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Healthy Lifestyle and Safety: An Expected Net Benefit Approach to Seat Belt Use

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This paper examines the relationship between motorist safety belt use and three lifestyle behaviors affecting health. A healthy lifestyle affects benefits of seat belt use because it indicates a greater value on safety. If individuals are rational in their behavior, we expect consistency across health and safety choices. Using a nationwide survey sample and logit analysis we find lifestyle has expected effects on belt use holding constant individual and vehicle characteristics. Illustrations for two different lifestyles are considered: (1) smoking 1 pack per day, 2 years between dental visits, and no regular exercise and (2) no smoking, 1 year between dental visits and regular exercise. Healthier lifestyle increases the probability of seat belt use by more than 50% for typical individuals

INTRODUCTION

Health status is subject to myriad risks, some of which can be influenced by the individual. The risk inherent in operation of a motor vehicle can be mitigated by use of safety equipment. Use of seat belts is but one choice concerning health and safety that people make. This paper is concerned specifically with motorist seat belt use and three lifestyle choices concerning health: cigarette smoking, dental checkups, and regular exercise. If individuals who engage in these lifestyle activities value expected benefits more highly and are rational in their behavior, we expect consistency across health and safety and greater use of seat belts.

In an individual net benefit framework for explaining safety behavior (see Blomquist, 1986) individuals seek to maximize their expected utility given constraints on time and income, technology, and the safety environment. In their decision to engage in safety-producing behavior individuals weigh the personal benefits and costs. Benefits might be direct, such as avoidance of monetary costs due to injury or accident, or indirect, such as the avoidance of losses to utility from future consumption, or even an increase in current psychic benefits from feelings of safety. Costs of producing safety might come from the purchase of equipment, the opportunity cost of time, and the value of discomfort and inconvenience. Circumstances which affect either benefits or costs can induce changes in behavior.[1] In this framework, investments in health represented by decisions to refrain from smoking, obtain regular dental care, and exercise regularly affect the benefit side of the equation in two possible ways. First, investments in health capital, as with any human capital, will increase the level of future consumption and increase the value of avoiding its loss. Second, health-enhancing behaviors may indicate that an individual places a greater value on health and safety *per se*.

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Other studies show some evidence of such a relationship between belt use and other health factors. In an early seat belt study Manheimer *et al.* (1966) found that infrequent seat belt users were more likely to smoke and less likely to receive regular medical checkups and vaccinations. Their finding is based on simple correlations which do not account for correlations with other factors. Merrill and Sleet (1984) found that seat belt users were more likely to have healthier practices involving smoking, nutrition, exercise and alcohol. Their finding is based on categorical, pairwise comparisons of seat belt use which do not account for correlations with other factors. More recently, Fuchs (1986) found significant correlations between seat belt usage and four health behaviors (smoking, weight, dental care, and exercise) when controlling for two factors, age and sex. Our study uses micro data which allow for analysis of individual data in which we estimate the effect of healthy lifestyle on safety behavior. Through multivariate logit analysis we test whether or not driver use of seat belts is influenced by underlying values and attitudes which are revealed by preventive health behavior. We hold constant a variety of other factors including education and income, as well as age and gender.

DATA AND LOGIT MODEL

The data were collected by Lawrence Johnson & Associates, Inc. for the US National Highway Traffic Safety Administration (see Mayas *et al.*, 1983.) A usable sample of 878 individuals were obtained in a 1982 nationwide telephone survey based on random-digit dialing, with oversampling in known high seat belt use (Seattle, 8.9%) and low seat belt use (Dallas/Fort Worth, 8.1%) areas. In a 20-minute interview respondents were asked questions which focused on demographic, situational, and motivational factors associated with seat belt usage.[2] The expected net benefits approach leads us to believe that we can explain use and nonuse of seat belts by examining individual factors which influence the benefits and costs of use. With multivariate logit analysis we can test whether lifestyle variables hypothesized

Table 1. Definition of Variables for Lifestyle, Individual Characteristics, and Vehicle and Travel Conditions

