The Evolution of the Schooling-Smoking Gradient

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Abstract

We explore how the schooling-smoking gradient has evolved over time. Using data from 11 Gallup Surveys conducted between 1954 and 1999, we find that the schooling-smoking gradient first emerged in tandem with a schooling-health knowledge gradient. As early as 1957, a schooling-knowledge gradient developed, with 62 percent of college graduates agreeing that smoking was a cause of lung cancer, compared to only 46 percent of those with less than a college degree. After the mid-1970s, the schooling-knowledge gradient began to flatten but the schooling-smoking gradient did not. To further explore patterns of smoking behavior, we next econometrically analyze data on individual life-course smoking histories from retrospective information available in six cycles of the Tobacco Use Supplements to the Current Population Survey (TUS-CPS). With these data we estimate discrete time hazard models of smoking cessation as functions of schooling, measures of the health information environment, and other control variables.

1. Introduction

In 1997-98, about 34 percent of U.S. adults with less than a high school education were current smokers, compared to only about 13 percent of college graduates and only 8 percent of those with graduate degrees (Schoenborn, Vickerie and Barnes 2003). In this study, we explore how the schooling-smoking gradient evolved over the last half of the 20th century. Over this time period, after scientific research firmly established the health hazards of smoking, the prevalence of smoking fell from 40 percent to 24 percent (USDHHS 2000).

Studying the link between schooling and what has been called the leading preventable cause of death is important in its own right, and serves as a case study to shed light on more general questions about the link between schooling and health. The schooling-health link has re-emerged as a hot topic in empirical health economics.[1] The recent research builds on evidence that was also accumulated over the last half of the 20th century. The evidence on the schooling-health link was already described in 1982 as "one of the strongest generalizations to emerge from empirical research on health in the United States." (Farrell and Fuchs 1982). Establishing whether the link is causal in nature has been more challenging. After reviewing recent studies that use the method of instrumental variables, Grossman (2006, p. 56) concludes that they "suggest causality from more schooling to better health." Culter and Lleras-Muney (2006) also conclude that "there is evidence of causal effects of education on health at lower levels of schooling....", but call for more research on the mechanisms involved.

[1] 21st century examples include Goldman and Lakdawalla (2001), Meara (2001), Currie and Moretti (2003), Arendt (2005), Etile and Jones (2005), Lleras-Muney (2005), Cutler, Deaton and Lleras-Muney (2006), Kenkel, Lillard and Mathios (2006), and de Walque (2007). For a recent review, see Grossman (2006).

To set the stage for our empirical analysis, in Section 2 we provide a brief review of health economics research on the schooling-health link. Our empirical approach uses the insight from Farrell and Fuchs (1982) that studying the interaction between an individual's schooling and the information environment sheds light on the nature of the schooling-smoking gradient. Put differently, our (and Farrell and Fuchs') approach could be described as a difference-in-differences approach. In this way, we hope to complement recent instrumental variables studies of the effect of schooling on health.

In section 3, we use data from 11 Gallup Surveys conducted between 1954 and 1999. We find that the schooling-smoking gradient first emerged in tandem with a schooling-health knowledge gradient. After the mid-1970s, however, the schooling-knowledge gradient began to flatten but the schooling-smoking gradient did not.

In section 4, we use retrospective information available in six cycles of the Tobacco Use Supplements to the Current Population Survey (TUS-CPS) to study the evolution of the schooling-smoking cessation gradient over this same time period. The patterns again contradict the hypothesis that the gradient should be flatter in the more information-rich environment of the last decades of the 20th century.

Section 5 concludes and discusses directions for future work.

2. Background

The standard approach in health economics uses the household health production function to model the schooling-health link (Grossman 2006). The key insights for our study of the schooling-smoking gradient can be illustrated in a simple one-period version of Grossman's (1972) model of the demand for health. The consumer is assumed to receive utility from

consuming a generic good X, her own health H, and smoking cigarettes, C: U = U(X, H,C). Health, in turn, depends on purchases of market goods that are viewed as inputs into a household production function: H = H(C, .). These inputs include goods like cigarettes that jointly enter the utility function and the household health production function. The consumer chooses levels of X and C to maximize utility, subject to the household production function and the relevant budget constraint.

Assuming an interior solution, re-arranging the first order condition for the utility-maximizing choice of cigarettes yields:

(1) $$U_C = \lambda\, p_X - U_H\, H_C$$

where sub-scripts denote partial derivatives, λ is the Lagrangian multiplier, and p_X is the price of the generic good X. Equation (1) has the familiar interpretation that cigarettes are consumed until the marginal benefits equal the marginal costs, where the marginal costs reflect both the monetary costs of cigarettes and the perceived health costs ($U_H\, H_C$).

The perceived negative marginal health product depends upon the interaction of the schooling level of individual i and of the information environment at time t :

(2) $$H_{C\ i\ t} = \text{schooling}_i \ \text{x} \ \text{information environment}_t$$

For example, prior to the 1950s, even a highly educated consumer perceived a small or zero marginal product of smoking on health. As scientific research accumulated demonstrating the adverse health consequences, consumers with more schooling may have been better able to gather and process the new health information more quickly, leading to revised perceptions of H_C. Schooling's role as a determinant of perceptions of H_C is consistent with the hypothesis that schooling increases the allocative efficiency of the household's production of health (Grossman

1972, 2006).

Equations (1) and (2) implicitly define a demand curve for cigarettes as a function of schooling and the information environment. A series of econometric studies explore the impact of the information environment on the demand for cigarettes (Hamilton 1972, Schneider, Klein and Murphy 1981, Blaine and Reed 1994). These studies exploit information "shocks,"including the 1964 Surgeon General's Report, the anti-smoking messages broadcast during the Fairness Doctrine era (1968-70), and the 1971 ban on television and radio advertising of cigarettes. Studies reviewed by Kenkel and Chen (2000) suggest that similar information shocks also reduced smoking in other countries. By contrast, after analyzing the full century of U.S. annual time series data Sloan, Smith and Taylor (2002) conclude that the impact of information on cigarette demand is less than suggested by the earlier studies. Because all these studies use aggregate data on cigarette consumption, they can not explore whether the impact of the information shocks varied across schooling categories.

Farrell and Fuchs (1982) provide the key insight that studying the interaction between the information environment and schooling sheds light on the schooling-health link[2]. They find that the strong negative correlation between schooling and smoking initiation only developed in age cohorts who began smoking after the 1964 Surgeon General's Report. Farrell and Fuchs argue that this pattern suggests that the link between schooling and smoking reflects health concerns, although it does not necessarily reflect causality. In the demand function implicitly defined by equation (1), the demand for cigarettes depends on both the perceived marginal health product of

[2]This insight has been re-discovered by Glied and Lleras-Muney (2003) and Cutler, Deaton and Lleras-Muney (2006) who propose that "gradients in health arise when there is knowledge and technology available to prevent or treat disease."

cigarettes (H_C) and the marginal utility of health (U_H). The schooling-smoking gradient could reflect differences in perceptions of H_C across schooling levels, but it could also reflect differences in U_H. In particular, Farrell and Fuchs (1982) suggest that people with more schooling may have a lower rate of time preference. As a result, their marginal utility from investing in their health today is higher because they place a greater weight on future health consequences. However, differences in U_H across schooling levels are not necessarily expected to influence smoking decisions before the 1964 Surgeon's General Report. Differences in U_H will not influence cigarette demand if, regardless of their schooling, most people perceived a relatively small or zero negative marginal health product of cigarettes.

