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Impact of Tobacco Control Policy on Quitting and Nicotine Dependence among Women in Five European Countries

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Abstract

Objective—Describe differences in and factors associated with former smoking and nicotine dependence among women in Ireland, Sweden, France, Italy and the Czech Republic.

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Contributors: Allen, Gritz and Vallone conceived of and refined the study, interpreted the data and wrote the manuscript with critical assistance from Rubenstein, Kralikova, Haglund and Heck. Allen was at Legacy during the development and drafting of the manuscript. Xiao and Niaura refined and conducted the data analysis. The WELAS Team, headed by Principal Investigator Mia Hashibe, designed and fielded the study, provided critical feedback on methodology and insight into country differences in smoking, quitting and dependence among women.

Competing Interests: None of the authors report any competing interests in relation to this work.

Ethics Approval: The study was approved by the IRB of the International Agency for Research on Cancer, France.

Methods—A cross-sectional, random digit dial telephone survey of 5000 women, ages 18 and older, conducted in 2008. Analyses were conducted using logistic regression models.

Results—Respondents from Ireland and Sweden had statistically significantly higher odds of having quit smoking within the 5 years prior to survey administration as compared with respondents from the Czech Republic. Current smokers from Ireland, Sweden, France and Italy are more nicotine dependent than those from the Czech Republic.

Conclusions—Respondents from countries with stronger tobacco control policies were more likely to have quit smoking compared with those living in the Czech Republic. However, respondents in countries with some of the strongest policies (Ireland, Sweden, France and Italy) had higher odds of smoking within 30 minutes of waking, an established indicator of nicotine dependence. More research in this area is warranted, but this study suggests that: 1) now that the Czech Republic is beginning to implement strong tobacco control policy, they will likely achieve a rapid decline in population-level smoking; and 2) Ireland, Sweden, France, Italy and other countries with established, strong tobacco control policies would do well to consider what additional programs they can put in place to help their highly nicotine dependent population of smokers successfully quit.

Keywords

tobacco control; policy; nicotine dependence; women; Europe

Introduction

In 1987, Europe became the first World Health Organization (WHO) region to create a tobacco control action plan. However, by 2001 smoking was increasing in a substantial proportion of European countries—particularly in Central and Eastern Europe—and many countries had failed to meet policy benchmarks.(1-4) The WHO Framework Convention on Tobacco Control (FCTC) marked a wave of policy implementation in the region. The treaty has been ratified by France (2004) Ireland (2005) Sweden (2005) Italy (2008) and—in June of 2012—by the Czech Republic.(5-7)

This study examines the likelihood of having quit smoking in the five years prior to survey administration and current levels of nicotine dependence among women in Ireland, Sweden, France, Italy and the Czech Republic in 2008. As the recent ratification of the FCTC by the Czech Republic and other sources make clear, the strength of tobacco control policy in these countries is in flux.(7, 8, 9) Nevertheless, these data provide a snapshot of a moment in time in which Ireland and Sweden were beginning to reap the rewards of their strong tobacco control policies and the Czech Republic was falling behind the rest of Europe, even while making small policy advances.(8) An analysis of the strength of tobacco control policy in 30 European countries at approximately the time this survey was conducted ranked Ireland 2nd, Sweden 6th, France 7th, Italy 10th and the Czech Republic 25th.(8)

Methods

This study is based on 5000 telephone interviews with women in Ireland, Sweden, France, Italy and the Czech Republic, conducted in association with the Women in Europe against

Lung Cancer and Smoking (WELAS) project. The WELAS survey instrument was based on the American Smoking and Health Survey (ASHES), a U.S. survey conducted by Legacy in 2002 and 2003. The survey was translated into the predominant language of each participating country. The study was approved by the IRB of the International Agency for Research on Cancer, France, and was funded in part by the European Commission.

Sampling Strategy and Data Collection

The sampling strategy consisted of a selection of households with listed, landline telephone numbers, using random-digit-dialing. From within each household, one woman, age 18 or older, was randomly selected to participate in the survey. Quota sampling was used so that the data would reflect the population in terms of age and urbanicity. Data collection took place in the summer of 2008. One thousand respondents were selected from each country, including an oversampling of smokers in order to ensure robust estimates on key variables. Response rates were 54.6% in Ireland, 59.0% in Sweden, 64.8% in France, 41.4% in Italy and 30.6% in the Czech Republic.

