1996, three months of nicotine replacement therapy in the form of nicotine patches cost consumers from \$213 to \$235 in Great Britain, and \$400 to \$472 in the U.S. Three months of nicotine gum cost consumers \$163 to \$175 in Great Britain, and \$441 to \$745 in the U.S. Estimates of the cost of smoking cessation products in Russia are not available from Novotny *et al.*

Implications for Research on Life-Course Smoking Behavior

The cross-country and inter-temporal variation documented above creates a rich set of natural or quasi-experiments to study the impact of tobacco control policies on smoking. We suggest that researchers will learn more if they analyze smoking behavior in a life-course framework using longitudinal rather than cross-sectional data because cross-sectional data can not shed light on all of the ways tobacco control policies may affect smoking rates. A standard cross-sectional specification of cigarette demand uses a two-part model, where the first part is a model of smoking participation and the second part analyzes consumption conditional upon participation (e.g., Wasserman *et al.* 1991, Evans, Farrelly and Montgomery 1999). Moore (2001) points out that this specification lumps never-smokers and former-smokers together into a

single, non-smoking group. Moore demonstrates that this mis-specification can lead to serious errors in inference. For example, Evans, Farrelly and Montgomery (1999) claim to find strong evidence that worksite smoking bans reduce smoking prevalence. Moore's re-analysis of the same data reveals that there is a strong positive relationship between worksite smoking bans and never smoking among older workers, even though they made their smoking decisions long before the bans were introduced. Similar criticisms could be made of cross-sectional research on the impact of prices and other tobacco control policies. A life-course approach is needed to distinguish the impact of policies on smoking initiation from the impact of policies on smoking cessation.

3. DATA - SMOKING BEHAVIOR

Overview of the Longitudinal Data Sets

Our measures of smoking behavior are from generally comparable longitudinal surveys conducted in Great Britain, the Russian Federation and the U.S. The British Household Panel Survey (BHPS) is an annual survey that began in 1991 with a nationally representative sample of more than 5,000 households in Great Britain. For a more complete discussion of the BHPS data see Taylor et al. (1996). The Russia Longitudinal Monitoring Survey (RLMS) is a series of nationally representative surveys of households and individuals in the Russian Federation, begun in 1992 and running through 2000 (Zohoori, *et. al* 2001). Unlike the other data we use, the RLMS collects information from a physical household instead of following all individuals who lived in a household in some base year. Because the RLMS surveys individuals living in the same physical location individuals who move exit the sample. For more details see www.cpc.unc.edu/projects/rlms. The Panel Study of Income Dynamics (PSID) began in 1968

with a sample of 5,000 U.S. households, representing a disproportionate number of low-income individuals. See Hill (1992) for an overview of the PSID.

Data on Life-Course Smoking Behavior

The BHPS, RLMS, and PSID ask respondents to report whether or not they smoke, the age at which they started smoking regularly and, for ex-smokers, the age when (or time since) they last smoked regularly. We use data from Wave 10 of the BHPS, when the retrospective questions provide fairly broad categorical measure of time since an ex-smoker last smoked regularly. In future work we will analyze data from Wave 12 of the BHPS, which will collect the exact age a person last smoked.

Using available data, we construct indicators of contemporaneous and life-course smoking behavior for respondents in each country. The contemporaneous smoking variable equals one if a respondent currently smokes and zero otherwise. To measure life-course smoking, we use each individual's retrospectively reported start and quit ages, calendar age (date of birth), and survey interview date to construct a series of variables that equal one in each calendar year (age) during which an individual smoked. Consider, for example, the life-course smoking history we construct for a 30 year old respondent to the 2000 survey of the RLMS. If the respondent reports that she started to smoke at age 10 and quit at age 25 then we know that she began smoking in 1980 and quit in 1995. Although a person may have started and stopped smoking one or more times between these two years, we label respondents as smokers in every intervening year. This assignment obviously masks temporary quits and so is not without its shortcomings. However, our research focuses on a highly significant outcome for public health – permanent smoking cessation (prolonged abstinence). Kenkel, Lillard and Mathios (2002a)

analyze in more detail the reliability and validity of retrospective information on smoking, and conclude that it is as useful as other commonly used data sources.

