Does Post-Graduate Education Affect Women's Investment in Health? [1]

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Does the well established positive association between education and investment in health hold for education beyond college? This study examines the effect of having a post-graduate degree on investment in health, using an original data set composed of samples of several alumnae classes of women educated at the same undergraduate institution. The probability that a woman will have a biannual general physical, gynecological examination, mammogram, or a flu shot is modeled as a function of her education level and demographic and socioeconomic characteristics. Whether those with post-graduate education behave differently with respect to other health-related life style choices is also investigated.

JEL codes: I12, I20, J16

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I. Introduction

The theoretical basis for this study of the effect of post-graduate education on investment in health is the Grossman model of the demand for health. (Grossman, 1972, 2000) Using this model, many economists have noted the positive association between investment in education and investment in health. (Fuchs, 1982; Grossman and Kaestner, 1997; Wagstaff, 1986) The arguments include the view that investments in education and in health both depend upon an individual's time preference, and that people who discount the future less heavily will be more likely to invest in both education and health. The argument is also made that education itself alters an individual's time preference so as to lead to an increase in investment in health, although Becker and Mulligan argue that an implication of their model of the endogeneity of time preferences implies the opposite causality, e.g. that better health leads to an increase in the incentive to invest in education and other activities that have a future return. (Becker and Mulligan, 1997) They do, however, allow that schooling improves the ability to imagine the future through the study of such subjects as history and practice in solving problems.

Education has also been found to make people more efficient in the production of their own health and the health of family members, although the relationship between education and health production is a complex one. (Kenkel, 1991; Grossman and Kaestner, 1997; Hollingsworth and Wildman, 2003; Grignon, 2008) This has led to the suggestion that it is more efficient to increase investment in education than in health if one wants to improve the health of a community. However, there is evidence that exogenous increases in schooling affect a community's health only at relatively low levels of schooling or for low-ability individuals at higher levels of schooling. (Auld and Sidhu, 2005)

Even if there were a straightforward causal relationship between education and investment in health, the effect of education on the demand for health *care* is nonetheless ambiguous, since a more educated person may demand more health, but may need less health care to attain the a given level of healthiness,

This paper addresses a question that has not been the subject of systematic investigation: whether the positive relationship between education and investment in health persists at higher levels of education, specifically, for formal education beyond the undergraduate baccalaureate degree. The paper examines the behavior of several cohorts of college educated women, all of whom were educated at the same undergraduate college. The homogeneity of their undergraduate environment should facilitate isolating the marginal effects of their post-graduate education. Investment in health will be construed broadly to encompass any activity that contributes to healthiness, including such things as concern with nutrition, weight gain, and smoking/non-smoking, as well as preventive medical care. Preventive medical care is measured by three types of medical examination, a biannual general physical, gynecological exam, and mammogram, and by inoculation against influenza (flu shot) during the current or most recent flu season.

The model of investment in health, based on the assumption of utility maximization on the part of a fully-informed rational individual who can choose an optimal level of health, has not gone uncriticized. It has been argued that investment in health, in the form of medical care, does not in fact usually add to the stock of health over which individuals have limited control (see for instance, Wagstaff, 1986, and Zweifel and Breyer, 1997) and that most medical treatment is in fact undertaken in response to negative shocks to the state of health, rather than an investment undertaken by a forward looking individual. (Triplett, 2001) But even if that is the case, this criticism should not

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apply to the demand for preventive health care, which can at least in theory be distinguished from treatment for illness.

The demand for preventive care will vary with an individual's perception of the risk of becoming ill and her calculation of the cost of illness, both short and long run. This will be weighed against the cost and disutility of the treatment itself, which includes the "ouch factor" and time costs, which are often an important consideration in decisions about preventive care. For instance, a man or woman may only have a flu shot if it is available at the place of employment. A woman may forego having a mammogram if it involves several hours of waiting room time in a radiologist's office. Another person may not exercise regularly because of the time it takes. The state of one's health, including a history of serious illness, and one's beliefs about the efficacy of preventive care are also relevant to the decision. Age is important because it alters the risk factors and because more investment is required to offset the depreciation in health that tends to accompany the aging process. The demand for preventive care will also vary with value that an individual assigns to the additional healthy days that result from the expected improvement in the stock of health. The utility derived from those days is not unrelated to income and the wage or salary one can earn.

II. Data

An original micro-data set has been constructed from responses to questionnaires administered to Vassar College alumnae from the classes of 1966, 1976, and 1988. The questionnaires were administered by mail, and respondents are anonymous. Although there were male members in the two more recent graduating classes, a decision was made to limit the study to women so as to avoid having to account for gender differences in investment in health.