In light of possible bias due to time preference or other unobservable differences correlated with schooling, a number of older and more recent studies use the method of instrumental variables (IV) to study the schooling-health link.[3] We take a different, complementary approach. The empirical analysis in section 3 focuses on the relationship described by equation (2) – how health knowledge depends on the interaction between an individual's schooling and the prevailing health information environment. The empirical analysis in section 4 focuses on how smoking cessation decisions depend on the same type of interactions. In the empirical work, we use the general time trend (year dummies) to capture the movement from an environment in the 1950s where there was relatively little information about the health risks of smoking, to the information-rich environment later in the century.

[3]Examples include Berger and Leigh (1989), Sander (1995a, b), Leigh and Dhir (1997), Adams (2002), Currie and Moretti (2003), Lleras-Muney (2005), Kenkel, Lillard and Mathios (2006), and de Walque (2007).

3. The Schooling-Smoking and Schooling-Health Knowledge Gradients

We begin by analyzing the evolution of consumer knowledge about the health risks of smoking. We use data from eleven cross-sectional surveys conducted between 1954 and 1999: eight Gallup Polls and three waves of the National Health Interview Survey [NHIS]. Special supplements to the NHIS in various years asked respondents whether they believed smoking is linked to a series of illnesses. However, to some extent the survey questions themselves reflected the information environment. To create the longest series possible, we focus on knowledge about the link between smoking and lung cancer – a Gallup poll asked about this link as early as 1954. Table 1 describes the wording of the questions we use from the Gallup Polls and the NHIS. The USDHHS (1989, Ch. 4) discusses the older surveys, survey methods, and issues in comparing the surveys. Kenkel and Chen (2000) present additional analysis of the trends in knowledge about other health risks of smoking, including heart disease, emphysema, and the risks of secondhand smoke.

As can be seen in Figures 1 and 2, the schooling-smoking gradient first emerged in tandem with a schooling-health knowledge gradient.[4] Scientific research establishing the link between smoking and lung cancer had just begun to receive major media attention during the 1950s (Viscusi 1992). So it is probably not surprising that in the 1954 survey, only 44 percent of college graduates and 43 percent of respondents with less than a college degree agreed that smoking was one of the causes of lung cancer. The schooling-smoking gradient was also almost flat: 42 percent of college graduates smoked and 44 percent of respondents with less than a

[4]Figure 1a documents the emergence of the schooling-smoking gradient using the TUS-CPS data, described in more detail below.

college degree smoked. As early as 1957, a schooling-knowledge gradient developed, with 62 percent of college graduates agreeing that smoking was a cause of lung cancer, compared to only 46 percent of those with less than a college degree. The schooling-smoking gradient developed somewhat more slowly, but by 1972 only 32 percent of college graduates smoked compared to 44 percent of those with less than a college degree.

Table 2 reports results of probit models of smoking participation. The models are estimated using data from 13 cross-sectional Gallup Polls conducted from 1944 through 1999. The estimated coefficients on the schooling variables confirm the general pattern shown in Figure 1: the schooling-smoking gradient mainly emerges sometime after the 1964 Surgeon General's Report.

After the mid-1970s, the schooling-health knowledge gradient in Figure 2 begins to flatten again but the schooling-smoking gradient in Figure 1 does not. From 1985 onwards, over 90 percent of both college graduates and those with less than a college degree agreed that smoking is a cause of lung cancer. Kenkel and Chen (2000) show that after 1985 there are similarly high rates of knowledge about other health risks of smoking. In such an information-rich environment, we might expect the schooling-smoking gradient to flatten dramatically. However, the 1999 gap in smoking rates was larger than in any previous Gallup poll: the smoking rate for college graduates (13 percent) was about half the rate of those with less than a college degree (27 percent).

Instead of differences in information levels, the patterns after 1985 suggest that the schooling-smoking gradient gap now reflects differences in how people with different schooling react to the information. Figure 3 illustrates this point by comparing smoking rates among

people who are knowledgeable about the link between smoking and lung cancer. By 1999, only 13 percent of knowledgeable college graduates smoked, compared to 26 percent of knowledgeable respondents with less than a college degree. In other words, virtually none of the gradient in smoking between college graduates and others is explained by differences in their knowledge of lung cancer risks.

4. The Schooling-Smoking Cessation Gradient

To further explore patterns of smoking behavior, we next econometrically analyze data on individual life-course smoking histories over the last half of the 20th century. We construct these histories from retrospective information available in five cycles of the Tobacco Use Supplements to the Current Population Survey (TUS-CPS): September, January and May 1992-1993; September, January, and May 1995-1996; September, January, and May 1998-1999; June, November, and February 2001-2002; and a Special Topics TUS in 2003. (An abbreviated TUS in 2002 did not provide complete histories of respondents' smoking.) The TUS were sponsored by the NCI and administered as part of the CPS, the U.S. Census Bureau's continuing labor force survey (Hartman et al. 2002). Each of the three-month cycles involves a large, nationally representative sample of about 240,000 individuals 15 years of age and older.

The TUS included questions about their current smoking behavior and retrospective questions about smoking histories. Respondents who report having smoked at least 100 cigarettes in their lives were then asked how old they were when they "first started smoking cigarettes fairly regularly." Respondents who were not current smokers but had ever smoked cigarettes everyday for at least six months were asked: "About how long has it been since you last smoked cigarettes every day?" We use responses to these questions to construct each

individual's smoking history. Kenkel, Lillard and Mathios (2003) provide evidence on the usefulness of retrospective data on smoking.

To focus on smoking cessation, we restrict the analysis to respondents who are current or former smokers. We initially created a measure of calendar-year quitting which took a value of one if the smoker quit in that year and zero otherwise. However, our measure of calendar-year quitting suffered from a form of recall bias known as heaping. When respondents recall how long it has been since they last smoked, they are very likely to report at multiples of five or ten years ago. Figure 4 shows the calendar-year smoking cessation rate from 1950 to 1991, based on the 1992-1993 TUS-CPS cycle. There is substantial heaping in the years 1953, 1963, 1973 and 1983 because these years are 40, 30, 20, and 10 years before the survey. There is also heaping to a smaller extent in the years 1958, 1968, 1978 and 1988 because they are 35, 25, 15 and 5 years before survey.

To solve the heaping problem, instead of measuring calendar-year smoking cessation, we measure cessation over a 5-year-average. For example, 1955 represents average cessation rate from 1953 to 1957. Note also that by pooling data from multiple cycles of the TUS-CPS conducted in different years, we further smooth over heaps. Figures 5, 6, and 7 show trends in 5-year-average smoking cessation.

We also use the 5-year time interval when we estimate discrete time hazard models of smoking cessation. QUIT is an indicator variable that equals one if the event of smoking cessation occurs during each 5-year interval, given that the individual was at risk of the event. An individual is at risk and contributes an observation for the smoking cessation sample in each 5-year interval she is a smoker and in the 5-year interval she quits. In contrast to continuous

time hazard models, discrete time hazard models avoid problems associated with censoring or incomplete spells (Alison, 1984). Because of the very large sample size, we estimate linear probability models by ordinary least squares. We estimate the models separately for men and women, and include a basic set of demographic variables including age and race/ethnicity, as well as four levels of schooling: less than high school (the omitted category): high school; some college; and college graduate.[5]

Figures 5 and 6 and the econometric results in Tables 3 and 4 tell the same story about the evolution of the schooling-smoking cessation gradient. In the 1950s, smoking cessation rates were low and similar across schooling categories. Smoking cessation rates increase over time, especially for respondents with a college education or more. By 1987, the smoking cessation rate among male college graduates is 4.3 percent, almost twice as high as the cessation rate of 2.2 percent among men with less than a high school degree. The gradient is even steeper for women: the cessation rate is 4.5 percent for female college graduates, compared to 1.8 percent for women with less than a high school degree. The results contradict the prediction that the schooling-smoking cessation gradient should flatten in the information-rich environment of the 1970s and 1980s.

