

# Smoking, Binge Drinking and the Social Capital of Marriage and Children

by

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## Abstract

The paper develops a model of decision making under risk where the tradeoff between risk and reward is modulated by exogenous changes in social capital. This latter is defined as fundamentally constituted by those significant and beneficial relationships one has in spouse, children, friends and community. The social capital elements studied empirically here are those of spouse and children. The National Longitudinal Survey of Youth 1979, which surveys over 12,000 individuals followed from 1979 to the present, forms the database for the study. Regression and logit analysis of both the levels and the changes in smoking and of binge drinking following exogenous changes in social capital tend to support the hypotheses that social capital will reduce the probability of behaviors entailing a risk of ill health or death.

It is well known to both health economists and medical scientists, perhaps also now to the general public, that cigarette smoking shortens one's life span, that binge drinking is dangerous to it, and that marriage extends life, especially for men. The present paper proposes a nexus between the literature on health-risky behaviors and the rapidly growing literature on social capital. Though "social capital" is still not uniformly defined, one central definition describes it as one's significant, sympathetic relationships (Helliwell and Putnam, 2004; Robison 1995); and following this approach, objective indicators of social capital can be understood to enter the utility function directly (Akerlof, 1998; Laibson, 2001). The tradeoff between life risk and monetary or psychic return (Viscusi, 1993) is then modulated by changes in the social capital. This implies a pattern of behavior under which greater social capital is associated with a lower acceptable probability of death when considering health-risky activities.

Marriage and children will affect health in other ways, such as through the reduction of stress; but, behavior toward risk, an enduring interest in economics, helps to fill a gap in this picture. The model elaborates a common belief that one takes fewer risks with one's own life and health when one feels more responsible to others and likewise the belief that one avoids foolish risks to a greater degree when one's self-valuation of own life is greater.

These predictions are tested empirically using the National Longitudinal Survey of Youth<sup>79</sup> conducted from 1979 continuously to the present by the Bureau of Labor Statistics. There are advantages to longitudinal, individual data over the cross-section, group aggregates that have been used in prior studies of health and social capital

(Subramanian, et al., 2001; Lochner, et al, 2003; Putnam, 2000; and Folland, 2004, 2005). Aggregate data pose different and more troublesome difficulties in identifying a true social capital effect. These longitudinal data allow studies of individuals at many points in time as well as the more informative 'before and after' analyses. Cross-tabulation, binary logit, and least squares regression models generally support the hypotheses.

Section I reviews literatures on the economics of social capital, the medical and health research findings on smoking and binge drinking and other issues related to the present study. Section II develops the model and derives the key implications. Section III describes the data as applied to the empirical analyses of smoking and presents and discusses the results of these analyses. Section IV similarly describes the data and analyses of binge drinking and discusses these results. Section V discusses the work as a whole, describes cautions regarding its weaknesses, and offers conclusions as well as ideas for further research.

## Section I Review of Relevant Literatures

### A. Social Capital Defined for the Present Purpose

At least since Becker's (1981) theoretical explorations of family phenomena, there has been increasing economic interest in social variables as potential influences on economic and social outcomes. "Social capital" represents such an interest, one that concentrates attention on sympathetic relationships such as spouse, children, friends, and

community networks as well as on qualities of these relationships such as trust, community activeness, sociability and community-mindedness. The phrase does not have a universal common definition in the literature, for example, sometimes it is a community-level phenomenon (Putnam, 2000), while in other usages it is a set of all individual relationships (Helliwell and Putnam, 2004; Shortt, 2004; Robison, 2002, 1995). It would be vain to insist on one universal definition, since the subject is still in exploration.

A specific definition for the present research is necessary, however, and I propose to treat social capital as simply the set of one's sympathetic relationships. Following close to the original social capital concept as developed in sociology, this also fits that of Robison (1995) in economics. An advantage is that relationships can be more objectively observed than qualities of relationships such as trust. With this approach, to test the relationship of social capital to health is to ask whether married people, parents, people with satisfying social relationships and people with satisfying community participation tend to be healthier. A good *prima facie* case available in the wider literature says that they are.