[Tables 1 and 2 here]

There may well be sampling bias associated with who responded. However, if we assume that the busiest women were both the least likely to respond to the survey and also the most likely to skimp on preventive health care, then if the non-respondents include a high proportion of women with post-graduate education, who have a higher rate of full-time employment, a reasonable conjecture is that this sampling bias is not likely to result in an underestimation of the effects of post-graduate training on investment in health.[3]

The survey research project was designed to provide a picture across several generations of college women. The class of 1966 was chosen so as to have information about women for whom both family formation and formal education were assumed to be complete, who were mature but not yet eligible for Medicare. This group falls near the end of but within the cohort that economic historian Claudia Goldin describes as the first generation of college women who tried to combine marriage, motherhood, and paid employment. (Goldin, 1995) The class of 1966 is a transitional group in the sense that many have been in the labor force for a substantial part of their adult lives but made their decisions about graduate training and careers before it was widely believed that women could earn a comparable return to men on post-graduate education.

The class of 1976 corresponds fairly closely to Goldin's cohort IV, a generation of college educated women whom she characterizes as choosing sequently career, then family. The average age at birth of first child for this group of women is 31. Average number of children is less than two.

The class of 1988 falls, in Goldin's analysis, within a cohort of women who believe it is possible to successfully combine marriage, family, and professional careers, and who regard marriage

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[3]A probit was estimated for the probability that a VC alumnae would be employed full time. When college class (cohort), marital status, location and region, number of children, and health status were included as controls, post-graduate education was found to increase the probability of employment by about 16%.

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and motherhood as optional.[4] In the sample, 69 percent were currently married, 60 percent were employed full time, 34 percent were both married and employed full time, 37 percent combined motherhood and full-time employment, and 23 percent were married, employed full time, and also had children at home.

Respondents were specifically asked to distinguish between physician visits and tests for purely preventive care and those that were undertaken in the course of treatment for disease. (For instance, an additional mammogram undertaken in the process of treatment for breast cancer would be excluded, but a regular annual or biannual mammogram for someone who has previously undergone treatment for breast cancer would be included). The three examinations can be thought of as investments in long-term health. The flu shot may be viewed as affecting either short- or long-term health. For those with certain serious illnesses, it may have long-term health implications, but for most respondents, it is probably a decision to invest in more healthy days in the season in which the flu shot is administered.

[Table 3 here]

III. The Model.

The Demand for Preventive Health Care.

The estimating equations for preventive medical care are probits of general form

$$P = a + \beta\ wage + \beta\ household\ \mathrm{in}come + \beta\ price + \beta\ (preferences) + \mu, \qquad (1)$$

where P is the probability of having a given examination (or flu shot) and where preferences are measured by a vector of personal characteristics: level of education, demographic factors (marital

[4]Questionnaires sent to the Classes of 1976 and 1988 included a modification of "currently-married spouse-present". Respondents were given an additional option, "co-habiting with long-term partner". The latter response was coded as "married" for the empirical analysis.

status, children, age/graduation class) location, employment status, and health status.

Throughout this paper, no wage variable is included in the empirical analysis. Only family income (broad categories) and full-time employment are used to indicate economic status and value of time. Although data were collected on annual salaries and hours worked, it was not possible to obtain reasonable wage data since hours worked were so variable over the year, and in many cases respondents could not accurately report them. Many also failed to answer the question about salary. Therefore, we use "full-time employment" as a rough indicator of value of time. Better salary and hours-worked data were available for the class of 1966 than for the other two classes, and tests which included a wage variable were run for that sub-sample. In no case was wage a significant determinant of investment in health.

The Selection Bias Problem

As is typical in studies of the demand for medical care, extent of insurance coverage is used as a proxy variable for the price of medical services. The more extensive the coverage, the lower the effective price, e.g. the out-of-pocket cost. However, selection bias is a common problem in studies in which individuals self select themselves into several insurance pools. For instance, people who join HMOs have been shown to behave differently with respect to how much medical care they use. This was validated by the RAND Health Insurance Experiment, which randomly assigned over 6000 people to different insurance pools. In that well regarded study, people with traditional indemnity policies with low levels or even no co-payments used significantly more medical services than did comparable people in HMOs that provided free services in exchange for an annual capitation fee. (Newhouse, 1993) A large number of studies have also established the tendency for the non-Medicaid population who join HMOs to be younger and healthier than those in other insurance pools. (See, for instance, Altman, et al, 2000; Miller and Luft, 1994, 2002; Newhouse, 1993)

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Before proceeding with the analysis, it is therefore important to attempt to assess the degree of the selection problem and determine whether we have a strategy for dealing with it. We begin by examining the association between a set of observable personal characteristics and the probability of a woman having more generous insurance coverage and/or being a member of an HMO. [5]

The estimating equation is

$$\textit{Probability of Insurance Type} = a + \beta\ \textit{(cohort)} + \beta\ \textit{marital status} + \beta\ \textit{child} + \beta\ \textit{location} + \beta\ \textit{income} + \beta\ \textit{health status} + \beta\ \textit{educ} + \beta\ \textit{employment status.} + \beta\ \textit{smoking} + \mu\ , \quad (2)$$

Dummy variables for having insurance plans with extensive coverage (*hicover*) or being in an HMO (*HMO*) are the dependent variables in the probits estimated, and independent variables include alumnae class (cohort), whether currently married, whether one has children, region of the country in which one resides, type of community in which one lives (large city, town or suburb, or rural community) family income, health status, post-graduate education, whether one is employed full-time, and a proxy for health-related life style (whether one smokes cigarettes (tobacco) or has smoked for at least ten years in the past).