Name	Definition (expected sign)[a]
Lifestyle	
Cigarette pks	Packs of cigarettes smoked per day (less benefit, –)
Dental years	Years since last dental visit (less benefit, –)
Exercise	Engages in regular exercise, yes = 1, no = 0 (benefit, +)
Driver individual characteristics	
Education	Years of schooling (information, + ; benefit, + ; lower cost, +)
Income	Household income, $1982 (benefit, + ; use cost, – ; net?)
Age	Motorist age in years (information, + ; less benefit, – ; net?)
Children	Number of children under 5 years of age (benefit, + ; cost, – ; net?)
Gender	Gender of respondent, male = 0, female = 1 (?)
Vehicle and travel conditions	
Comfort	Rating of comfort of seat belt system on scale of 1 to 3, uncomfortable to comfortable (lower cost, +)
Convenience	Rating of convenience of seat belt system on a scale of 1 to 3, less to more convenient (lower cost, +)
Vehicle age	Vehicle age in years (benefit, +)
Vehicle weight	Estimated motor vehicle weight in pounds[b] (less benefit, –)
Total miles	Miles driven during an average work day (benefit, +)
Highway	Percentage of total weekly travel time on divided highways (benefit, ?; lower cost, + net?)

[a] +, –, or ? indicates the expected sign.
[b] Weights are imputed from *Ward's Automotive Yearbook*

to influence the benefits of seat belt use affect the probability of use in the expected direction while holding other effects constant.

Table 1 gives definitions of variables expected to influence seat belt use. They can be divided into three broad categories: healthy lifestyle behaviors, individual characteristics of the respondent, and vehicle and travel conditions. The healthy lifestyle behaviors included in the seat belt use analysis would affect perceived benefits of a risk reduction. We predict that, holding other factors the same, motorists who smoke less, make dental visits more frequently, and exercise regularly are less willing to undertake a risky behavior such as failure to use seat belts than those who do not engage in these health-producing activities.

Social and demographic characteristics of drivers are also included in the model. Education enhances production of health and safety by increasing the ability to process information about health and safety risks as well as the efficiency of household production. Education may also serve as a proxy for wealth as well as a proxy for time preference, i.e. willingness to make investments for the future. All three effects lead to greater perceived benefits of seat belt use and are expected to lead to a higher probability of use. Income, to the extent it represents the value of future consumption, would increase benefits. However, to the extent it is correlated with higher cost of time and seat belt use, higher income would lead to greater costs. The net effect of income on the seat belt use depends on the relative strengths of these two effects and is indeterminate. Age, to the extent it represents more information about safety through experience, would be associated with greater benefits. However, greater age might represent lower future benefits. The net effect of age on the probability of use is indeterminate. Number of children may have a mixed effect also. Children can be expected to increase the benefits of future periods, but young children also raise the cost of seat belt use through more frequent disruption of normal use patterns. Gender is included because it is thought to be important in health and risk-taking behavior. In this study it is used as a control variable. If women drive under less hazardous conditions, then they will have lower expected benefits of seat belt use and can be expected to use them less.[3]

The remaining variables represent vehicle and travel conditions. Comfort and convenience ratings of the seat belt systems indicate how great are the user costs of seat belt use. The higher are these ratings, the lower are the time and disutility costs of using seat belts and the greater is expected to be the probability of use. Vehicle age increases the risk of an accident and increases expected benefits of seat belt use; use is expected to be greater in older vehicles. Vehicle weight reduces the probability of injury in a crash and reduces expected benefits; use is expected to be less in heavier vehicles. Total miles per day, while holding trip length constant along with percent divided highway, would increase the probability of an accident and thus the expected benefit; use is expected to increase with more total miles. Although the design is inherently safer, percent divided highway indicates higher rates of speed and thus higher expected benefits in a crash. This type of highway also indicates that the driver is making longer trips and hence incurring lower average seat belt use costs associated with getting in and out of the vehicle. The greater benefits and lower costs lead us to expect greater seat belt use as the percentage of driving on divided highways increases.