Measures

Current smokers were those who reported having smoked at least 100 cigarettes in their lifetime, and who smoked “every day” or “some days” at the time of the survey. Former smokers also reported having smoked 100 or more cigarettes in their lifetime, and had quit smoking during the 5 years preceding survey administration. Former smokers who quit more than 5 years prior to survey administration were excluded from the analysis, on the premise that the tobacco control policy changes in question could not have influenced their quitting behavior. The quit ratio was calculated by dividing the number of former smokers by the number of ever smokers in the sample; the past 5 year quit ratio was calculated by dividing the number of former smokers who quit during the 5 years preceding the survey by the number of ever smokers. Nicotine dependence was measured among current smokers using the single item, “How soon after you wake up do you have your first cigarette?” Research indicates that this single item performs as well as other commonly used multi-item dependence scales, including the Heaviness of Smoking Index (HSI).(10) The response option on the nicotine dependence variable was open-ended, thus producing continuous data. It was coded into two dichotomous variables: one measured smoking within 5 minutes of waking, the other smoking within 30 minutes of smoking.(10) Income was measured by providing each respondent with the 2005-2006 national median household disposable income for their country, then asking whether their own annual household disposable income was “below,” “well below,” “above,” “well above” or “about the same” as the national median.(11) Responses were collapsed into “below” and “above” the median for analysis. Because a large proportion of respondents (20.4%) declined to provide income data, a separate category on the income variable was created to represent undisclosed income, and was included in the models. This technique can be used to determine whether the missing data are associated with the outcome of interest.(12)

Data Analysis

This study examines two outcomes: reported smoking cessation within 5 years prior to survey administration among respondents who report having smoked 100 or more cigarettes

in their lifetime (n=1733), and nicotine dependence among current smokers (n=1413). Logistic regression models were used to assess the impact of respondent country of residence on the outcomes, controlling for income, age and age of smoking initiation. Data were weighted to account for the oversampling of smokers in the sample. Robust standard errors were used to account for clustering of responses within country. Analyses were conducted using Stata 12.1.

Results

Description of the Weighted Sample

The original sample consists of 5000 adult, female respondents. In terms of age, 27.3% of respondents were age 18-34, 36.0% were age 35-54 and 36.7% were age 55 or older (Table 1). One third (32.7%) reported that their annual household disposable income was below the median for their country, while 27.6% reported income around the median and 19.3% reported income above the median. One fifth of respondents (20.4%) chose not to disclose their income. About three quarters of the smokers in the sample began smoking before age 19. In terms of smoking behavior, 19.9% of the sample were current smokers, 7.1% were former smokers who quit within the 5 years preceding the survey and 14.4% were former smokers who quit more than 5 years before survey administration. The majority of the sample (58.7%) had never smoked. The overall quit ratio was 48.1%; the past 5 year quit ratio was 17.1%. Among current smokers, most (57.2%) reported smoking ten or fewer cigarettes per day, 37.1% reported smoking between half a pack and one pack per day and 5.6% smoked more than one pack per day. Within the overall sample of current smokers, 19.8% reported smoking their first cigarette within five minutes of waking, and 45.8% smoked their first cigarette within 30 minutes of waking. Overall and country level data are shown in Table 1.

Factors Associated with Having Quit Smoking

Among respondents who reported having smoked 100 or more cigarettes in their lifetime and who quit smoking within the 5 years preceding the survey, those from Ireland (OR 1.91; $p < .001$) and Sweden (OR 1.95; $p < .001$) had substantially greater odds of being former smokers than those from the Czech Republic (Table 2). Greater age was associated with lower odds of having quit smoking (OR .98, $p < .001$).

Factors Associated Nicotine Dependence (Time to First Cigarette of the Day)

Among current smokers, respondents from Ireland (OR 2.10), Sweden (OR 1.51) and France (OR 1.23) had higher odds of smoking their first cigarette of the day within 5 minutes of waking as compared with respondents in the Czech Republic (all $p < .001$) (Table 2). Results using the nicotine dependence measure TTFC within 30 minutes of waking were similar, though respondents from Italy (OR 1.34) also had higher odds of smoking their first cigarette of the day within 30 minutes of waking as compared with respondents in the Czech Republic ($p < .001$). Other factors associated with greater nicotine dependence were age (OR 1.02) and age of initiation (OR 0.97) (both $p < .001$).

Discussion

This study shows that within a sample of adult females in five European countries, those living in Sweden and Ireland had higher odds of having quit smoking during the past five years as compared with those living in the Czech Republic. Respondents from Ireland, Sweden, France and Italy had higher odds of smoking their first cigarette of the day within a short period after waking as compared with those living in the Czech Republic, suggesting greater nicotine dependence (10).