The results about the schooling-cessation gradient also contradict the suggestion by Cutler and Lleras-Muney (2006) and others that the causal effect of schooling through information should be stronger at lower levels of schooling. The gradient is steepest between

[5]Although the TUS-CPS contains richer contemporaneous data on individual characteristics, it does not contain retrospective information on past characteristics relevant to past smoking cessation decisions. The TUS-CPS also does not provide a complete history of respondents' state of residence, so it is not possible to merge state-level measures such as cigarette taxes.

college graduates and other levels of schooling. At the lower levels of schooling, there are only small differences in the cessation rates of smokers without a high school degree, high school graduates, and smokers who had completed some college.

To further explore the interactions between an individual's schooling and the prevailing information environment, we re-specified the smoking cessation model to include a measure of whether the respondent started smoking before the 1964 Surgeon General's Report. The models also include the interactions between this indicator and the measures of schooling. Our hypothesis is that the schooling-cessation gradient should be steeper in the cohorts who initiated smoking before the spread of smoking health information. In these cohorts, there will be more people who started smoking only because of their lack of information, so we expect that as the information becomes available they will decide to quit.

The results reported in Tables 5 and 6 are in the opposite direction than hypothesized. The negative coefficients on the interaction terms imply that the effect of more schooling on cessation is smaller for cohorts who initiated smoking before 1964.

5. Discussion

The fact that the schooling-smoking gradient first emerged in tandem with a schooling-health knowledge gradient is consistent with a causal role for schooling through health information. However, this role is called into question by the evidence that the gradient became stronger rather than weaker in the information-rich environment of the 1970s and 1980s. It is hard to explain the current schooling-smoking gradient as stemming from differences in information.

In future work, we will also explore the schooling-smoking initiation link, again

following in the footsteps of Farrell and Fuchs (1982). In this work, we will examine smoking behavior before and after respondents completed their schooling. Farrell and Fuchs find that smoking behavior (before schooling is completed) varies with the level of eventual schooling and that, controlling for eventual schooling, additional schooling has no additional effect on subsequent behavior. This result leads Farrell and Fuchs to "reject the hypothesis that schooling differences are causal to smoking differences...." (p. 219). Similarly, DeCicca, Kenkel, and Mathios (2002) find that students who eventually drop out are already more likely to smoke in 8th grade. The estimates control for many potentially important factors, including the student's math/reading ability, parents' income and education, and whether there was a disruption in the family such as divorce. So DeCicca, Kenkel, and Mathios suggest that the strong impact of eventual dropout status even when such factors are controlled for reinforces the interpretation that dropout status proxies for an unobservable factor such as time preference or a taste for deviancy.

Grossman (2006, p. 48) argues that this conclusion does not necessarily follow if consumers are farsighted. He proposes a different chain of causality, where for farsighted consumers schooling increases the costs of smoking in high schooling because smoking leads to future illness and time lost from work. Etile and Jones (2005) use data from France to test a similar hypothesis. They create a measure of the schooling-related opportunity costs of smoking, based on the relative economic value of different levels of schooling. Consistent with Grossman's suggested causal chain, Etile and Jones conclude that the schooling-related opportunity costs of smoking are positively correlated with the age of starting and negatively correlated with smoking duration. Increasing returns to schooling over time (Juhn, Murphy and

Pierce 1993) could likewise provide an explanation for the steepening of the schooling-smoking gradient we find in the U.S. data. This may be a fruitful direction for future work.

Another direction for future work is to explore alternative interactions or differences-in-differences in the determinants of smoking cessation over time. As a quick example, Figure 7 shows the trends from 1967 to 1987 in the smoking cessation rates by race. White smokers are almost a percentage point more likely to quit over the entire period, with little apparent convergence or divergence. It might be fruitful to compare this (lack of) trend to evidence on the slowdown of convergence in the Black-White wage differential (Juhn, Murphy and Pierce 1991). Or, various patterns across schooling and racial groups might be better explained by other mechanisms, such as bandwagon peer effects.

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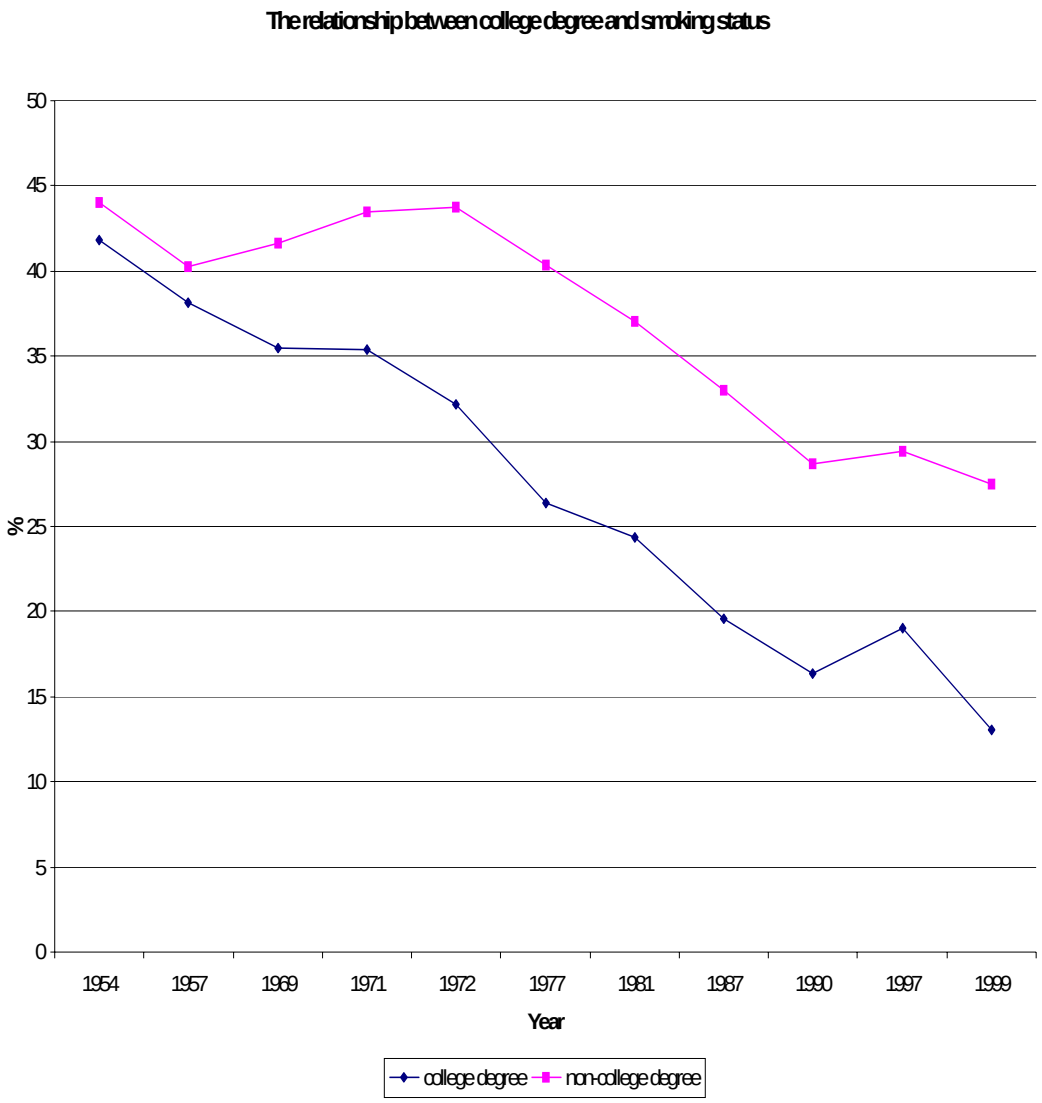
Figure 1