## B. Community Social Capital and Health

Community level social capital, Putnam (2000) showed, is beneficially correlated with age-adjusted mortality rates across states. Subramanian et al. (2001) also studied social capital indicators by state and similarly found a salutary effect in a variety of

illness rates. Folland (2004) studied a panel of states, using Putnam's indicators, finding a supportive case for beneficial effects of social capital in health; Folland (2005) investigated a cross-section of state level effects of Putnam's index, adding marital status and children, on health risky behaviors, this also generally supported the hypothesis. Lochner et al. (2003) collected data on 342 neighborhoods in the Chicago area and found that higher levels of neighborhood social capital were associated with lower death rates in the 45-64 year old age group that was studied. Social ties also proved inversely related to mortality in a study of three communities in Massachusetts, Connecticut and Iowa (Seeman et al, 1993).

### C. Marriage and Health

The effect of marriage on health appears in many more studies, most often outside of an explicit social capital framework. "Lone mothers" are more stressed and sicker than those married; they are also more likely to smoke (Young, James, and Cunningham, 2004). A satisfying marriage proves to lower cardiac risk in a study by Gallo et al. (2003a); conversely, an unhappy marriage is associated with physiological stress and poor health indicators (Gallo, 2003b).

Unmarried men in New South Wales, Australia incur a significantly higher risk of heart disease than married men (Malcolm and Dobson, 1989). Sometimes such data are loosely summarized with the phrase: "One of the greatest risks to health for both men and women is 'not getting married'." Nevertheless the transitions into and out of marriage can

generate unhealthful stress levels (Prigerson, Maciejewski, and Rosenbeck (1999), and quality of the marriage relationship also counts for health (Robles and Kiecolt-Glaser, 2003).

#### D. One's Children and One's Health

It is less common in these literatures to find assessments of the effect of one's children on one's health, although the social capital economic model that I will shortly present asserts that they would play a similar role as the spouse. The scarcity of such research probably reflects a medical model in the common research framework. In medicine, one *treats* the patient and *provides* care; since children require care rather than provide it, it would seem natural to discount them as contributors to parental health. A recent exception was by economist George Akerlof (1998) who argued that both marriage and children affect utility directly; he applied this model to theoretically and econometrically show beneficial effects of both marriage and children on work performance and on choices regarding health-risky behaviors.

#### E. Social Capital and Smoking and Drinking

The correlation of marriage and the health risky behaviors of smoking and excessive drinking proves inverse as reported in the epidemiologic literature. Single women exhibit a greater likelihood of smoking (DuNah et al., 1991). Married subjects drink less and smoke less in the Minnesota Heart Study (1986). The odds of quitting

smoking are greater among married, both male and female, in the Framingham Study (Freund et al., 1992). Reported ex-smokers include a disproportionately higher percentage of married (Rustin et al., 1978). Marriage to a nonsmoker helps one to quit (Franks, Pienta, and Wray, 2002). Husband's drinking patterns are influential to the wife's patterns of drinking among newly marrieds (Leonard and Mudar, 2003). Lindstrom and Ostergren (2001) found reduced likelihood of smoking for people with greater social participation.

#### F. Can Community Social Capital Be Improved?

In sum, whether the element of social capital as defined here is marriage, children, friends, or community ties, it is found in association with individual health in a manner consistent with some beneficial effect. These facts have led to much enthusiasm among many in the health research community to foster growth in community social capital. Lomas (1998) suggests, for example, that cases exist where investment in social capital development would be better than investments in traditional treatment methods. Likewise, Putnam (2000) has been extraordinarily successful in igniting efforts to measure and address the reported secular decline of social capital in the United States.

However, there are several reasons for caution. First, it is not clear that anyone yet knows how to effect genuine, measurable improvement in a community's social capital. Second, some (Lochner et al, 2003) point to potential downsides from augmenting social capital, for example, social activities are often associated with unhealthful behaviors.