There does not appear to be any association between graduation-class, health status, education, or health-related life-style choices and HMO membership. There are regional differences, with those living in the Middle Atlantic, South East, and MidWest regions being less likely to belong to HMOs. Full-time employment is associated with a nine percent higher probability of belonging to an HMO. With respect to *hicover*, only regional effects and being a member of the class of 1976 were found to be significant. Graduation class (cohort), full-time employment status, and region in which one lives will be included as explanatory variables in all tests run.

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[5] The dummy variable *hicover* assumes a value of 1 if respondent stated that her insurance covered the full cost of a biannual general physical exam, mammogram, and gynecological examination.

The use of insurance coverage as an explanatory variable may still be problematic in that it may reflect unobservable taste differences as well as the price of health care services. Those who opt for more extensive insurance coverage may have different utility functions. They may be more risk averse or may value health more highly. If this is the case, it will distort our results to the extent that people in the same circumstances, with regard to age, income, education, health status, etc. and faced with the same effective prices, will behave differently in their utilization of medical care. However, if we find no systematic differences in the utilization of medical care as insurance coverage varies, the problem is not likely to be of practical import. Therefore, regressions were run to see whether HMO membership or more generous insurance coverage was associated with any difference in use of medical care measured by a) number of hospital-based procedures in a year[6] and b) number of physician office visits per year:

$$\textit{No. of visits (or procedures)} = \alpha + \beta\ \textit{age/cohort} + \beta\ \textit{marital status} + \beta\ \textit{children} + \beta\ \textit{location} + \beta\ \textit{level of education} + \beta\ \textit{employment status} + \beta\ \textit{family income} + \beta\ \textit{health status} + \beta\ \textit{type of insurance} + \mu. \quad (3)$$

Since health status is such an important determinant of the use of physicians and hospital-based procedures, in these tests two alternative indicators of health status were used: A dummy variable, *none*, indicated that the respondent had never been diagnosed as having any of a long list of diseases. An alternative dummy variable, *disease,* was used to tag those who had been diagnosed with any of a designated number of serious diseases that normally require medical treatment, including alcoholism, bi-polar disease, cancer, clinical depression, diabetes and coronary artery disease.

No significant difference in utilization of physician office visits was found for those with more

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[6] This includes out-patient procedures.

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or less generous insurance coverage or those who were or were not in HMOs. There were also no significant differences in number of hospital-based procedures between members of HMOs and others, and those with more generous insurance coverage were actually found to have fewer hospital-based procedures (0.42 less per year when *none* is used as the health status control variable and 0.44 when *disease* is used). The results of these tests do not suggest any taste bias that would distort the results in the following analysis since there appears to be no tendency toward a more profligate use of medical services on the part of those with more extensive insurance coverage nor any difference in utilization of medical care on the part of HMO members.

One interesting incidental result was found in this preliminary analysis. Women with post-graduate training had on average slightly more hospital-based procedures per year, (0.3 more). This finding will be considered in the discussion section at the end of the paper.

IV. Investment in Health Care: Regression Results

1. Flu Shot

John Mullahy (Mullahy, 1998) modeled the demand for flu shots as a function of the usual set of income, wage, price, age, and education variables and in addition factored in the individual's recent past experience with the flu, current level of exposure to flu, and information about whether immunization or natural infection in recent years mitigates the risk of infection in the current time period. Mullahy found schooling to play a significant positive role in determining who has flu shots. He also found workers to be less likely than those who are not employed to have flu shots. He rejected the hypothesis of higher time-costs deterring workers from being inoculated, finding the reason for the lower incidence to be that workers were healthier than non-workers.