The relationship between college degree and smoking status
50
45
40
35
30
25
20
15
10
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%
1954
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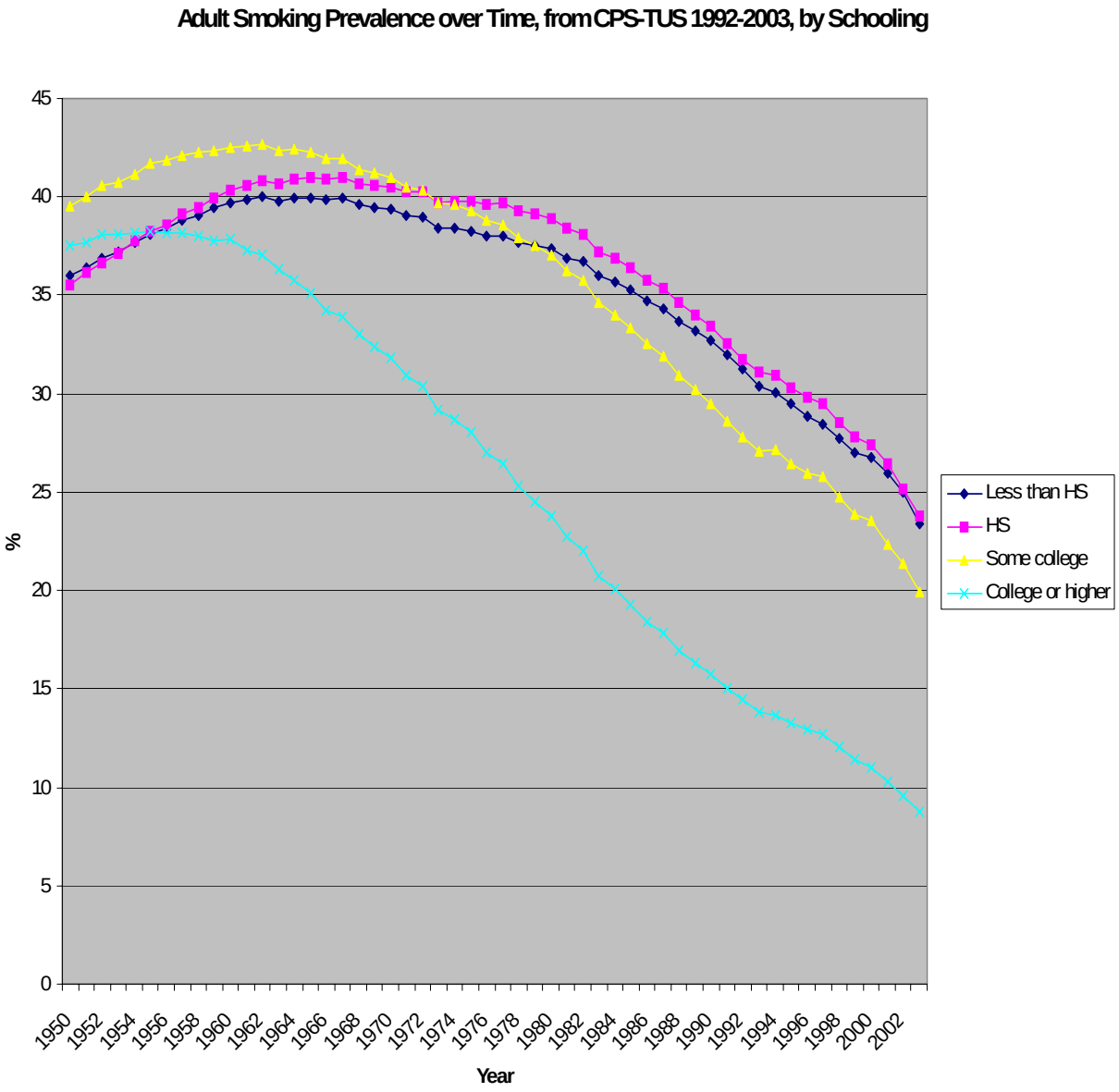
1969
1971
1972
1977
1981
1987
1990
1997
1999
Year
college degree
non-college degree

Figure 1a


Adult Smoking Prevalence over Time, from CPS-TUS 1992-2003, by Schooling
45
40
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%
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1996
1998
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Year
Less than HS
HS
Some college
College or higher

Figure 2

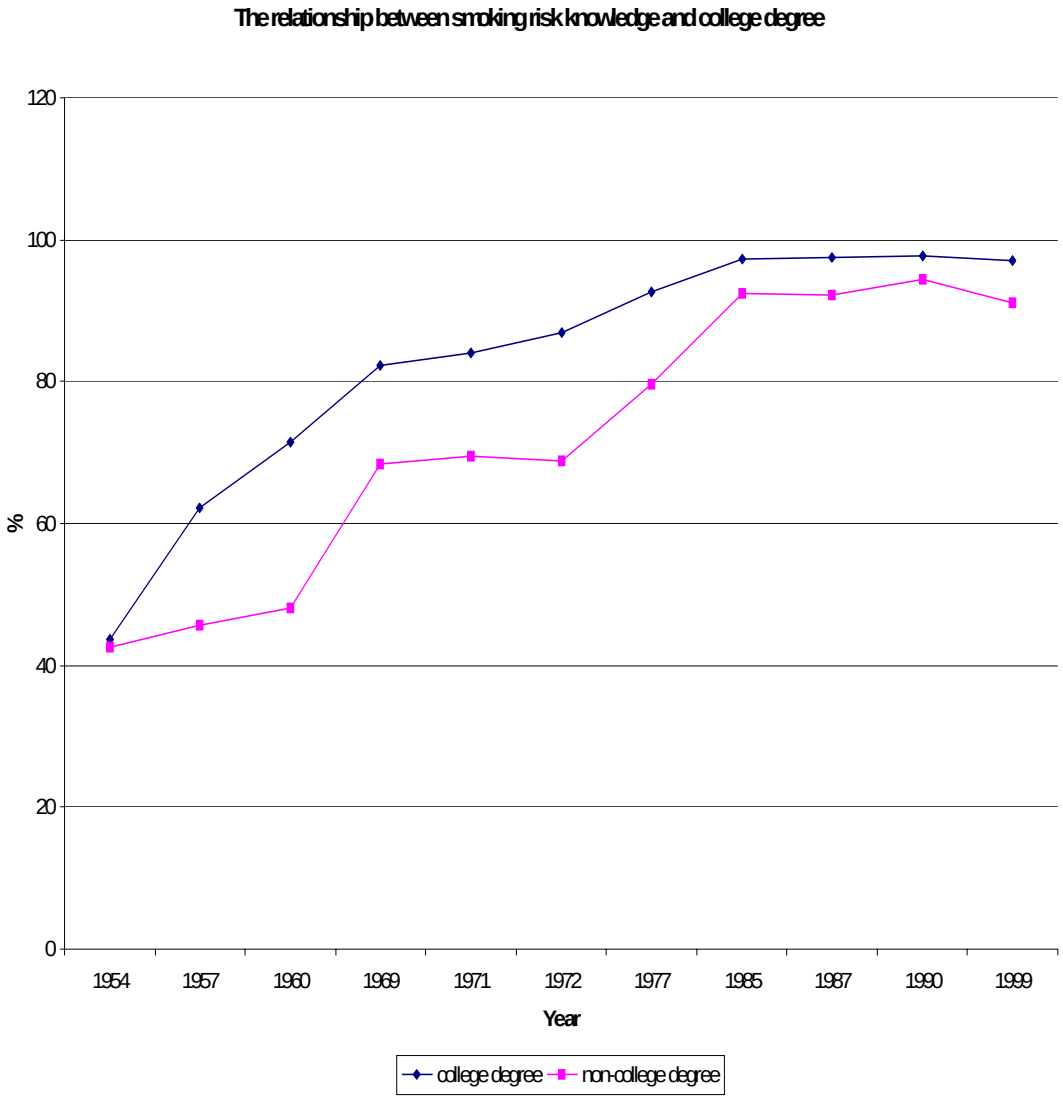
The relationship between smoking risk knowledge and college degree
120
100
80
60
40
20
0
%
1954
1957
1960
1969
1971
1972
1977
1985
1987
1990
1999
Year
college degree
non-college degree