4. PATTERNS IN SMOKING BEHAVIOR

Life-Course Smoking Patterns

In Figures 2 – 7 we present evidence on life-course smoking behavior for different cohorts of men and women in Great Britain, Russia, and the U.S. The patterns point to a number of ways in which a life-course perspective sheds new light on smoking behavior. First, in almost all of the Figures it is clear that most smoking initiation occurs by the time people are in their early 20s. While this fact has been observed elsewhere, our analysis reveals striking similarities in the timing of smoking initiation across different cohorts of men and women across different countries. These different cohorts came of age under much different sets of tobacco control policies, suggesting that the *timing* of decisions to start smoking may often have little to do with policies. The main exception to the pattern is the youngest cohort of Russian women, who continued to initiate smoking at ages 21 through 30 (Figure 5).

Despite many similarities in the timing of smoking initiation, the rates of smoking initiation, and hence the prevalence of smoking at a given point in the life-course, vary more across gender, cohorts, and countries. British men initiate smoking at slightly higher rates than U.S. men. In both Britain and the U.S., the oldest cohort of men (Figure 4) initiated smoking at a higher rate than the younger two cohorts (Figures 2 and 3). Smoking initiation is much higher in all of the cohorts of Russian men than in their British or U.S. counterparts, and there does not seem to be any secular trend towards lower initiation rates. British women initiate smoking at a higher rate than U.S. women (Figures 5 – 7). In the older cohorts Russian women were less

likely to initiate smoking than in the other two countries, but smoking initiation by the youngest cohort of Russian women has caught up with the British (Figure 5). The variety of smoking initiation rates apparent in these data suggests the potential of extending several recent studies of smoking initiation in Germany (Bantle and Haisken DeNew 2002) and the U.S. (DeCicca, Kenkel, and Mathios 2002).

Smoking cessation rates also vary across gender, cohorts, and the three countries. Because smoking initiation is mainly so infrequent after the mid-20s, from that age on smoking cessation rates drive the trends in smoking prevalence in Figures 2 - 7. To bring the comparisons into sharper focus, Table 1 reports the average smoking cessation rates of Russian and U.S. men and women. (We can not calculate comparable rates for Britain because Wave 10 of the BHPS only provides a fairly broad categorical measure of time since an ex-smoker last smoked.)

As can be seen in the upper left hand quadrant of Table 1, smoking cessation rates among Russian men are very low, generally below 1 percent. There is a slight pattern for cessation rates to increase over the life-course, and a slight trend for higher cessation rates in the younger cohorts. In contrast, smoking cessation rates among U.S. men are generally in the range of 2 to 4 percent a year. These estimates compare well with the estimates of Mendez, Warner and Courant (1998), who use a much different method to estimate average smoking cessation rates in the U.S. Our estimates for U.S. men also show a strong life-course pattern, with cessation rates increasing at older ages. In addition, there is a strong time trend where at any given age, younger cohorts have higher smoking cessation rates.

From the lower two quadrants of Table 1, Russian and US women who smoke tend to be somewhat more likely to quit than their male counterparts. The life-course patterns of smoking cessation among Russian and US women are complex. There is some evidence that

smoking cessation increases first when women are in their late twenties and early thirties, and again later in the life-course. This perhaps reflects smoking cessation related to pregnancy. Kenkel, Lillard and Mathios (2002b) estimate that pregnancy substantially increases the probability of smoking cessation. A rich avenue for future research is to explore the role differences in policies, such as differences in restrictions on smoking or the regulation of cessation products, might play in explaining the observed differences in smoking cessation behavior in Russia and the U.S.

5. CONCLUSIONS

In this paper we illustrate the usefulness of a life-course approach to study smoking behavior in Great Britain, the Russian Federation and the U.S. Given the different mixes of tobacco control policies in these countries, it is intriguing to note that the cross-sectional prevalence of smoking in Great Britain and the U.S. is fairly similar, while in Russian smoking rates are very high for men but much lower for women (Corrao *et al.* 2000). Our results reveal other similarities and differences that are not apparent in cross-sectional data. For example, we find that the timing of smoking initiation is very similar in most cohorts across the three countries. Another interesting pattern is that the very high smoking prevalence among cohorts of Russian men reflects both high smoking initiation and an almost total lack of smoking cessation.