Although it is not possible to exactly replicate Mullahy's estimating equation, his approach is used in a very general way as the model for this investigation of who among Vassar College alumnae have flu shots. Although we have no information on specific levels of risk in communities in which our respondents live, we do control for urban (vs. suburban or rural) and region. The latter allows us to at least partly standardize for locational differences in risk of contracting the flu. Although we lack information on past flu experience of the individual, the health status variable is constructed so as to take account of disease history. Income, marital status, whether one has children, level of education beyond college, employment status, and whether insurance covers the cost of the flu shot are also included as explanatory variables. [Appendix Table 4]

Although only significant at a .07 level, extensive post-graduate education does seem to make a difference in that those with professional degrees (PhD, MD, or JD) are 11 percent more likely to have a flu shot. Health status and whether insurance covered the cost of the flu shot also turn out to be important. Those with no history of serious disease are about 11 percent less likely to have a flu shot. If insurance covers the cost of the shot, the probability of having one is increased by 14 percent. An alternative specification of the equation included a dummy variable for the flu shot being offered at the place of employment. The coefficient was not significant; thus the time cost appears not to have been an important consideration. High income was associated with a higher probability of having a flu shot. If family income was > $175,000, the probability increased by about 15 percent.

2. The General Physical Examination

We next examine the demand for a general physical examination. The belief in the importance of the annual medical checkup has declined over time. Although questions have been raised about the efficacy of such exams, the protocol in most medical communities is still that it is advisable to have a general physical "checkup" biannually. A probit was therefore estimated for the probability of having a general physical within two years of the time of the survey. Post-graduate education appears to have no effect;

however, working full-time reduces the probability of having a general physical by approximately nine percent. Being in an HMO increases the probability by nine percent, and having insurance that covers this exam increases the probability by 19 percent. [Appendix Table 5] Here it appears that both time and monetary costs are important, if we interpret working full time as increasing the cost of taking the time to go for a general physical exam. There are also some regional differences with those residing in the Middle Atlantic or Southern states being less likely to have a general physical. Since it is well known that there are regional differences in the practice of medicine, this may reflect differences in attitudes of physicians rather than patient preferences. Those who reside in central metropolitan areas are also more likely to have had this exam, which may be a reflection of supply side differences rather than a greater demand for this exam on the part of city dwellers.

3. Mammogram

Neither education nor employment status are significant nor is insurance coverage in predicting the likelihood of a woman having a biannual mammogram. [Appendix Table 6] Medical protocol recommends using mammography to screen for breast cancer in women 40 years of age and older, and some medical centers and insurance companies support mammograms only for women 50 years of age and older. We would therefore expect age to make a difference. This is born out by the analysis, with membership in the class of 1988 reducing the probability of having a mammogram (compared with the class of 1966) by about 50 percent and membership in the class of 1976 reducing it by 13-14 percent.

4. Gynecological Examination with Pap Smear

We employ the same strategy for studying the third form of preventive medical examination: a biannual gynecological exam including a Pap smear. Here post-graduate education seems to have a small but significant negative effect. [Appendix Table 7] Those with any post-graduate degree are found to be about four percent less likely to have a biannual gynecological examination. The main determinants of whether one has this examination seem to be insurance coverage and personal demographic characteristics, with high insurance coverage increasing the probability by about seven percent. Being a member of an HMO increases the probability by about three percent, although this effect is significant only at a .074 level. Currently married women were about 10 percent more likely to have this exam, and those with no children were also more likely (approximately four percent) to have had a gynecological exam. Age (measured by college class) seems to make a small difference also, but there is no consistent time trend: Being a member of the class of 1988 increases the probability of having a biannual gynecological exam by about four percent, compared with the class of 1966, whereas being a member of the class of 1976 reduces the probability by about the same amount. Here it should be noted that one reason for gynecological examinations is to obtain prescriptions for birth control pills. This would probably be more relevant for the members of the Class of l988, and for those who were married or co-habiting with a male partner.

5. Non-Medical Health Care

(1) Attention to Diet

The questionnaire included a multiple choice question about diet, which offered the options listed below, plus a space for a write-in answer.

Restrict fat intake ________________
Eat a diet high in fiber________________
Restrict amount of red meat eaten______________
Adhere to a vegetarian diet________________
Do not restrict my diet in any way____________

A dummy variable for "restricts diet" was created in which a respondent was coded 1 if she checked any of the first four options or provided a write-in answer explaining other health-related ways in which she restricted her diet. If she checked the fifth option, it was coded 0. There was no evidence that post-

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graduate education has any effect on attention to healthy diet. The only significant explanatory variables were the graduation-class, and there was no consistent time-trend. The class of 1976 paid a little more attention to diet then their older counterparts; the class of 1988 paid less.

(2) Use of Vitamin Supplements

A probit was run to estimate the determinants of the probability that a woman would take a daily vitamin supplement, since this may be an alternative way of investing in health through attention to nutrition. Here post-graduate education did appear to make a difference, but only if one had a professional degree. The probability was 10-11 percent higher that one would take a daily multivitamin pill if one had a PhD, JD, or MD degree. What part of the country one lived in also made a difference, and members of the Class of 1976 were 15 percent less likely to take vitamin pills than were their colleagues in the Class of 1966. [Appendix Table 8]

(3) A regular exercise or sports program

An attempt was made to measure amount of regular exercise or participation in sports per week, Three dummy variables were constructed for degree of engagement in exercise or sports: 1) three or more times a week, 2) one to two times a week, or 3) exercising less than this. However, it became apparent that it was going to be very difficult to assess the degree of equivalence of different types of activities reported. For instance, would a half hour leisurely walk twice a week be equivalent to a twice a week hour-long pilates class?[7] It was therefore not surprising that the estimating equations had very little explanatory power (measured by low R-squared and adjusted R-squared values). The only explanatory variable that was significant was being a member of the class of 1976, which seemed to be associated with slightly more engagement with exercise and sports activities.