Figure 3

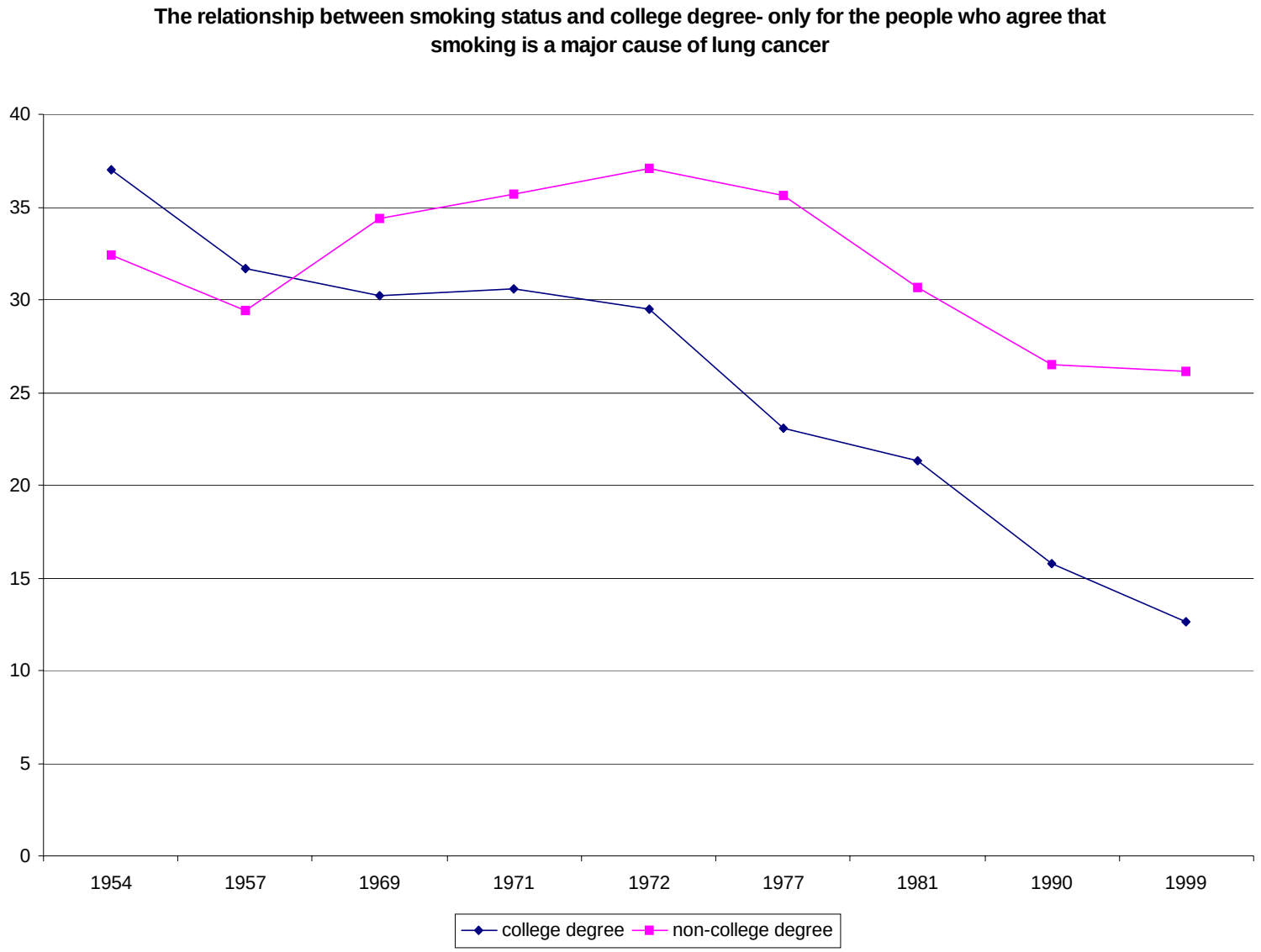
The relationship between smoking status and college degree- only for the people who agree that smoking is a major cause of lung cancer
40
35
30
25
20
15
10
5
0
1954
1957
1969
1971
1972
1977
1981
1990
1999
college degree
non-college degree