Future research is needed to address a host of questions about the determinants of life-course smoking behavior, including the separate impacts of tobacco control policies on initiation and cessation. Preliminary results from an analysis of data for a cohort of U.S. women suggest that higher cigarette prices, pregnancy, father's death due to a smoking-related illness, and race/ethnicity may be important factors in women's decisions to quit smoking (Kenkel, Lillard, and Mathios 2002b). The retrospective smoking information available or becoming available in

many long-running panel studies offers a perspective on smoking behavior that has rich possibilities. In the future we will use longitudinal data from Germany, Great Britain, the Russian Federation and the U.S. to construct and analyze lifetime smoking histories for multiple cohorts of men and women.

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Figure 1
Relative Prices of Cigarettes in the UK and US
(1980=100)

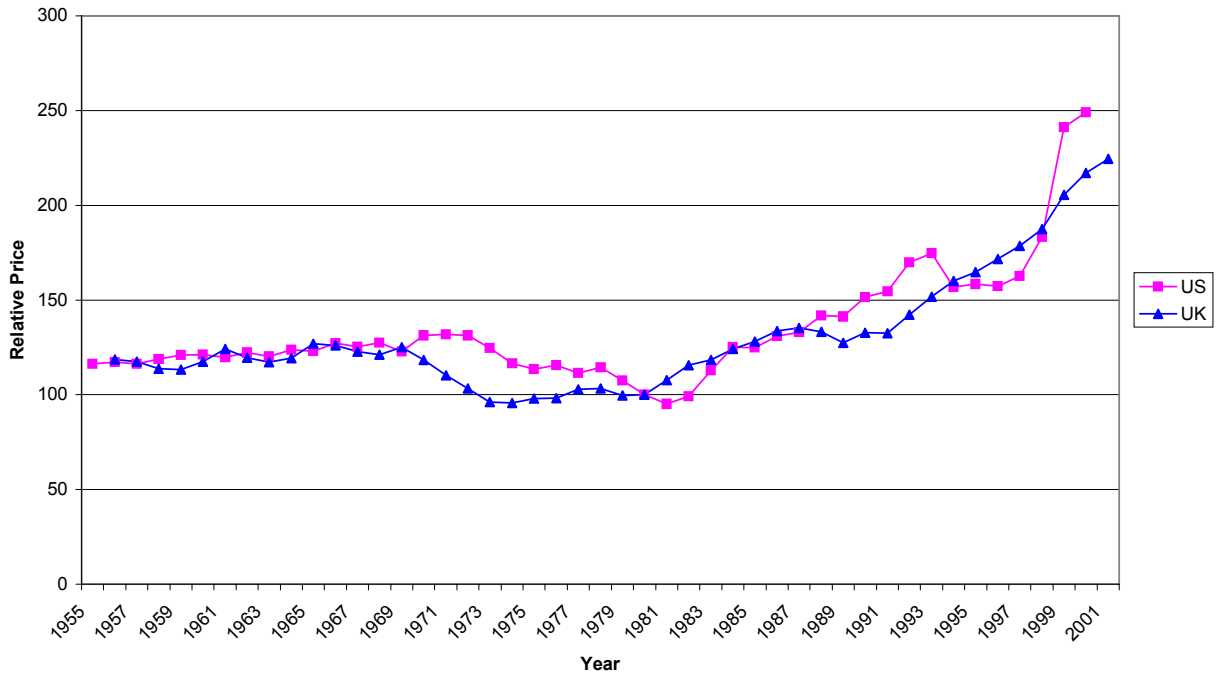


Figure 2
Life-course Smoking Prevalence of Men 21-30 in 1999,
by country

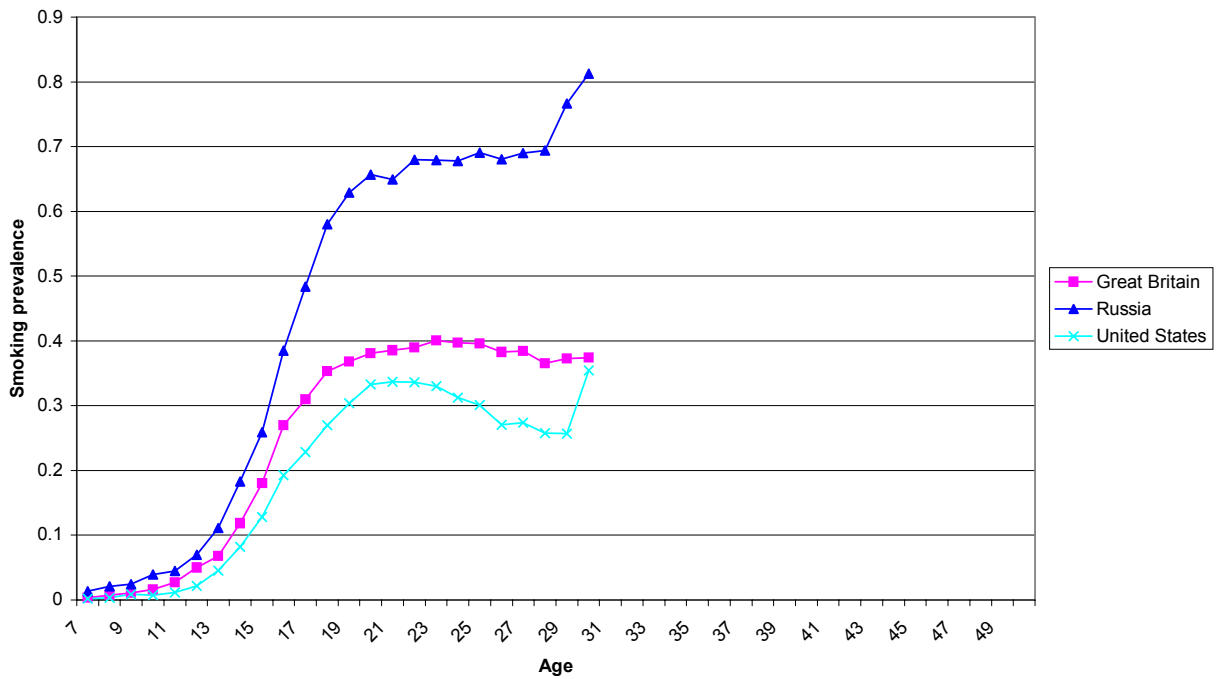


Figure 3
Life-course Smoking Prevalence of Men 31-40 in 1999,
by country

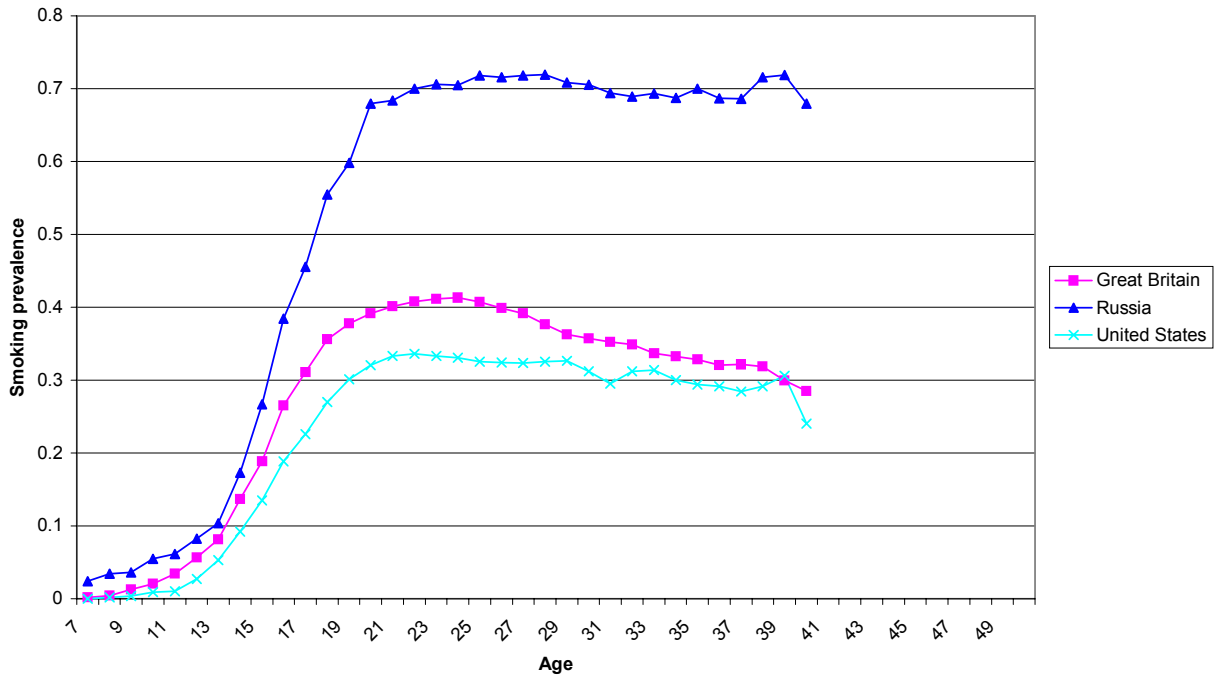


Figure 4
Life-course Smoking Prevalence of Men 41-50,
by country

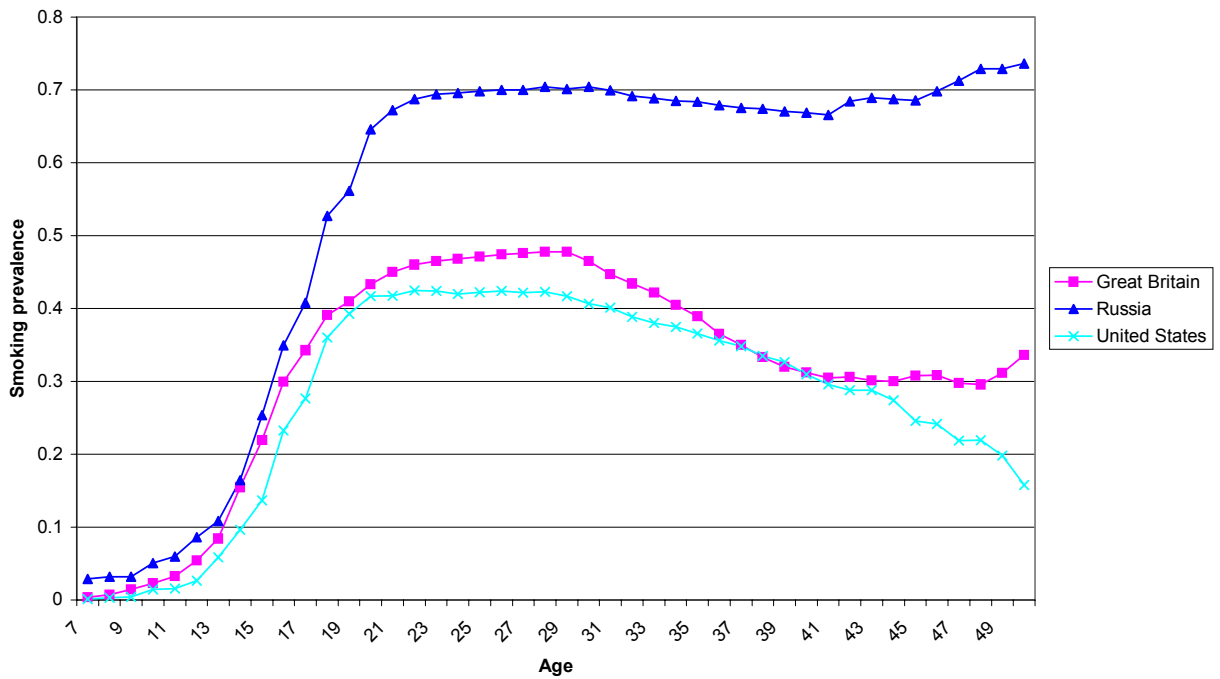


Figure 5
Life-course Smoking Prevalence of Women 21-30 in 1999,