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[7] One respondent even wrote a note in the margin asking if we would consider bird watching to be a form of exercise.

(4) Weight Gain

Probits were also run in which the dependent variable was "probability of gaining more than 20 pounds since graduation from college". Post-graduate education was significantly associated with a 10 to 11 percent higher probability of having gained more than 20 pounds. [Appendix Table 9] In addition, graduation class was also important. Members of both the classes of 1976 and 1988 were about 17 to 18 percent less likely to have gained this amount of weight than were their colleagues in the class of 1966.

(5) Smoking

Probits were estimated for the probability that one smoked [tobacco cigarettes] or had smoked for at least ten years. Post-graduate education was not a significant determinant of this behavior, which again appeared to be related to college cohort, with both the classes of 1976 and 1988 being much less likely to be smokers than were their colleagues in the Class of 1966; whether one had children, which reduced the likelihood by about 14 percent; and income. Both family income less than $65,000 and high income (> $175,000) were negatively associated with smoking. Thus childless middle-income graduates from the mid-sixties were more prone to have smoked during their lifetime than were the more recent graduates. [Appendix Table 10]

V. Discussion.

Can the null hypothesis that post-graduate education has no effect on women's investment in health be rejected? The answer is a qualified "yes", but the effects are small, often only marginally significant, not robust across a variety of measures of investment in health, and variable in direction of effect. Having a PhD, MD, or JD appears to increase the probability of having a flu shot by about nine percent, but this is only significant at a 0.073 level. It also appears to increase the probability of having a biannual general physical by about eight and a half percent, whereas having any post-graduate degree or

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certificate decreases the probability by seven percent. Having any post-graduate degree also reduces the probability by about six percent that one routinely takes a daily multivitamin, whereas having a PhD, MD, or JD more than offsets this. Having a post-graduate degree increases the likelihood that one will have gained more than 20 pounds since receiving the bachelor's degree, and it is also associated with having, on average, slightly more hospital-based procedures per year, even when health status is taken into account. This may be because more highly educated women opt to have more elective surgery, such as joint repairs or replacements. Post-graduate education in general has no observed effects on the likelihood of having a biannual mammogram or gynecological examination, nor is it associated with any difference in the probability that one currently smokes or has smoked for a period of 10 or more years.

In summary, the evidence suggests that post-graduate training overall has no positive effects on investment in health and may even be associated with some negative ones, but that having a PhD, JD, or MD degree is associated with some positive effects measured by the likelihood of having a flu shot, a biannual general physical examination, or taking a daily vitamin pill. However, a review of the descriptive statistics in Table 3 shows that with respect to preventive medical care in the form of screening (general physical exams, mammograms for those > 40 old, and gynecological exams) these college educated women are near the flat of the curve, with a very high proportion investing in these forms of preventive care whether or not they continue their schooling beyond the first baccalaureate degree.

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Table 1
Summary Descriptive Statistics

Class	No. Respondents	Proportion	Age (Mode)	Year Surveyed
1966	168	50.4%	55	1999
1976	212	70.7%	46	2000
1988	101	33.5%	36	2002

Table 2
Proportion of Sample with Post Graduate Degrees or Employed Full Time
By Alumnae Class

Class	Any Post-Graduate Degree Or Certificate*	Professional Degree (Ph.D, MD, or JD)	Employed Full Time
1966	65.8%	24.6%	59%
1976	72.5%	28.6%	61%
1988	84.6%	65.9%	60%

*Certificate programs include such things as the former Harvard Business School one-year certificate program for women but exclude, for example, a 6 week training program in computer programming.

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Table 3
Preventive Medical Care by Graduation Class

Class	Flu Shot	General Physical	Gynecological Exam	Mammogram
	Percent of Respondents Having Had*			
1966	44	84	93	92
1976	43	64	88	80
1988	33	78	98	41

*the proportions of women who had a general physical exam, a mammogram, or a gynecological exam within two years of the time they were interviewed and the proportion who had a flu shot within a twelve month period of the interview.