Third, cultural differences may make it difficult or even risky to import this 'solution' across cultures. Fourth, much of the supportive research compares group averages or likelihood's, whereas it is the marginals that apply when considering changing social capital. All these concerns emphasize that this line of research is still exploratory.

#### G. Econometric Issues

A more fundamental inquiry is whether the social capital and related literature identify a true social capital effect (Durlauf, 2002). Aggregate equations across states or communities may be identified but only under fairly stringent modeling assumptions, and equations of individual behaviors also may fail to achieve proper identification. For example, if married individuals smoke less than those married, we may ask whether marriage changed the behaviors, or whether nonsmokers were better prospects in the mating and marriage markets. Consider also that in cross-sectional state aggregate studies, states recording high social capital may have achieved greater sociability because they had already achieved greater health and in consequence were for that reason happier and more outgoing.

#### H. The 'Value of a Statistical Life' Model

Since the model proposed here is a reconception of models of the value of a statistical life, it will be useful to recount that model here. As described by Viscusi (1993), observed individual choices over risk and reward can be used to infer monetary

value attached to a small change in risk to life. If the representative group adheres to this pattern, one can calculate the monetary value of saving a representative life. It is understood that the value of life may be nonlinear; were the change in risk more than marginal the valuations would likely be different.

Two classes of behaviors fit the model: 1) willingness to pay; and, 2) willingness to accept. The former applies naturally to many health care treatments, and a large literature has grown up that estimates the tradeoffs by asking subjects their hypothetical willingness to pay contingent on asserted reductions in health risk (Kartman, Stalhammar, and Johannesson, 1996; Propper, 1990; Johannesson and Jonsson, 1991).

The willingness to accept analysis observes the monetary reward individuals will accept as sufficient to be indifferent between their status quo and the risks of the new endeavor, such as a risky job (Viscusi, 1993). Though this approach has not been as frequently used in health economics research, it is the one I apply here. This is because it is best suited to health-risky behaviors such as smoking cigarettes and binge drinking, behaviors that entail the acceptance of increased health risk in order to obtain a psychic reward in as enhanced pleasure and satisfaction.

### I. Where the Present Paper Fits Into This Literature

This paper focuses on the social capital elements of marriage and children studied in the context of a large, longitudinal sample. This allows for "before and after" looks at impacts following changes in social capital. Marginal effects can in principal be found, a

process that eliminates several of the questions plaguing the interpretation of social capital studies. It also proposes an economic theory of social capital effects that accounts for responsibility motives and develops the role of the value of a statistical life in assessing behavior toward risk. That economic ideas can contribute to the understanding of social capital has been shown by Glaeser et al (2000). In a developing area of investigation such as this, increments to theory can surely be useful; the literature of social capital has even been described as "untheorized" (Shortt, 2004, p. 12).

## Section II. The Model

Let social capital be defined as the presence of spouse, children, friends, and the set of relationships forming the individual's network of community. The data available to the present study are limited to spouse and children, and these will be the focus in what follows. Thus

(1) *Social Capital* =  $S = [W, C]$  where  $W = 1$  indicates married, and  $C = 1$  indicates that the individual has children.

Let the probability of death be  $p$  for a single decision period. Let utility be a function of exogenously determined *Social Capital*,  $S$ , and  $m$ , which is the return from a risky activity. The return may be monetary--such as in the case of a risky job--or psychic--as in the case of the pleasures of smoking cigarettes. The return,  $m$ , will be treated as metric.

Further the utility function is assumed to be of a form appropriate to expected utility calculation. Expected utility becomes

$$(2) \quad EU = (1 - p)U(S_o, m) + pU(0, 0, I)$$

The added variable,  $I$ , represents the individual's net bequeathal such as life insurance. The individual values this death benefit altruistically during his life; but, since he gains utility from his planned beneficence it is better termed *impure altruism* (Andreoni, 1990). The presence of life insurance may seem theoretically to significantly modify the results; however, it is shown in the Appendix that life insurance causes no qualitative changes in the model provided that  $U(S_o, m) > U(0, 0, I)$ , which is plausible, perhaps even trivial, to assume. The converse would imply a suicidal subject, an uncommon case.