by country

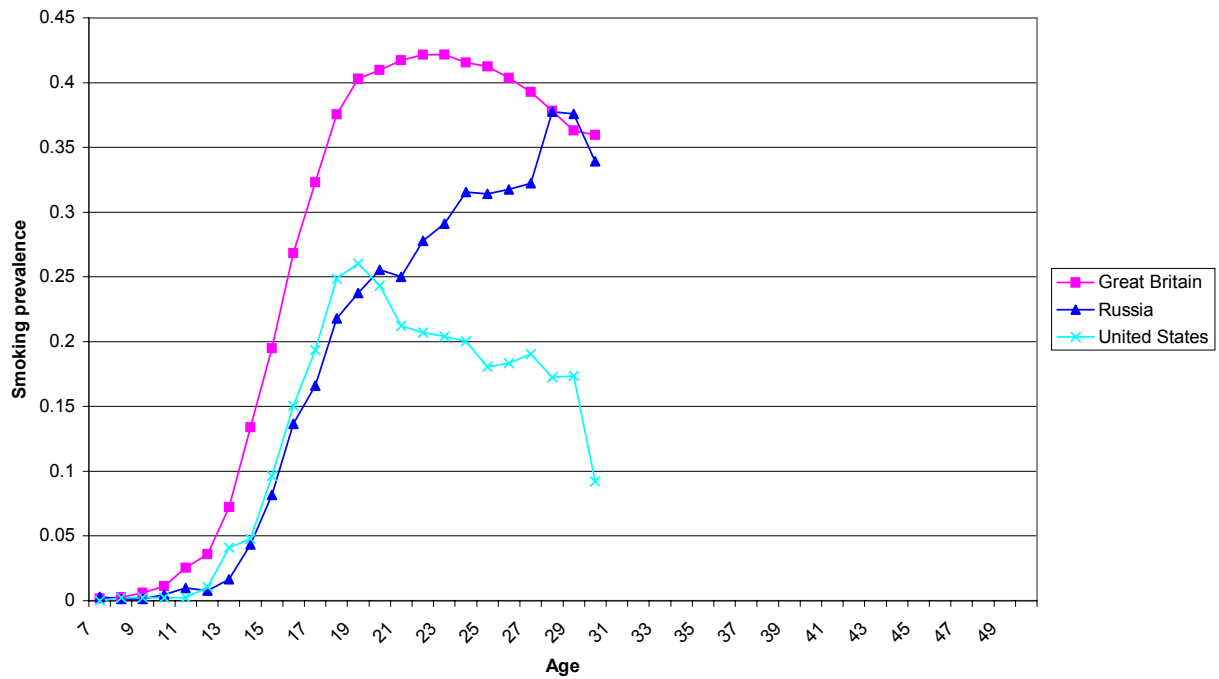


Figure 6
Life-course Smoking Prevalence of Women 31-40 in 1999,
by country

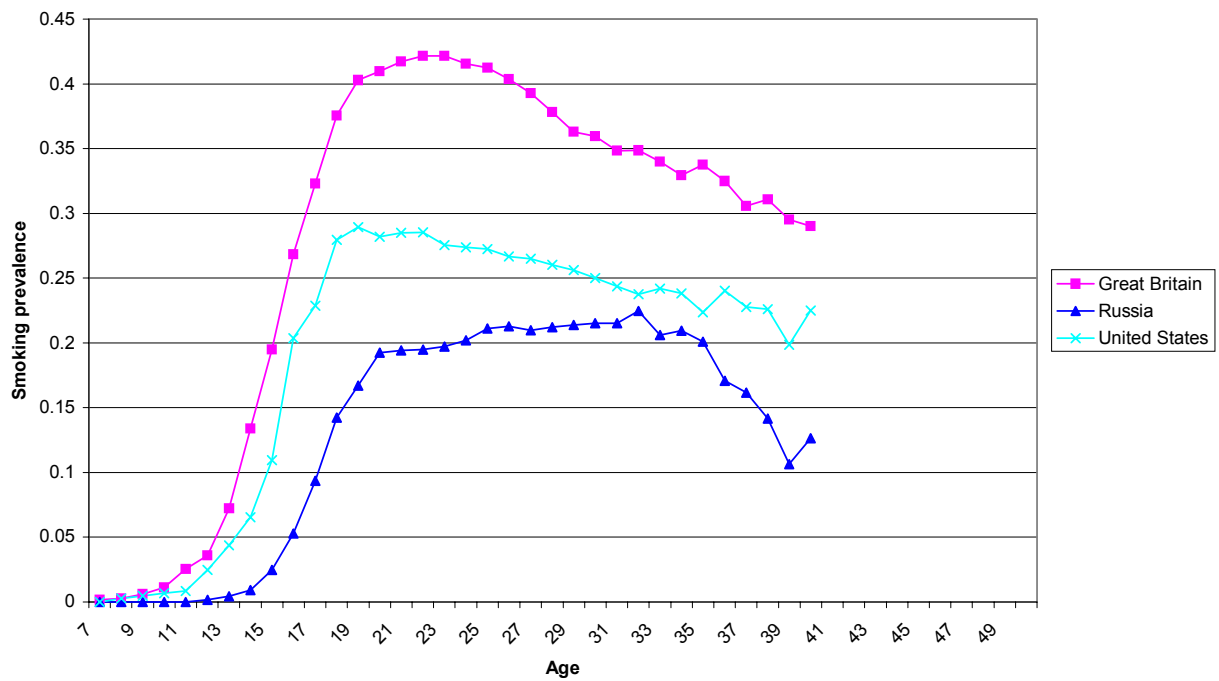


Figure 7
Life-course Smoking Prevalence of Women 41-50,
by country

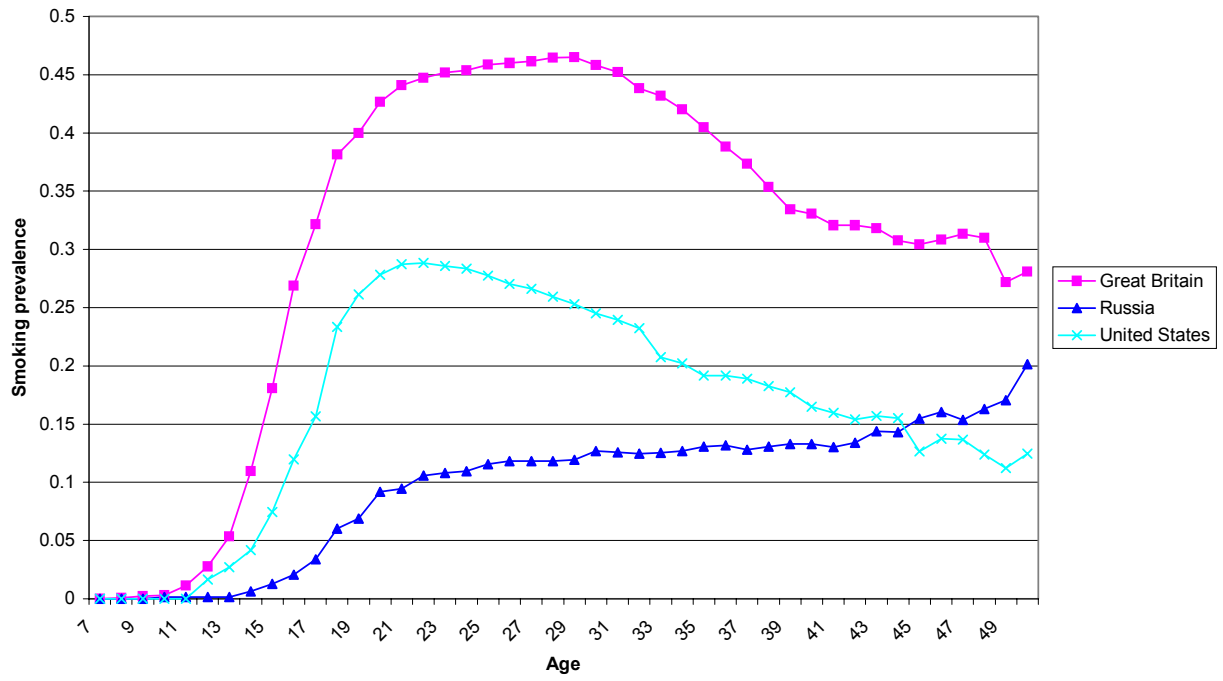


Table 1.
Russian and U.S. Smoking Cessation Rates by Gender, Age, and Birth Cohort

	Russian Men			U.S. Men		
	Cohort age in 1999			Cohort age in 1999		
	21-30	31-40	41-50	21-30	31-40	41-50
15-24	1.1%	0.3%	0.2%	3.2%	1.6%	1.1%
25-30	1.0%	0.7%	0.4%	6.4%	1.4%	1.9%
31-35		0.9%	0.6%		4.0%	2.5%
35-40		1.3%	0.5%		3.8%	2.8%
40-45			0.7%			4.3%
45-50			0.4%			4.2%

	Russian Women			U.S. Women		
	Cohort age in 1999			Cohort age in 1999		
	21-30	31-40	41-50	21-30	31-40	41-50
15-24	3.3%	1.3%	1.5%	3.9%	2.5%	1.7%
25-30	3.6%	1.7%	0.4%	13.5%	2.8%	3.9%
31-35		2.3%	1.2%		3.4%	5.3%
35-40		5.8%	1.2%		3.1%	2.6%
40-45			1.8%			5.1%
45-50			0.7%			7.0%