Given that Ireland and Sweden have implemented strong tobacco control laws, it is not surprising that women living in these countries have quit smoking at higher rates than those in other countries. This finding is consistent with expectations regarding the effects of tobacco control policy in Europe and evidence from the United States, where implementation of stronger tobacco control policies has been linked with declines in tobacco use and increases in cessation.(1, 4, 13,14). This is not the first study to find that women in the Czech Republic wait longer after waking to smoke their first cigarette of the day; a 2012 study shows that a substantial proportion of the overall smoking population of the Czech Republic smokes their first cigarette of the day one hour or more after waking. (15) Another study finds that smokers in the Czech Republic are more likely to be light smokers than smokers in other European countries, which may be a reflection of lower levels of dependence. (16)

One possible interpretation of these findings is that, in countries with the strongest policies, those who continue to smoke may do so because they are highly nicotine dependent, and therefore less likely to successfully quit. (17) This is the “hardening hypothesis,” which posits that those who are less nicotine dependent quit first following implementation of tobacco control policy, leaving a core group of highly nicotine dependent smokers. However, the evidence in support of the hardening hypothesis is mixed at best. (18-20) It is also possible that the nicotine dependence level of female smokers in the Czech Republic has historically been lower than that of other female smoker populations in Europe, and tobacco policy has played no role in the observed differences. More research is needed to understand whether country-level differences in dependence are related to current policy. In any case, it would be appropriate for countries with strong tobacco control policy to consider additional strategies for helping highly dependent populations quit.

Regardless of the reason for their relatively lower levels of nicotine dependence, these findings represent good news for the Czech Republic. This study suggests that, now that the Czech Republic is beginning to implement strong tobacco control policy, they will likely achieve a rapid decline in population-level smoking. (21) Specifically, and in accordance with the FCTC, the Czech Republic should quickly move to ban tobacco use in public places, increase the price of tobacco through taxation and implement stronger, pictorial health warnings on tobacco packaging. Because these policies have been shown to increase quitting,(13, 22, 23) the Czech Republic would also benefit from stronger support for evidence-based cessation treatment. In this way, the Czech Republic will enhance and accelerate the impact of policy.

This study is subject to several limitations, chief among them the differences in response rate and particularly the low response rate (30.6%) for the Czech Republic. It is possible that these results are biased as a result of this low response rate. For example, the sample from the Czech Republic that describes their household income as “above the median” is lower than in the overall sample (15.3% versus 19.3%). It is possible that higher income respondents are under-represented in the study, which may skew results toward lower reported levels of having quit smoking and lower cigarette consumption. Second, a substantially larger proportion of respondents from the Czech Republic initiated smoking after age 19 as compared with the overall sample (40.7% versus 25.7%). Because studies show that greater age of initiation is associated with lower levels of nicotine dependence, this may influence our findings, despite our having controlled for age of initiation in the dependence model. Third, our analysis indicates that not all data are missing at random; specifically, undisclosed income is highly statistically significantly associated with time to first cigarette of the day. We have handled this by creating a separate category on the income variable to represent those who did not provide income data and including the variable in the model. We might surmise, given what we know about the relationship between income and smoking rates, that those who did not disclose their income had incomes below the median, but we cannot know for certain. A simple crosstabulation with education showed that those with missing income data were distributed fairly evenly across education level. Fourth, respondent memories of events deteriorate over time; it is possible that a proportion of those who report quitting within the past five years in fact quit longer ago than that. Fifth, the survey was administered in five countries and languages; it is possible that cultural differences or issues related to the survey translation resulted in response bias. Sixth, the sample was drawn from among landline telephone numbers only, excluding mobile-only users. Seventh, it was not possible to include specific policy variables in the models because of the high correlation between policy and country of residence.

All European countries—regardless of their standing in terms of strength of tobacco control—can and should continue to implement and enforce effective tobacco control policy. Ireland, Sweden and France should consider what additional programs they can put in place to help their smoking populations—who are highly nicotine dependent—successfully quit. Despite being a top ranked country in terms of tobacco control policy, Ireland could enhance warnings about the risk of tobacco use and implement a tobacco-related public health campaign. Sweden, France and Italy would all benefit enormously from increased tobacco taxes, pictorial health warnings, stronger public smoking bans and public health campaigns. (14, 22) All countries should also, according to Article 4.2.d of the FCTC (5), consider gender in the implementation of all tobacco measures. Taking these steps will most certainly reduce—over time—some of the enormous costs nations bear as a result of tobacco use among both women and men.

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What This Paper Adds

Studies show that tobacco control policy has had a substantial impact on smoking rates in the U.S. As Europe adopts stronger tobacco control policies, smoking prevalence and tobacco-related deaths are projected to decline. This study examines the impact of tobacco control policy on rates of quitting and tobacco dependence among women in five European countries. It will serve as a baseline against which to measure changes in smoking behavior in the Czech Republic, as that country enacts the policies of the Framework Convention on Tobacco Control.

Table 1

Demographic characteristics and smoking behaviors of full sample, overall and by country, weighted.