RESULTS

Results of logit analysis of seat belt use for drivers are presented in Tables 2 and 3. Table 2 shows binary logit results for two combined categories, the always-and-most-times versus the sometimes-and-never. Table 3 gives results of an ordered logit across all four categories. Results of the binary logit are presented because of ease of interpretation. Specifically, there is no ambiguity in the expected signs of the two intermediate categories of use, most and some, as in the ordered logit. Results of the ordered logit are presented because it is statistically preferred for a categorical dependent variable such as seat belt use which is ordered as never, some, most and always (Greene, 1993). Overall, these results are consistent with our prior expectations based on the net benefit model. The χ^2 statistics for both specifications (212.4 and 270.0) indicate the models are significant at standard levels. The χ^2 tests against the null hypothesis that the coefficients of the three lifestyle variables are all zero indicate

Table 2. Logit Analysis of Seat Belt Use, 1982, $n = 878$ Dependent Variable: Always or Most = 1; Some or Never = 0 327 (37.2%) of drivers use seat belts always or most of the time

Variable[a]	Coefficient	z-value	Derivative
Lifestyle[b]			
Cigarette pks	−0.3576	−2.45	−0.0786
Dental years	−0.2592	−3.20	−0.0569
Exercise	0.1602	0.94	0.0352
Individual characteristics			
Education	0.1397	3.62	0.0307
Income	−0.801E-5	−1.37	−0.176E-5
Age	0.1663E-1	2.93	0.359E-2
Children	0.1377	0.99	0.0303
Gender	−0.4212	−2.57	−0.0925
Vehicle and travel conditions			
Comfort	0.6786	5.41	0.1490
Convenience	0.8719	7.02	0.1915
Vehicle age	0.1180E-1	1.02	0.259E-2
Vehicle weight	−0.126E-3	−0.68	−0.277E-4
Total miles	0.1190E-2	0.54	0.261E-3
Highway	0.8719E-2	3.23	0.192E-2
Constant	−6.1193	−6.213	−1.3434

Log likelihood value = −474 Chi-squared = 212.4 with 14 df

[a]Variables are defined in Table 1.
[b]The χ^2 value for a joint test of the hypothesis that the coefficients of the three lifestyle variables are zero is 19.22, which is significant at the 1% level.

that the lifestyle variables do indeed tell us something useful about the individuals. The χ^2 values for the binary logit (19.22) and the ordered logit (17.74) indicate the null hypothesis can be rejected at any standard level of confidence.

The lifestyle variables consistently have the expected signs for their coefficients. Two of the three individual lifestyle coefficients are statistically significant at the 95% confidence level.[4] The signs of the coefficients across the binary and ordered logits are the same for all variables. For these variables the derivative of the probability of always use with respect to the variable has the same sign as its corresponding coefficient and the derivative of the never use category has the opposite sign. For example, a person who waited one month longer, a 1/12 of a year increase, for a dental visit has a probability of always use which is 0.002 lower, all other things constant. The same person has a probability of never using seat belts which is 0.003 higher, all other things the same. A check of the derivatives of the most category (not shown) showed the same signs as the corresponding always derivatives. A similar check for the some category (not shown) showed the same signs as the corresponding never derivatives.

Table 4 shows the responsiveness of the probability of seat belt use to changes in the explanatory variables with elasticities calculated from the means and derivatives for the binary logit and the always category of the ordered logit.[5] In our sample, seat belt use is most strongly influenced by educational attainment. A 10% increase in the number of years of schooling increases the probability of using a seat belt by more than 10%. This result is quite consistent with previous studies and will be discussed along with the lifestyle results below.

Seat belt use is also very responsive to the comfort and convenience of use. While we do not have a direct measure of the use costs, comfort and convenience represent the utility or psychic costs of seat belt use. Consider the binary logit results. The elasticities mean that a 10% increase

Table 3. Ordered Logit of Seat Belt Use, 1982, $n = 878$ Dependent Variable: Always, most, some, never[a]