Table 4. Probability that a VC Alumna Had a Flu Shot Within a 12 Month Period

Pseudo $R^2 = 0.0712$ N = 451

Y = Probability that a Vassar alumna had flu shot within 12 months =0.413399

Marginal Effects after Probit

Variable	dy / dx	Standard Error	z	P > | z |
Class of 1976	-0.0013203	0.05388	-0.02	0.980
Class of 1988	-0.1176	0.07622	-1.54	0.123
Married	-0.0913157	0.07636	-1.20	0.232
Employed Full-Time	0.0180241	0.05306	0.34	0.734
Any Post Graduate Degree	0.0948824	0.05861	1.62	0.105
PhD, MD, or JD	0.1092107	0.06085	1.79	0.073
Residence: City, Town, Rural	0.0153551	0.02845	0.54	0.589
Middle Atlantic	0.0690871	0.08309	0.83	0.406
Southeast	-0.0931016	0.0868	-1.07	0.283
South	0.0318224	0.19906	0.16	0.873
Midwest	-0.0194447	0.08467	-0.23	0.818
Northwest	0.1240653	0.14747	0.84	0.400
Southwest	-0.0034295	0.11171	-0.03	0.976
Pacific Coast	-0.0388898	0.09156	-0.42	0.671
No Children	-0.074684	0.05799	-1.29	0.198
No History of Serious Disease	-0.108062	0.05257	-2.06	0.040
Flu Shot Coverage	0.1339984	0.05064	2.65	0.008
Income: Under $40,000	0.0362587	0.13596	0.27	0.790
Income: $40,000 - $64,999	-0.0148822	0.09127	-0.16	0.870
Income: $65,000 - $89,999	-0.1486398	0.08205	-1.81	0.070
Income: $90,000 - $124,999	-0.0251559	0.07741	-0.32	0.745
Income: > $175,000	0.1484699	0.07172	2.07	0.038

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Table 5. Probability that a VC Alumna Had a General Physical in Past 24 Months[1]

Pseudo R^2 = 0.1096 (*0.1362*) N = 451 (*452*)

Y = Probability that Vassar Alumna Had Physical Exam = 0.75723489 (*0.76360155*)

Marginal Effects after Probit

Variable	dy / dx	Standard Error	dy / dx	Standard Error
Class of 1976**	-0.2278579	0.04775	*-0.1825119*	*0.04902*
Class of 1988	-0.1181459	0.08625	*-0.1185365*	*0.08629*
Married	0.0274942	0.0617	*0.0289558*	*0.0617*
Any Post-Graduate Degree	-0.0684526	0.04954	*-0.0732362*	*0.04884*
PhD, MD, or JD	0.0859071	0.05003	*0.0876957*	*0.04965*
Employed Full-Time **	-0.0933052	0.04575	*-0.0891144*	*0.04511*
Residence: City, Town, Rural *	-0.0584086	0.02425	*-0.0573422*	*0.02406*
Middle Atlantic *	-0.1925403	0.08215	*-0.1667139*	*0.08113*
Southeast	0.0657943	0.07028	*0.0786711*	*0.06682*
South *	-0.4432766	0.19427	*-0.4448095*	*0.20694*
Midwest	-0.0536568	0.07838	*-0.0418176*	*0.07747*
Northwest	-0.0449036	0.14287	*-0.0371658*	*0.14166*
Southwest	-0.0378922	0.10861	*-0.0013033*	*0.10442*
Pacific Coast	-0.0731462	0.09294	*-0.0705808*	*0.09302*
No Children	-0.0264142	0.05177	*-0.0396166*	*0.05256*
Income: Under $40,000	-0.0335955	0.12133	*-0.0134508*	*0.11514*
Income: $40,000 - $64,999	0.0397636	0.07523	*0.0611758*	*0.07124*
Income: $65,000 - $89,999	0.0431533	0.07281	*0.0399144*	*0.07222*
Income: $90,000 - $124,999	0.0275078	0.06844	*0.0243532*	*0.06849*
Income: > $175,000	-0.0479366	0.06677	*-0.0344734*	*0.06624*
No History of Serious Disease	-0.0489211	0.04741	*-0.0429141*	*0.04741*
HMO * / Hicover **	0.09232	0.04637	*0.1869266*	*0.04597*

[1] Note: Values in italics use are resulting using 'Hicover' instead of 'HMO'.

Table 6. Probability that a VC Alumna Had a Mammogram in Past 24 Months

Pseudo R^2 = 0.1875 (*0.1891*) N = 451 (*452*)