The subject maximizes (2) over  $p$  and  $m$  but is constrained by the "market" relation between  $p$  and  $m$ . In the case of job choice, the function  $M(p)$  ( $M' > 0$ ,  $M'' < 0$ ) represents the offers of employers with increasing risks worth a higher return but risk finding a diminishing marginal return. In the case of psychic returns from smoking or binge drinking,  $M(p)$  ( $M' > 0$ ,  $M'' < 0$ ) represents a production-like function indexing the psychic return and exhibiting diminishing marginal returns. The resulting LaGrangian function with the first order conditions for a maximum is:

$$(3) \quad \text{to max } L = (1-p)U(S_o, m) + \lambda[M(p) - m]$$

$$\otimes m, p, \lambda \rightsquigarrow$$

$$(3.1) \quad L_p = -U(S_o, m) + \lambda M_p = 0$$

$$(3.2) \quad L_m = (1-p)U_m - \lambda = 0$$

$$(3.3) \quad L_\lambda = M(p) - m = 0$$

To solve for the desired unknown effects,  $\frac{\partial p}{\partial S}$  &  $\frac{\partial m}{\partial S}$ , we derive the following system of second partials:

$$(4.0) \quad \begin{bmatrix} \lambda M_{pp} & -U_m & M_p \\ -U_m & (1-p)U_{mm} & -1 \\ M_p & -1 & 0 \end{bmatrix} \begin{bmatrix} \partial p / \partial S \\ \partial m / \partial S \\ \partial \lambda / \partial S \end{bmatrix} = \begin{bmatrix} U_s \\ -(1-p)U_{mS} \\ 0 \end{bmatrix}$$

By Cramér's Rule we have

$$(5) \quad \partial p / \partial S = [-U_s + (1-p)U_{mS}M_p] / |H| < 0$$

where  $|H|$  is the determinant,  $|H| = \{-\lambda M_{pp} + U_m M_p + M_p(U_m - M_p(1-p)U_{mm})\} > 0$ .

Provided that social capital offers utility,  $U_s > 0$ , that the return on social capital is a gross substitute for  $m$ ,  $U_{mS} < 0$ , and that  $|H| > 0$ , as holds here and satisfies the second order conditions, then the individual reduces his health-risky behaviors on acquiring increments to social capital. Also,

$$(6) \quad \partial m / \partial S = [-M_p U_S + (1-p) U_{mS} M_p^2] / |H| < 0.$$

Thus, the increase in social capital leads to a decrease in the health risky behavior.

## Section IV. Smoking Behaviors

### A. The Data on Smoking

The U.S. Bureau of Labor Statistics, which developed and maintains a database of over 12,000 randomly selected people chosen as youth in 1979, follows up this sample in repeated surveying through time to the present. This National Longitudinal Survey of Youth 79 contains detailed information on smoking and drinking behaviors as well as thorough records on family and marriage characteristics. Specific subject surveys, such as those on smoking, may be done irregularly, and though BLS interviewers often ask essentially the same questions, sometimes there are differences. The taking of thorough observations on family status and marital status in 1992 and 1998 as well as smoking behaviors make this span of years a convenient setting for the empirical analysis on smoking. The descriptive statistics on the smoking study variables are presented in Table 1.

TABLE 1 ABOUT HERE

*Smoke* is defined as equal to one if the individual responded to the survey by indicating a positive amount of cigarettes smoked per day. *Firstborn8892* indicates that the individual's first child was born during the span of 1988-92, and *Firstborn9298* for the corresponding span. *Quality of Marriage* equals one when the respondent indicated the highest quality of marriage option proffered on a Likert scale; only women were asked this question, thus the equations which include this variable have about half the number of observations. *Age* is calculated in years. *Quit* is defined equal to one when the individual reports being a smoker in 1992 and a nonsmoker in 1998. *Married* equals one if the individual was married during the respective survey year.