Figure 4

Figure 1: Smoking Cessation Rate over Time,from CPS-TUS 1993

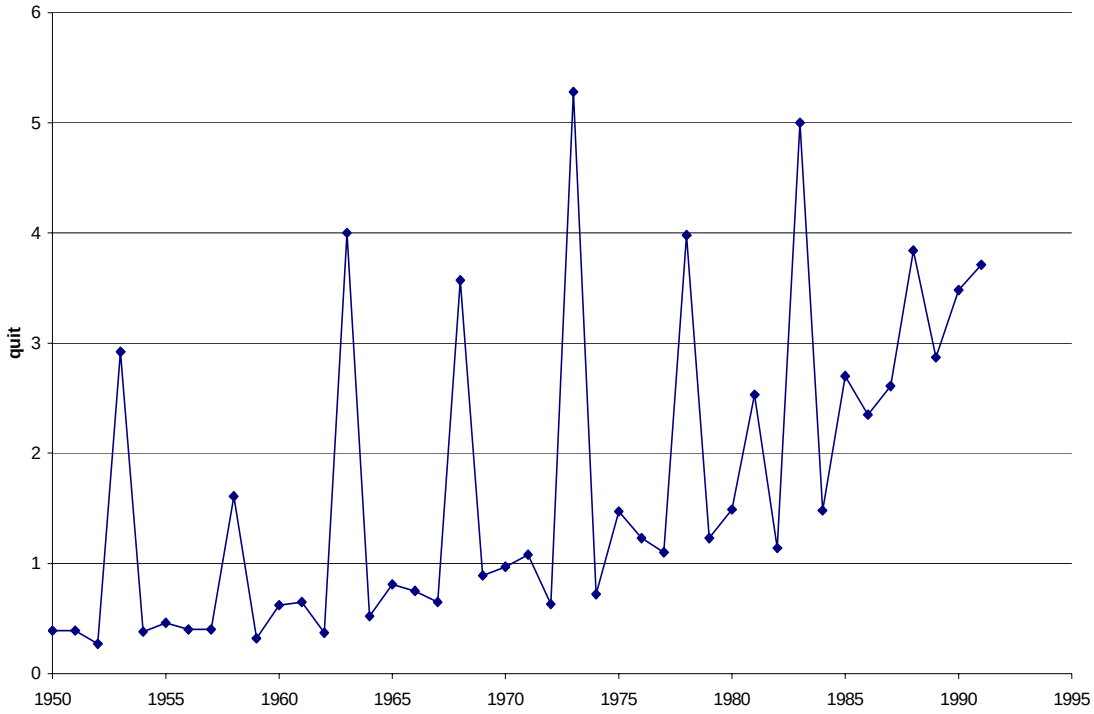

Figure 5

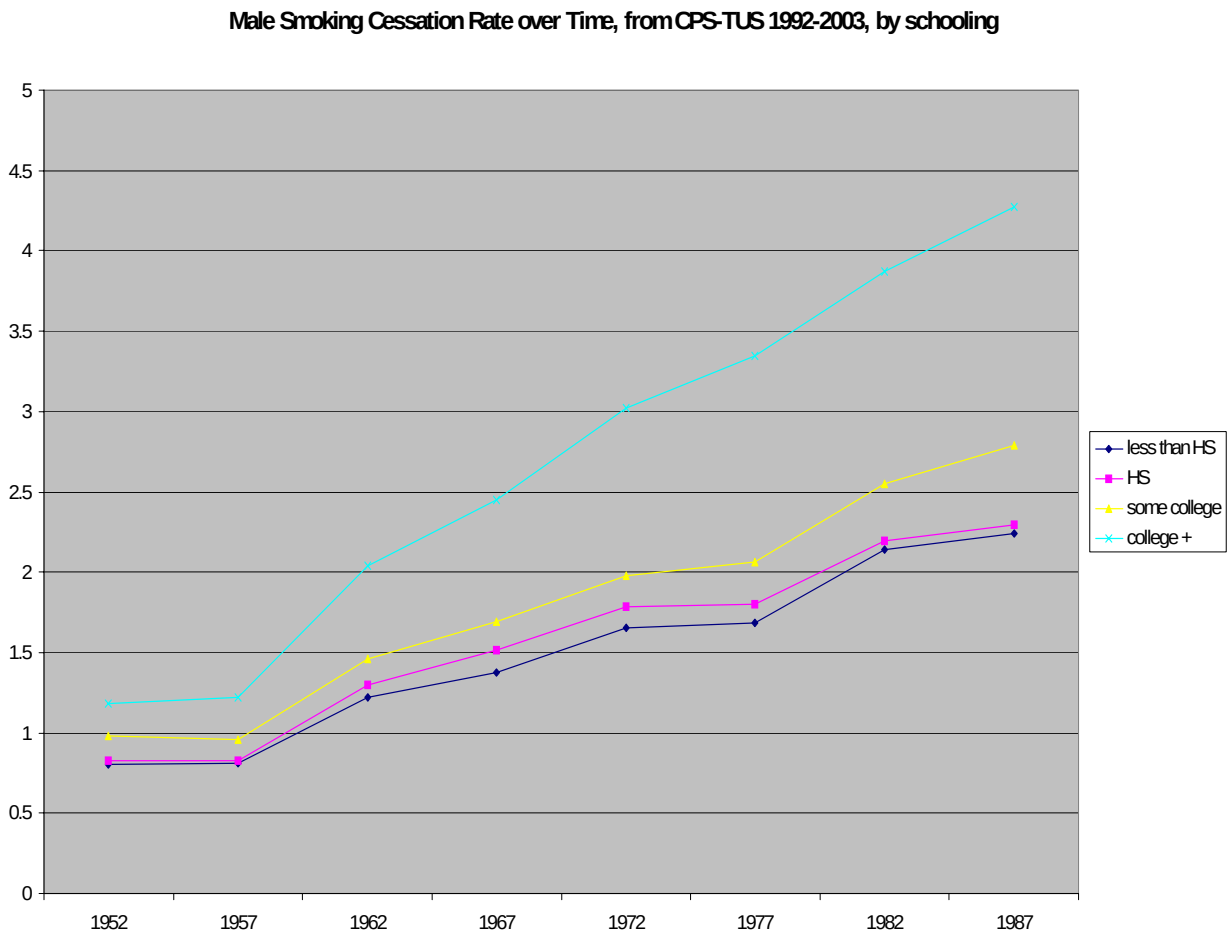
Male Smoking Cessation Rate over Time, from CPS-TUS 1992-2003, by schooling
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1952
1957
1962
1967
1972
1977
1982
1987
less than HS
HS
some college
college +

Figure 6


Female Smoking Cessation Rate over Time, from CPS-TUS 1992-2003, by schooling
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1952
1957
1962
1967
1972
1977
1982
1987
less than HS
HS
some college
college +