Y = Probability that Vassar Alumna Had Mammogram = 0.82925335 (*0.83015861*) *

Marginal Effects after Probit

Variable	dy / dx	Standard Error	z	P > | z |
Class of 1976	-0.1384163 *-0.1292475*	0.04624 *0.04687*	-2.99 *-2.76*	0.003 *0.006*
Class of 1988	-0.5083345 *-0.5062806*	0.08413 *0.0839*	-6.04 *-6.03*	0.000 *0.000*
Any Post-Graduate Degree	-0.0006128 *-0.0008221*	0.04907 *0.04892*	-0.01 *-0.02*	0.990 *0.987*
PhD, MD, or JD	-0.0452645 *-0.0450202*	0.05044 *0.05018*	-0.90 *-0.90*	0.370 *0.370*
Income: Under $40,000	-0.2041809 *-0.1949993*	0.14731 *0.14471*	-1.39 *-1.35*	0.166 *0.178*
Income: $40,000 - $64,999	-0.1810423 *-0.1722594*	0.09296 *0.09168*	-1.95 *-1.88*	0.051 *0.060*
Income: $65,000 - $89,999	-0.0187088 *-0.018905*	0.07294 *0.07254*	-0.26 *-0.26*	0.798 *0.794*
Income: $90,000 - $124,999	-0.0210183 *-0.0211621*	0.06753 *0.06724*	-0.31 *-0.31*	0.756 *0.753*
Income: > $175,000	0.0118222 *0.013446*	0.05813 *0.05786*	0.20 *0.23*	0.839 *0.816*
No History of Serious Disease	-0.0008135 *0.0003212*	0.04163 *0.04146*	-0.02 *0.01*	0.984 *0.994*
HMO	0.0247794	0.04301	0.58	0.565
Hicover	0.*0348019*	*0.04054*	*0.86*	*0.391*

[1]Note: Values in italics give results using 'Hicover' rather than 'HMO'.

[2]Region, residence (city/town/rural), marital status, and whether one had children were included in the equation but were not significant.

Table 7. Probability that a VC Alumna had a Gynecological Exam in Past 24 Months[1]

Pseudo R^2 = 0.1727 (*0.2041*) N = 451 (*452)*

Y = Probability that Vassar Alumna Had Gynecological Exam = 0.95543432 (*0.96152902*) [2]

Marginal Effects after Probit

Variable	dy / dx	Standard Error	z	P > | z |
Class of 1976	-0.0443363 *-0.0192416*	0.02352 *0.02103*	-1.89 *-0.91*	0.059 *0.360*
Class of 1988	0.0414109 *0.0397235*	0.02161 *0.01793*	1.92 *2.22*	0.055 *0.027*
Married	0.1027202 *0.104828*	0.04749 *0.04632*	2.16 *2.26*	0.031 *0.024*
Any Post-Graduate Degree	-0.037038 *-0.0358429*	0.01915 *0.01731*	-1.93 *-2.07*	0.053 *0.038*
PhD, MD, or JD	0.0010332 *0.0006528*	0.02219 *0.02014*	0.05 *0.03*	0.963 *0.974*
Employed Full-Time	0.0140408 *0.0190315*	0.02295 *0.02061*	0.61 *0.92*	0.541 *0.356*
Residence: City, Town, Rural	0.0047787 *0.0040135*	0.01135 *0.01018*	0.42 *0.39*	0.674 *0.693*
No Children	0.0453705 *0.0421125*	0.0199 *0.01824*	2.28 *2.31*	0.023 *0.021*
No History of Serious Disease	-0.0230268 *-0.0164957*	0.02203 *0.01977*	-1.05 *-0.83*	0.296 *0.404*
HMO	0.0329544	0.01842	1.79	0.074
Hicover	*0.0680637*	*0.02478*	*2.75*	*0.006*

[1]Note: Values in italics give results using 'Hicover' rather than 'HMO'.

[2] Variables for regions and for family income were included n the equation but were not significant.

Table 8. Probability that a Vassar Alumna Takes a Daily Multivitamin Pill[1]

Pseudo $R^2 = 0.0702$ (*0.0705*) N = 450 (*451*)

Y = Probability that an Individual Takes Daily Multivitamin = 0.65283764 (*0.65128786)*[2]

Marginal Effects after Probit

Variable	dy / dx	Standard Error	dy / dx	Standard Error
Class of 1976*	-0.150988	0.0520	*-0.1276764*	*0.0533*
Class of 1988	-0.0459194	0.0842	*-0.0429597*	*0.0841*
Any Post-Graduate Degree	-0.0600325	0.0564	*-0.0680127*	*0.0560*
PhD, MD, or JD*	0.1040688	0.0573	*0.1124065*	*0.0568*
Employed Full-Time	-0.052587	0.0519	*-0.041117*	*0.0515*
Middle Atlantic **	0.1637468	0.0630	*0.1699841*	*0.0625*
Southeast	-0.0199437	0.0866	*-0.022587*	*0.0863*
South	0.0674775	0.1662	*0.067831*	*0.1651*
Midwest**	0.230966	0.0581	*0.2342817*	*0.0579*
Northwest	0.066537	0.1279	*0.0700922*	*0.1272*
Southwest**	0.1869226	0.0834	*0.1985889*	*0.0806*
Pacific Coast**	0.2223406	0.0653	*0.2295616*	*0.0640*
No Children	-0.0103909	0.0567	*-0.0154653*	*0.0567*
No Serious Disease History	0.0290128	0.0511	*0.0376451*	*0.0509*
HMO / Hicover*	0.082781	0.0536	0.0745742	0.0500

[1] Note: Values in italics are results when 'Hicover' instead of 'HMO' is used.