#### TABLE 2 ABOUT HERE

##### B. The Results on Smoking Behavior

Table 2 presents several results indicating that marriage as well as the event of the firstborn child are associated with lowered smoking propensities. The equations for 1992 and 1998 are presented in two forms; one with *Quality of Marriage* included and one with this variable deleted to allow for a larger sample size.

The associations, most them significant in at least a one-tailed test (except *Age*, which has no predicted sign), take the sign consistent with the hypothesis that a beneficial effect of social capital exists on smoking behavior. However, a beneficial "effect" suggests that smoking habits respond to change in the social capital variables. In Table 3,

a sub sample is formed by selecting only people who were smokers in 1992, and we can ask whether these smokers quit smoking subsequent to getting married and/or experiencing their firstborn child during the period 1992-1998. The Table presents equations with the dependent variable *Quit*, testing by logit equations for evidence of behavior change associated with exogenously changed social capital.

### TABLE 3 ABOUT HERE

The data reveal that the arrival of children significantly affects the decision to quit smoking. *Firstborn* indicates a decisive change in one's responsibilities to others and on one's assessment of the values others attach to oneself. On the margin, some smokers reappraise the value of staying alive and healthy and thus quit smoking. Such, evidence on the margin is more compelling than knowledge alone that the average parent is less likely to smoke than the average nonparent. Of course, consistency with this hypothesis does not deny that these data may be also consistent with other hypotheses. For example, the same statistics could result if parents were sufficiently concerned about the effect of side stream smoke on the child, a sense of responsibility different from the present interpretation.

The theory also predicts that smoking would be reduced upon getting married, but this variable though of the expected sign, is insignificant in both equations. The first assumption must be that marriage does not change one's smoking habits, that is, no

marginal effects; alternatively marriage markets may favor nonsmokers, resulting in different group averages. While this interpretation cannot be ruled out by these data, the sample of quitters here is quite small. Table 4 presents the cross tabulation of *Got Married* and *Quit*; revealing the group sizes. We note that the pattern though insignificant is in the hypothesized direction: The *Got Marrieds* quit smoking in greater proportion than those who did not marry. That the significance level is inadequate may be due to the small cell size, though this also cannot be said with confidence.

TABLE 4 ABOUT HERE

#### Section IV. Binge Drinking Behaviors

##### A. The Data on Binge Drinking

The NLSY79 records drinking habits of these youth at irregular intervals. *Binges* is defined the number of times during the past month that the subject consumed six drinks or more at a single session; through interviews, the BLS recorded the number binges reported by each subject during the month prior to the interview. Binging levels were reported in 1984 and again in 1989 for each individual. The descriptive statistics for these data are presented in Table 5.

TABLE 5 ABOUT HERE

As in the previous manner, *Got Married* is defined as equal to one for a subject who was not married in 1984 but reported being married in 1989. Similarly, *Reduction in Binging* is described by the percent reduction in number of binging episodes reported from 1984 to 1989; in contrast *Quit Binging* refers to a subject who reported positive binges in 1984 and zero binges in 1989. *Firstborn8488* is defined to equal one if the individual's first child was born during the period 1984 to 1989. *Married* variables equal one if the individual reported being married in the given reporting year. As previously described, *Binges* records the number of occasions of having six or more drinks on a single occasion during the past month.

The following discussion divides the binging analysis into two parts; first, an analysis of the level of binging at two points in time, 1984 and 1989. Second, it presents an analysis of changes in binging over this span of years.

#### TABLE 6 ABOUT HERE

Table 6 indicates that marriage, combined with marriage quality, tends to displace binge drinking to a significant extent. Having one's first child during this span of years tends to discourage binge drinking at the beginning of the period (though it is significant only at the 10% level); there is no discernable effect at the end of the period in these data. Drinking creates no toxic fumes and is often done out of children's' presence suggesting that there is no externality hypothesis that might confound the interpretation.

In reconsidering the marriage effect, it is common to say that marriage "matures one" or that it has a "settling effect." The present model is simply a proposal to explain the effect in economic terms. The spouse is valued directly in the utility function. As such this increment provides two paths by which risky actions are given a reduced value. One, the utility of the social capital substitutes for the utility of risk taking. And, two, the social capital offers a greater reward for staying healthy and alive.