Figure 7

Trends in Smoking Cessation by Race

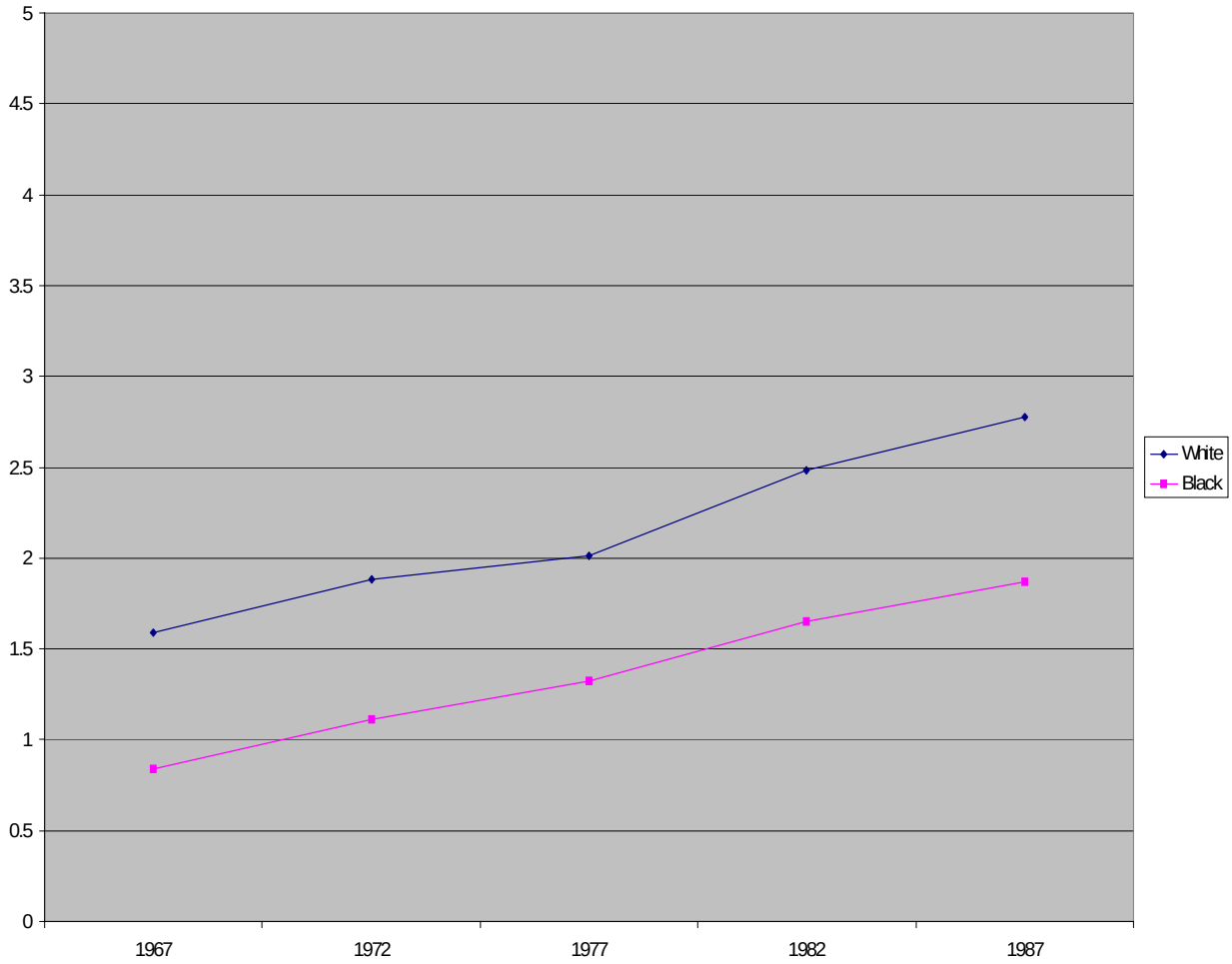

Table 1: Survey questions about lung cancer risk

Smoking Knowledge(with consistent smoking knowledge questions)			
Gallup Survey & NHS			
Year	**Survey title**	**Smoking question**	**Sample size**
1954	Gallup Poll #532 (1/7/1954)	**What is your own opinion – do you think cigaret smoking is one of the causes of lung cancer, or not?**	1435
		Yes (38.75%), No (28.22%), No opinion (27.46%), Qualified yes (3.41%), Qualified no (0.70%), No code or no data (1.46%)	
1957	Gallup Poll #592	**What is your opinion – do you think cigarette smoking is one of the causes of cancer of the lung?**	1541
		Yes (47.00%), No (32.40%), No opinion (20.60%)	
1960	Gallup Poll #628	**What is your opinion – do you think cigarette smoking is or is not one of the causes of cancer of the lung?**	3044
		Is (50.41%), Is not (28.10%), Don't know (21.49%)	
1969	Gallup Poll #785 (7/24/1969-7/29/1969)	**What is your opinion, do you think cigarette smoking is or is not one of the causes of cancer of the lung?**	1555
		Is (63.73%), Is not (10.32%), Undecided (16.47%), No Code or No Data (9.49%)	
1971	Gallup Poll #830 (5/14/1971-5/17/1971)	**Do you think cigarette smoking is or is not one of the causes of lung cancer?**	1639
		Yes (57.23%), No (12.70%), No Opinion (11.15%), No Code or No Data (18.92%)	
1972	Gallup Poll #850 (4/18/1972)	**Do you think cigarette smoking is or is not one of the causes of lung cancer?**	1556
		Yes (70.69%), No (12.66%), No Opinion (16.06%), No Code or No Data (.57%)	
1977	Gallup Poll #982 (8/16/1977)	**Do you think that cigarette smoking is or is not one of the causes of lung cancer?**	1507
		Is (80.91%), Is not (10.54%), No opinion (8.55%)	
1985	1985 HPDP	**Cigarette smoking increases chances of lung cancer?**	33630
		Definitely increases(78.29%), Probably increases(14.69%), Probably does not increase(.88%), Difinitely does not increase(.72%),	
		Double entry(.05%), Refused(.05%), DK/no opinion(5.28%)	
1987	1987 CancerControlStudy	**Relationship between somking and lung cancer?**	22043
		Yes(88.07%), No(1.99%), Maybe(5.04%), Unknown(4.87%)	
1990	1990 HPDP	**Does cigarette smoking increase chance of lung cancer?**	41104
		Definitely increases(83.93%), Probably increases(11.17%), Probably does not increase(.78%), Difinitely does not increase(.49%),	
		Refused(.01%), Unknown(.03%).	
1999	GallupNewsServicePoll#9909040	**What is your own opinion – do you think cigarette smoking is one of the causes of lung cancer, or not?**	1039
	(9/23/1999-9/26/1999)	Yes (91.72%), No (6.22%), Don't know/refused (2.06%)	

Table 2: Models of Smoking Participation, 1944 - 1999

Cross sectional regression (Probit model)											
Dependent variable: smoking decision (1: smoke, 0: don't smoke)											
year	**sample size**	**price**	**income**	**age**	**Age2**	**white**	**male**	**lesshigh**	**highdrop**	**somecol**	**college**
1944	2,072	0.13[1]		-0.02***	0.02***	-0.26***	0.15***	-0.05	-0.03	-0.00	-0.01
1949	1,088	0.16		0.02***	-0.03***	-0.07	0.27***	-0.08	0.00	0.01	-0.04
1954	1,370	-0.10		0.01**	-0.02***	-0.07	0.29***	-0.04	-0.02	-0.09*	-0.11*
1957	1,499	-0.06		0.01**	-0.02***	-0.04	0.15***	0.00	0.07**	-0.01	-0.05
1969	1,469	0.19***	0.02	0.01	-0.01***	-0.08**	0.11***	0.04	0.12***	0.00	-0.09*
1971	1,451	0.21***	0.03	0.02***	-0.02***	0.03	0.12***	0.05	0.07*	-0.05	-0.12***
1972	1,531	-0.03	0.02	0.01***	-0.02***	-0.07	0.11***	-0.05	-0.02	0.00	-0.17***
1977	1,484	-0.07	0.01	0.01***	-0.02***	-0.01	0.10***	-0.00	0.04	-0.05	-0.19***
1981	1,513	-0.17	-0.07***	0.03***	-0.03***	-0.01	0.09***	-0.04	0.02	-0.05	-0.15***
1987	1,003	0.19*	-0.05	0.02***	-0.03***	-0.01	0.04	-0.04	0.17***	-0.07*	-0.16***
1990	1,213	0.05	-0.04	0.02***	-0.02***	-0.06	0.04	0.04	0.04	-0.11***	-0.15***
1997	1,012	0.01		0.00	-0.01**	0.02	0.04	-0.07	0.12***	-0.01	-0.11***
1999	997	-0.01	-0.04	0.01***	-0.02***	0.06**	-0.02	-0.03	0.04	-0.06**	-0.16***

[1] Since we don't have information on cigarette prices before 1954, we use cigarette taxes instead prices for the regression in 1944 and 1949.

Table 3: Discrete Time Hazard Model of Smoking Cessation Among Males

quit	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
age	.0019817	.0000263	75.29	0.000	.0019301	.0020333
_Irace_2	-.0199762	.0011254	-17.75	0.000	-.022182	-.0177704
_Irace_3	-.0018569	.0014418	-1.29	0.198	-.0046829	.000969
_Irace_4	-.0101108	.0017023	-5.94	0.000	-.0134473	-.0067744
_Iedu_2	.0030759	.0029492	1.04	0.297	-.0027045	.0088563
_Iedu_3	.0059654	.0035298	1.69	0.091	-.0009528	.0128836
_Iedu_4	.0104813	.003616	2.90	0.004	.0033941	.0175685
_Iyear_1957	-.0055085	.0028619	-1.92	0.054	-.0111177	.0001007
_Iyear_1962	.0041794	.0027876	1.50	0.134	-.0012842	.0096429
_Iyear_1967	.0032537	.0027553	1.18	0.238	-.0021466	.008654
_Iyear_1972	.0071656	.0027292	2.63	0.009	.0018165	.0125147
_Iyear_1977	.0026622	.0027066	0.98	0.325	-.0026426	.007967
_Iyear_1982	.0129475	.0026973	4.80	0.000	.0076609	.018234
_Iyear_1987	.0145855	.0027076	5.39	0.000	.0092787	.0198923
_Iedu~2_1957	.000857	.0039332	0.22	0.828	-.0068519	.0085659
_Iedu~2_1962	.0036371	.0037834	0.96	0.336	-.0037783	.0110525
_Iedu~2_1967	.0103288	.003702	2.79	0.005	.003073	.0175847
_Iedu~2_1972	.0099597	.0036374	2.74	0.006	.0028306	.0170888
_Iedu~2_1977	.0111403	.0035852	3.11	0.002	.0041135	.0181672
_Iedu~2_1982	.0100496	.0035563	2.83	0.005	.0030794	.0170199
_Iedu~2_1987	.0090904	.0035525	2.56	0.011	.0021277	.0160531
_Iedu~3_1957	.0006202	.004665	0.13	0.894	-.008523	.0097634
_Iedu~3_1962	.0098878	.0044461	2.22	0.026	.0011736	.018602
_Iedu~3_1967	.0161646	.0043084	3.75	0.000	.0077204	.0246089
_Iedu~3_1972	.0150827	.0042144	3.58	0.000	.0068225	.0233428
_Iedu~3_1977	.0175334	.0041555	4.22	0.000	.0093887	.0256781
_Iedu~3_1982	.0177803	.0041306	4.30	0.000	.0096844	.0258762
_Iedu~3_1987	.0229109	.0041283	5.55	0.000	.0148195	.0310023