	ALL (n=5,000) %	CZ REP (n=1,000) %	IRELAND (n=1,000) %	SWEDEN (n=1,000) %	FRANCE (n=1000) %	ITALY (n=1,000) %	X ² p-value
Smoking status							
Current smoker	19.9	19.2	23.5	18.6	20.5	17.5	
Former smoker (Quit Within 5 Years)	7.1	5.2	9.7	8.4	5.4	6.6	<0.01
Former smoker (Quit 5+ Years)	14.4	9.9	15.9	18.7	11.9	15.6	
Never smoker	58.7	65.7	51.0	54.2	62.3	60.3	
Past 5 yrs Quit Ratio	17.1	15.1	19.7	18.4	14.2	16.7	.23
Overall Quit ratio	51.9	44.0	52.1	59.3	45.6	56.0	<0.01
Age							
18-24	8.5	8.3	11.4	8.2	8.2	6.5	
25-34	18.8	20.1	22.0	15.2	17.2	19.4	
35-44	18.3	16.0	19.8	18.2	18.6	19.0	<0.01
45-54	17.7	17.9	16.8	18.6	18.1	16.9	
55+	36.7	37.7	30.0	39.8	37.9	38.2	
Income							
Well below the median	9.2	8.2	7.7	5.2	7.5	17.5	
Below the median	23.5	19.2	25.3	19.2	24.1	29.7	
Around the median	27.6	40.8	26.5	21.7	27.4	21.6	<0.01
Above the median	16.0	14.5	21.9	21.2	14.9	7.4	
Well above the median	3.3	0.8	3.5	9.1	2.8	0.5	
Refused	20.4	16.5	15.1	23.6	23.3	23.3	
Age of initiation (Current smoker only)							
<17	43.9	28.9	50.1	58.3	41.3	39.9	<0.01
17-19	30.4	30.33	29.9	23.7	38.0	29.2	
>19	25.7	40.7	20.1	18.0	20.7	30.8	

	ALL (n=5,000) %	CZ REP (n=1,000) %	IRELAND (n=1,000) %	SWEDEN (n=1,000) %	FRANCE (n=1000) %	ITALY (n=1,000) %	X ² p-value
Cigarettes per day (Current smoker only)							
0-10	57.2	64.6	48.7	63.9	55.4	55.8	
11-20	37.1	31.4	42.8	33.4	38.2	38.5	<0.01
21-30	4.1	2.8	5.6	2.7	5.1	4.0	
31+	1.5	1.2	3.0	0.0	1.3	1.7	
Time to first cigarette (Current smokers only)							
<5 minutes	19.8	13.9	26.4	22.8	19.6	14.7	<0.01
6-30 minutes	26.0	19.1	19.9	33.6	30.2	28.5	<0.01
31-60 minutes	9.3	9.1	9.0	10.7	6.3	11.7	0.29
After 60 minutes	45.0	57.9	44.8	32.9	43.9	45.1	<0.01

Table 2

Logistic regression models showing the odds of having quit within 5 years prior to survey administration, and smoking the first cigarette of the day within 5 or 30 minutes of waking.

	Quit within 5 years prior to survey administration (among ever smokers) n=1733		Time to First Cigarette (among current smokers) Smoke within 5 minutes n=1413			
	OR	95% CI	Smoke within 5 minutes n=1413		Smoke within 30 minutes n=1413	
			OR	95% CI	OR	95% CI
Czech Republic (ref)	1.00		1.00		1.00	
Ireland	1.91***	(1.29-2.83)	2.10***	(1.93 to 2.29)	1.65***	(1.54 to 1.77)
Sweden	1.95***	(1.29-2.96)	1.51***	(1.32 to 1.72)	2.19***	(2.03 to 2.37)
France	.79	(.50-1.24)	1.23***	(1.15 to 1.31)	1.83***	(1.70 to 1.97)
Italy	1.22	(.79-1.88)	.97	(.92 to 1.02)	1.38***	(1.25 to 1.52)
Age	.98***	(.97-.99)	1.01*	(1.00 to 1.03)	1.02***	(1.01 to 1.02)
Income around the median (ref)	1.00		1.00		1.00	
Income below median	1.10	(.79-1.53)	1.33**	(1.03 to 1.71)	1.30	(0.82 to 2.06)
Income above median	1.19	(.82-1.72)	.94	(.65 to 1.36)	.93	(0.70 to 1.23)
Undisclosed Income	1.39	(.96-2.03)	1.56***	(1.26 to 1.91)	1.12	(0.77 to 1.61)
Greater age of initiation	.98	(.95-1.01)	.97*	(.93 to 1.00)	.97***	(0.95 to 0.98)
constant	.47	(.24-.93)	.17	(.08 to .36)	.44	(0.29 to 0.66)

* Age, and age of initiation are continuous variables; ORs represent reflect effect of change per unit score.