While the previous Table suggests that marriage and marriage quality matter for drinking behaviors, a better test is to see whether changes in social capital result in changes in bingeing. Table 7 attempts to discern this by regressing the *Reduction in Bingeing* as well as the indicator for *Quit* (Quit Bingeing) against *Got Married*, *Quality of Marriage* and *Firstborn '80s*.

#### TABLE 7 ABOUT HERE

The results suggest that getting married and the quality of marriage bear importantly on changes in bingeing activities. We can see in the *Reduction* equation that to have a high quality marriage sharply reduces the propensity to binge--by 35%; while, getting married itself has a lesser and less significant effect. However, marriage and its quality significantly associated with the choice to quit bingeing, as is shown in the logit equation for *Quit*.

## Section V. Discussion and Conclusions

These data suggest that spouse and children have effects on the individual's relative willingness to adopt health-risky behaviors such as smoking and excessive drinking. The results for spouse are also consistent with a substantive literature in health and medical research. The conception of both marriage and children being contributors to one's health is more novel, yet this makes good sense in the context of smoking and excessive drinking, and possibly other health-risky activities. In this conception, social capital elements can be but need not be care-givers; it is sufficient that they compete in the subject's utility valuation with the pleasures of the health-risky activities and that they increase the payoff to staying healthy and alive.

While the statistics support the hypothesis in the main, in some cases they cannot dispel an alternative hypothesis. Though the NLSY79 is large, sample reductions required for certain tests (especially the tests for Quitting smoking) leave the cell sizes at issue quite small, and this causes questions about the marriage effect on quitting to remain unanswered. However, the hypothesis is likely to hold true for this case; as discussed in Section I when reviewing the health and medical research literature (Freund et al., 1992; Franks, Pienta and Wray, 2002), behavioral health studies have found that 'marrieds' are more likely to quit smoking. In one study (Young, James, and Cunningham, 2004), the authors found that lone mothers had a greater propensity to smoke than married mothers. This latter study suggests an effect of the birth of a child on quitting smoking separate from concern about harmful side stream smoke on the child--

unmarried mothers are more likely to smoke than married mothers. Nevertheless parent's concern for the smoking externality is surely real, and this area needs further careful quantification.

Overall this investigation supports an interpretation of social capital consistent with the view that it is the set of one's sympathetic relationships. Thus spouse and children can be understood as equivalent health-affecting agents in the sense that they similarly contribute to the subject's value of social capital and to the utility of staying alive and well. Certainly quality relationships will also reduce stress and improve one's physiological well-being; but, these are not competing hypotheses but rather are complementary. Surely, the choices we make regarding health-risky behaviors are important to our health.

## TABLES

**Table 1. Variable Definitions and Descriptive Statistics for the Study on Smoking, 1992-1998.**

Variable	Extended variable definition.	Mean	Std. Dev.	N
Age92	Age in years at 1992	30.614	2.248	1912
Age98	Age in 1992 plus 6 years.	36.614	2.248	1912
Firstborn8892	First child during 1988-1992	0.194	0.395	1587
Firstborn9298	First child during 1992-1998	0.067	0.250	1587
Got Married	Got married during 1992-1998	0.085	0.279	1320
Married92	Reported married status in 1992	0.572	0.494	1653
Married98	Reported married status in 1998	0.637	0.480	1461
Smoke92	Reports self a smoker in 1992	0.333	0.471	1779
Smoke98	Reports self a smoker in 1998	0.302	0.459	1647
Quality92	Report marriage high quality, 1992	0.677	0.467	562
Quality98*	Report marriage high quality, 1998	0.846	0.360	548
Quit	Quit smoking during 1992-1998	0.088	0.283	1599

Note: Quality98 is defined to equal one when "high quality marriage" was reported in either 1996 or 1998. The number of observations varies due to missing or undefined values; these are deleted case wise in the statistical analysis.