Variable[b]	Coefficient	z-value	Always derivative[c]	Never derivative[d]
Lifestyle[e]				
Cigarette pks	−0.2466	−2.16	−0.0344	0.0500
Dental years	−0.193	−3.05	−0.0269	0.0391
Exercise	0.2044	1.51	0.0285	−0.415
Individual characteristics				
Education	0.1563	4.98	0.0218	−0.0317
Income	−0.439E-5	−0.93	−0.613E-6	0.890E-6
Age	0.0137	2.91	0.191E-2	−0.278-2
Children	0.0906	0.80	0.0126	−0.0184
Gender	−0.2998	−2.28	−0.0418	0.0608
Vehicle and travel conditions				
Comfort	0.6658	6.83	0.0929	−0.1350
Convenience	0.8065	8.60	0.1125	−0.1636
Vehicle age	0.634E-2	0.63	0.884E-3	−0.129E-2
Vehicle weight	−0.633E0-5	−0.04	−0.883E-6	−0.128E-5
Total miles	0.106E-2	0.58	0.148E-3	−0.216E-3
Highway	0.635E-2	2.91	0.886E-3	−0.129E-2

Log likelihood value = −1049 Chi-squared = 270.0 with 14 df

[a]The number and percentage of drivers across use frequency categories is: always 187 (21.3%), most 140 (16.0%), some 263 (30.0%), and never 288 (32.8%).
[b]Variables are defined in Table 1.
[c]The derivative for always gives the change in probability of always seat belt use with respect to a small change in the variable. The derivatives were calculated at the means.
[d]The derivative for the never category is expected to have the opposite sign of the derivative of the always category. The derivatives were calculated at the means.
[e]The χ^2 vallue for a joint test of the hypothesis that the coefficients of the three lifestyle variables are zero is 17.74 which is significant at the 1% level.

in comfort and convenience of the belts increases the probability of use by 9.3% and 11.9%, respectively. This responsiveness indicates that costs are important factors in the decision to use seat belts. Fuchs (1986, p. 216) suggested that psychic and time costs can be important determinants of health and safety behavior. The only variable available in our data with which to measure the (value of) time cost of seat belt use was income. To the extent that income measures the wage rate, this variable indicates the value of time spent in fastening the seat belt, but this effect may be confounded by a correlation between income and wealth. The coefficient on this variable was negative but not significant at the usual levels.

Age was also a significant factor in determining the probability of seat belt users. A 10% increase in the age of the driver implies a 3.8% increase in the probability of belt use. Gender was found to be significant. For the sample, a 10% increase in the number of female drivers would reduce seat belt use by 1.2%. One possible explanation is that the results are for general driving conditions, and trip length is not held constant. If women drive under less risky conditions and for shorter trips, then their use can be expected to be lower. Percent of miles driven on divided highways was also found to be significant. A 10% increase in miles spent on divided highways increases the probability of seat belt use by 1.6%. Higher highway speeds increase benefits and generally longer trips would decrease per trip use cost. Surprisingly, vehicle characteristics were not found to be significant determinants of seat belt use in this sample. Blomquist (1991) found vehicle weight to be important, but our estimated coefficients are insignificant. The lack of significance may be largely

Table 4. Responsiveness of Seat Belt Use to Net Benefit Factors, 1982, $n = 878$ Elasticities Evaluated at the Means

Net benefit factor	Mean value	Binary logit always or most (37.2%) Elasticity	Ordered logit always use (21.3%) Elasticity
Lifestyle			
Cigarette pks	0.3486	−0.07[a]	−0.06[a]
Dental years	1.19	−0.18[a]	−0.15[a]
Exercise[b]	0.6241	0.06	0.08
Individual characteristics			
Education	13.41	1.10[a]	1.37[a]
Income	26720	−0.13	−0.08
Age	39.61	0.38[a]	0.36[a]
Children	0.2836	0.02	0.02
Gender[b]	0.4943	−0.12[a]	−0.10
Vehicle and travel conditions			
Comfort	2.32	0.93[a]	1.01[a]
Convenience	2.31	1.19[a]	1.22[a]
Vehicle age	6.96	0.05	0.03
Vehicle weight	3216	−0.24	−0.01
Total miles	38.19	0.03	0.03
Highway	31.43	0.16[a]	0.13[a]

[a] Elasticity is based on a coefficient with a z-value of at least 1.96
[b] These elasticities are calculated for small increases in the shares of the sample with the characteristics since the variables for an individual are binary. These values are reported here for ease of comparability to the continuous variables for which small changes are possible. In Table 5 the effects of exercise and gender are estimated for unit (0–1) changes.

due to measurement error since vehicle weights were not directly reported but imputed from size categories. (Vehicle weight was imputed from reported size categories using the 1982 *Ward's Automotive Yearbook* since weight was not part of the LJA data.)