_Iedu~4_1957	.0061246	.0047701	1.28	0.199	-.0032246	.0154738
_Iedu~4_1962	.0216638	.0045445	4.77	0.000	.0127568	.0305708
_Iedu~4_1967	.0314135	.0044157	7.11	0.000	.0227588	.0400681
_Iedu~4_1972	.0393925	.0043346	9.09	0.000	.0308968	.0478882
_Iedu~4_1977	.0470042	.0043	10.93	0.000	.0385764	.055432
_Iedu~4_1982	.0492885	.0042982	11.47	0.000	.0408641	.0577128
_Iedu~4_1987	.0525627	.0043239	12.16	0.000	.0440879	.0610374
_cons	-.0271164	.0022372	-12.12	0.000	-.0315012	-.0227316

Number of obs = 673,432

Table 4: Discrete Time Hazard Model of Smoking Cessation Among Females

quit	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
age	.0010198	.0000242	42.19	0.000	.0009724	.0010672
_Irace_2	-.0131789	.0010392	-12.68	0.000	-.0152156	-.0111421
_Irace_3	.0014594	.0016673	0.88	0.381	-.0018085	.0047273
_Irace_4	-.0148486	.001865	-7.96	0.000	-.018504	-.0111932
_Iedu_2	.0014145	.0033395	0.42	0.672	-.0051308	.0079599
_Iedu_3	.0032457	.0039303	0.83	0.409	-.0044575	.010949
_Iedu_4	.0175239	.0046847	3.74	0.000	.0083419	.0267058
_Iyear_1957	-.0058324	.0033957	-1.72	0.086	-.012488	.0008231
_Iyear_1962	.0022016	.0032495	0.68	0.498	-.0041673	.0085706
_Iyear_1967	.0006802	.0031722	0.21	0.830	-.0055371	.0068975
_Iyear_1972	.0030676	.0031163	0.98	0.325	-.0030402	.0091755
_Iyear_1977	.0061369	.0030662	2.00	0.045	.0001272	.0121466
_Iyear_1982	.0118984	.0030342	3.92	0.000	.0059515	.0178453
_ Iyear_1987	.0234483	.0030249	7.75	0.000	.0175197	.029377
_Iedu~2_1957	.0029936	.00436	0.69	0.492	-.0055519	.0115391
_Iedu~2_1962	.0047499	.0041486	1.14	0.252	-.0033811	.012881

_Iedu~2_1967	.0097555	.0040295	2.42	0.015	.0018578	.0176532
_Iedu~2_1972	.0105627	.0039419	2.68	0.007	.0028367	.0182886
_Iedu~2_1977	.0111521	.0038664	2.88	0.004	.0035742	.01873
_Iedu~2_1982	.0179358	.0038204	4.69	0.000	.0104481	.0254236
_Iedu~2_1987	.0167522	.0038027	4.41	0.000	.009299	.0242053
_Iedu~3_1957	.0088326	.0051156	1.73	0.084	-.0011938	.018859
_Iedu~3_1962	.0115792	.0048403	2.39	0.017	.0020923	.0210661
_Iedu~3_1967	.0195362	.0046695	4.18	0.000	.0103841	.0286882
_Iedu~3_1972	.0183585	.0045486	4.04	0.000	.0094435	.0272736
_Iedu~3_1977	.02395	.004456	5.37	0.000	.0152163	.0326836
_Iedu~3_1982	.0333318	.0044049	7.57	0.000	.0246983	.0419652
_Iedu~3_1987	.031136	.0043863	7.10	0.000	.0225391	.0397329
_Iedu~4_1957	.0025279	.0060794	0.42	0.678	-.0093876	.0144433
_Iedu~4_1962	.0156896	.0057176	2.74	0.006	.0044832	.026896
_Iedu~4_1967	.0363995	.0054964	6.62	0.000	.0256267	.0471722
_Iedu~4_1972	.0389512	.0053463	7.29	0.000	.0284726	.0494298
_Iedu~4_1977	.0481534	.0052549	9.16	0.000	.037854	.0584528
_Iedu~4_1982	.0613338	.0052171	11.76	0.000	.0511084	.0715592
_Iedu~4_1987	.0652668	.005217	12.51	0.000	.0550417	.0754919
_cons	-.0089939	.0026665	-3.37	0.001	-.0142202	-.0037677

Number of obs = 641077

Table 5: Discrete Time Hazard Model of Smoking Cessation Among Pre- and Post-1964 Initiators, Males

quit	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
age	.0021057	.0000438	48.08	0.000	.0020199	.0021916
_Irace_2	-.0216824	.0013385	-16.20	0.000	-.0243058	-.0190589
_Irace_3	-.0012006	.0016827	-0.71	0.476	-.0044987	.0020975

_Irace_4	-.0106541	.0019724	-5.40	0.000	-.0145199	-.0067883
_Iedu_2	.0144759	.0016937	8.55	0.000	.0111562	.0177956
_Iedu_3	.0270994	.0017657	15.35	0.000	.0236387	.0305602
_Iedu_4	.0634323	.0018832	33.68	0.000	.0597414	.0671233
_Ipre64_1	.0013611	.002036	0.67	0.504	-.0026294	.0053516
_IeduXpr~2_1	-.0010983	.0020948	-0.52	0.600	-.005204	.0030073
_IeduXpr~3_1	-.0043415	.0022598	-1.92	0.055	-.0087707	.0000877
_IeduXpr~4_1	-.0153992	.0023959	-6.43	0.000	-.0200951	-.0107032
_Iyear_1972	.0042169	.0012119	3.48	0.001	.0018415	.0065923
_Iyear_1977	.0017058	.0012414	1.37	0.169	-.0007272	.0041389
_Iyear_1982	.011579	.0013029	8.89	0.000	.0090254	.0141326
_Iyear_1987	.0142324	.0013827	10.29	0.000	.0115223	.0169424
_cons	-.0309373	.0018881	-16.39	0.000	-.0346379	-.0272368

Number of obs = 515,589

Table 6: Discrete Time Hazard Model of Smoking Cessation Among Pre- and Post-1964 Initiators Females

quit	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
age	.0011117	.0000388	28.63	0.000	.0010356	.0011878
_Irace_2	-.0140299	.0012008	-11.68	0.000	-.0163834	-.0116764
_Irace_3	.0013784	.0018823	0.73	0.464	-.0023109	.0050678
_Irace_4	-.0161926	.0021127	-7.66	0.000	-.0203335	-.0120518
_Iedu_2	.0200982	.0015039	13.36	0.000	.0171507	.0230458
_Iedu_3	.0384617	.0015612	24.64	0.000	.0354019	.0415215
_Iedu_4	.085707	.0017277	49.61	0.000	.0823207	.0890933
_Ipre64_1	.0091566	.0018445	4.96	0.000	.0055414	.0127718
_IeduXpr~2_1	-.0068866	.0019262	-3.58	0.000	-.0106618	-.0031114
_IeduXpr~3_1	-.0155461	.0020864	-7.45	0.000	-.0196355	-.0114567
_IeduXpr~4_1	-.0342292	.0023964	-14.28	0.000	-.038926	-.0295324
_Iyear_1972	.0016416	.0012089	1.36	0.174	-.0007279	.004011
_Iyear_1977	.0072164	.0012127	5.95	0.000	.0048396	.0095933
_Iyear_1982	.0199897	.0012487	16.01	0.000	.0175423	.0224372
_Iyear_1987	.0306761	.001307	23.47	0.000	.0281143	.0332378
_cons	-.0215815	.0017676	-12.21	.000	-.0250461	-.018117

Number of obs = 519,017