**Table 2. Determinants of the Likelihood of Smoking, 1992 and 1998, Binary Logit Equations: Dependent Variable = *Smokeyear*.**

Ind. Variable	<i>Smoke92</i>	<i>Smoke92</i>	<i>Smoke98</i>	<i>Smoke98</i>
Constant	-4.165	-1.727	-2.687	-1.948
<i>Married</i>	-1.035 (2.90)	-0.599 (4.86)	-1.442 (3.71)	-0.690 (5.48)
<i>Quality</i>	-0.361 (1.40)	----	-0.388 (1.41)	----
<i>Firstborn9298</i>	-0.595 (2.05)	-0.273 (1.68)	-0.482 (0.96)	-0.557 (1.83)
<i>Age</i>	0.143 (2.95)	0.045 (1.71)	0.088 (1.76)	0.041 (1.49)
p value for F	0.000	0.000	0.000	0.000
Mean (N)	0.279 (476)	0.328 (1372)	0.025 (480)	0.293 (1314)

Note: *Quality* represents reported "high" quality of marriage in 1992 for the *Smoke92* equations, and it represents a combination of quality in 1996 and quality in 1998 for the *Smoke98* equations. In this case, a "high" in either 1996 or 1998 implies *Quality*=1. The ratio of the estimated coefficient to its standard error is reported in parentheses.

**Table 3. Determinants of the Likelihood of Quitting Smoking Between 1992 and 1998, Logit Equations.**

Independent Variable	<i>Quit During '92-'98</i>	<i>Quit During '92-'98</i>
Constant	-5.309	0.151
<i>Got Married</i>	-0.376 (0.42)	0.075 (0.18)
<i>Quality98</i>	1.033 (1.41)	----
<i>Firstborn9298</i>	2.625 (2.38)	0.911 (1.88)
<i>Age</i>	0.083 (0.75)	-0.032 (0.64)
p value for Chi Square	0.067	0.231
Mean (N)	0.236 (110)	0.269 (390)

Note: These samples are restricted to subjects who reportedly smoked in 1992. *Quality98* combines reported quality of marriage in 1996 with quality of marriage in 1998; "high" in either year implies *Quality98*=1. The ratio of the estimated coefficient to its standard error is reported in parentheses.

**Table 4. Getting Married vs. Quitting Smoking: A Cross tabulation**

<i>Got Married</i>	Did Marry	Did Not Marry
<i>Quit Smoking</i>		
Did Quit	15	104
Did Not Quit	26	286
Totals	41	390
Percent Who Quit	36.5%	26.6%
Signif. probability = 0.187		

Note: Small numbers of subjects who married during 1992 and 1998 are likely due to the ages of the subjects in the NLSY79 sample during this era: 30-36 years.

**Table 5. Variable Definitions and Descriptive Statistics for the Study on Binge Drinking, 1984-1989.**

Variable	Extended Definition	Mean	St. Dev	N
<i>Age</i>	Age in years as of 1989	27.614	2.248	1912
<i>Binges 1984</i>	Reported number of binge occasions during past month 1984	0.967	1.551	2410
<i>Binges 1989</i>	Reported number of binge occasions during past month 1989	0.769	1.419	2128
<i>ReductionBinge</i>	Percentage reduction in binge drinking during '84-'89	15.707	52.817	2087
<i>Firstborn8489</i>	First child was born during '84-'89	0.243	0.429	1607
<i>Got Married</i>	Reported getting married some time during '84-'89	0.203	0.402	2535
<i>Married 1984</i>	Reported marital status as "married" in 1984	0.238	0.426	2355
<i>Married 1989</i>	Reported marital status as "married" in 1989	0.443	0.499	2066
<i>Quality of Marriage</i>	Reported high quality on a Likert type scale	0.094	0.293	1948
<i>Quit Binging</i>	Reduction in reported binge drinking to zero	0.145	0.352	2535

Note: A "Binge" is defined as drinking six or more alcoholic drinks in a single session. Binge year is the number of reported binges during the most recent month prior to the subject's interview. Quality of marriage equals one if the female subject reported a "high satisfaction" with the relationship in 1988. In a step that improved the degrees of freedom in the analyses that follow, subjects who were interviewed in 1988 but were given a "valid skip" on this question were interpreted as zeroes.