[2] Dummy variables for Residence (city/town/rural), marital status, and family income category were included in the estimating equation but were not significant.

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Table 9. Probability that a VC Alumna Gained > Twenty Pounds since Graduation[1]

Pseudo R^2 = 0.0673 (*0.0686*) N = 451 (*452*)

Y = Probability that a Vassar Alumna gained >Twenty Pounds = 0.31510627 (*0.31696406)*[2]

Marginal Effects after Probit

Variable	dy / dx	Standard Error	z	P > | z |
Class of 1976	-0.184381 *-0.1791283*	0.04807 *0.04972*	-3.84 *-3.60*	0.000 *0.000*
Class of 1988	-0.1714747 *-0.1717329*	0.06192 *0.06202*	-2.77 *-2.77*	0.006 *0.006*
Married	0.0049062 *-0.0013524*	0.06479 *0.06445*	0.08 *-0.02*	0.940 *0.983*
Any Post-Graduate Degree	0.1027109 *0.1051247*	0.0529 *0.05272*	1.94 *1.99*	0.052 *0.046*
PhD, MD, or JD	-0.0934855 *-0.0951101*	0.05458 *0.05449*	-1.71 *-1.75*	0.087 *0.081*
Employed Full-Time	0.0596478 *0.0582176*	0.04974 *0.04946*	1.20 *1.18*	0.230 *0.239*
Residence: City, Town, Rural	-0.0260349 *-0.0254076*	0.02687 *0.0268*	-0.97 *-0.95*	0.333 *0.343*
No Children	-0.0813398 *-0.0852813*	0.05266 *0.05266*	-1.54 *-1.62*	0.122 *0.105*
No History of Serious Disease	-0.0713862 *-0.0720524*	0.04937 *0.04927*	-1.45 *-1.46*	0.148 *0.144*
HMO/Hicover	0.0335159 *0.0268453*	0.05422 *0.04864*	0.62 *0.55*	0.536 *0.581*

[1]Note: Values in italics are for results using 'Hicover' rather than 'HMO'

[2]Variables for region, residence (city/town/rural), marital status, and family income were included in the estimating equation but were not significant.

Table 10. Probability that a VC Alumna Smokes or has Smoked for 10 years[1]

Pseudo R^2 = 0.3148 (*0.3186*) N = 442 (*443)*

Y = Probability that an Individual Smokes = 0.2165198 (*0.2170973*)[2]

Marginal Effects after Probit

Variable	dy / dx	Standard Error	z	P > | z |
Class of 1976	-0.4758759 *-0.4685855*	0.04036 *0.04134*	-11.79 *-11.34*	0.000 *0.000*
Class of 1988	-0.2758783 *-0.2763145*	0.03137 *0.03143*	-8.79 *-8.79*	0.000 *0.000*
Any Post-Graduate Degree	-0.0776425 *-0.0769117*	0.0592 *0.05909*	-1.31 *-1.30*	0.190 *0.193*
PhD, MD, or JD	0.0204314 *0.0155778*	0.0592 *0.05911*	0.35 *0.26*	0.730 *0.792*
Employed Full-Time	-0.074814 *-0.0796538*	0.05173 *0.0515*	-1.45 *-1.55*	0.148 *0.122*
No Children	0.1390955 *0.1355697*	0.05726 *0.05726*	2.43 *2.37*	0.015 *0.018*
Income: Under $40,000	-0.1462008 *-0.1499458*	0.0671 *0.06504*	-2.18 *-2.31*	0.029 *0.021*
Income: $40,000 - $64,999	-0.1317078 *-0.1352299*	0.06103 *0.05969*	-2.16 *-2.27*	0.031 *0.023*
Income: $65,000 - $89,999	-0.053267 *-0.0588421*	0.07192 *0.07061*	-0.74 *-0.83*	0.459 *0.405*
Income: $90,000 - $124,999	0.0369942 *0.0270763*	0.07575 *0.07473*	0.49 *0.36*	0.625 *0.717*
Income: > $175,000	-0.1287353 *-0.1275768*	0.05701 *0.05716*	-2.26 *-2.23*	0.024 *0.026*
No History of Serious Disease	-0.0310325 *-0.0309999*	0.04946 *0.04943*	-0.63 *-0.63*	0.530 *0.531*
HMO/Hicover	-0.0148661 *0.0557199*	0.05331 *0.04672*	-0.28 *1.19*	0.780 *0.233*

[1]Note: Values in italics give results using 'Hicover' rather than 'HMO'.

[2] Regions, (city/town/rural), and marital status were included in the equation, but were not significant.

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