**Table 6. Determinants of the Level of Binge Drinking,  
Ordinary Least Squares Regression**

Dependent Variable= *Binges* in the Past Month

Variable	1984	1989
Intercept	-0.132	1.200
<i>Quality of marriage</i>	-0.343 (1.10)	-0.850 (2.39)
<i>Got Married 8489</i>	-0.383 (2.82)	-0.243 (1.56)
<i>Firstborn8489</i>	-0.244 (1.58)	0.041 (0.23)
<i>Age</i>	0.102 (3.46)	0.012 (0.37)
R <sup>2</sup> (p value)	0.036 (0.001)	0.018 (0.037)
Mean (N)	2.500 (541)	1.396 (540)

Note: *Quality of marriage* equals one if the wife indicates a "high" quality marriage when interviewed in 1988. t values are in parentheses.

**Table 7. Determinants of Changes in Binge Drinking Behavior Measured Alternatively in Percent Reduction in Number of Binges or in Quitting, N=540**

Variable	<i>ReductionBinge</i>	<i>Quit (Logit)</i>
Intercept	-8.350	-0.477
<i>Quality of marriage</i>	35.024 (2.04)	0.883 (1.97)
<i>Age</i>	1.498 (0.92)	0.005 (0.12)
<i>Got Married</i>	9.504 (1.16)	0.565 (2.82)
<i>Firstborn8489</i>	8.812 (1.04)	-0.137 (0.65)
R <sup>2</sup> (p value)	0.017 (0.051)	.... (0.009)
Mean (N)	39.154 (540)	0.145 (541)

Note: Coefficient estimates divided by their standard errors are reported in parentheses.

## Appendix

If the bequeathal,  $I$ , is independent of the other variables, and if

$U(S,m) < U(0,0,I)$ , then the objective function

$$(A1.0) \quad (1-p)U(S,m) + pU(0,0,I)$$

is monotonically increasing in  $p$ . The equilibrium risk,  $p^*$ , is determined within the model

except for the contingency that the subject intervene by ending his life, setting  $p$  to unity. Barring this, the

LaGrangian becomes

$$(A2.0) \quad L = (1-p)U(S,m) + pU(0,0,I) + \lambda[M(p) - m]$$

The first order conditions become:

$$(A2.1) \quad L_p = -U(S,m) + U(0,0,I) + \lambda M_p = 0$$

$$(A2.2) \quad L_m = (1-p)U_m - \lambda = 0$$

$$(A2.3) \quad L_\lambda = M(p) - m = 0$$

The related system of partials becomes:

$$(A3.0) \quad \begin{bmatrix} \lambda M_{pp} & -U_m & M_p \\ -U_m & (1-p)U_{mm} & -1 \\ M_p & -1 & 0 \end{bmatrix} \begin{bmatrix} \partial p / \partial S \\ \partial m / \partial S \\ \partial \lambda / \partial S \end{bmatrix} = \begin{bmatrix} U_s \\ -(1-p)U_{mS} \\ 0 \end{bmatrix}$$

The system (A3.0) is identical to that of (4.0) in the text, and thus the qualitative implications of the models are the same.

A more interesting variation occurs if the bequeathal is responsive to the social capital, that is,  $dI/dS > 0$ . The effect of  $S$  on equilibrium  $p$  then becomes:

$$(A4.0) \quad \frac{\partial p}{\partial S} = [(-U_S + U_{IS}) + (1-p)U_{mS}M_p]/|H| \quad ? \quad 0$$

Where  $|H| > 0$ .

A sufficient, though not necessary condition for  $\frac{\partial p}{\partial S} < 0$  is that

$U_S > U_{IS}$ . This condition makes economic sense; acquiring new social capital benefits the subject primarily through its direct effects on his satisfaction, not through its opportunities for increased bequeathal.

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