The rightmost column in Table 4 shows the elasticities of always use with respect to each variable for the ordered logit. A case can be made that the most interesting elasticity from the ordered logit is the elasticity for the never category. Lack of familiarity or experience with seat belts might make people in the never category least responsive to changes in net benefits. The elasticities for the never use category (not shown) are almost exactly the same size as the elasticities for the always category but of opposite sign.

DISCUSSION

The lifestyle variables results are consistent with an expected net benefit model. Cigarette smoking, dental visits and exercise all have the expected impact on seat belt use. As shown by the elasticities, a 10% decrease in the number of packs of cigarettes smoked per day increases the probability of seat belt use by 0.7%. Likewise, a 10% decrease in the length of time between dental visits increases the probability by 1.8%. If we calculate the sample elasticity for exercise based on the point estimate, we find that if the share of individuals who exercise regularly were to increase by 10% driver seat belt use would increase by 0.6%. The ordered logit results indicate that 10% changes in the lifestyle variables would increase the probability of always using seat belt by 0.6%, 1.5% and 0.8%, respectively.

One way to get an idea of the impact of the three lifestyle variables on seat belt use is to consider the combined effect of concurrent changes. A 10% reduction in packs smoked, 10% reduction in length of time between dental visits and a 10% increase in the share of individuals who exercise regularly would produce a 3.1% increase in seat belt use based on the binary logit

Table 5. Effects of Lifestyle on Seat Belt Use for Typical Individuals Sample of All Drivers, $n = 878$

Individual type	Binary logit prob. change %			Ordered logit (always use) prob. change %		
Male with no child under 5						
Smokes 1 pack daily, 2 years dental, No regular exercise	0.250			0.127		
		0.170	51%		0.090	52%
Nonsmoker 1 year dental Exercise regularly	0.420			0.217		
Female with 1 child under 5						
Smokes 1 pack daily 2 years dental No regular exercise	0.200			0.106		
		0.153	55%		0.078	54%
Nonsmoker 1 year dental Exercises regularly	0.353			0.184		

Note: Changes are evaluated at the mean values for the following variables: education, income, age, comfort, convenience, vehicle age, vehicle weight, total miles driven, and highways.

and a 2.9% increase in always using seat belt use based on the ordered logit. A better way to see the combined effect of lifestyle choices is to calculate the probabilities of seat belt use for typical drivers with different lifestyles. In Table 5 we show, based on the binary and ordered logit results, the combined effects for two typical individuals: (1) a male with no children under age 5 and (2) a female with one child under age 5. Two different lifestyles are considered: (a) smoking 1 pack per day, 2 years between dental visits and no regular exercise and (b) no smoking, 1 year between dental visits and regular exercise. The impacts of lifestyle are substantial. For combined use estimated with binary logit the impact is a 0.170, or 51%, increase in the probability of seat belt use for the male with no children under 5. The impact is a 0.153 (or 55%) increase for the female with one child under 5. For the ordered logit the impact is a 0.090, or 52%, increase in the probability of always use for the male with no children under 5. The impact is a 0.078 (or 54%) increase for the female with one child under 5.

Education, as reported above, is the single factor to which seat belt use is most responsive. The elasticity for combined use was 1.10 and the elasticity for always use was 1.37. The importance of education found here and in earlier studies, (Ryan and Bridgeman, 1992; Blomquist, 1991; Leigh, 1990; McCarthy, 1986; Fuchs, 1986) has a number of possible explanations. Education may be serving as a proxy for wealth in our specification since education and wealth are often highly correlated. According to the net benefit model, greater wealth would lead to a greater value of safety and a greater probability of seat belt use. Another possibility is that education may be measuring individuals' rates of time preference (Fuchs, 1986). Within the expected net benefit model of seat belt use, costs are incurred in the present for the sake of future benefits. Individuals with lower rates of time preference might then be expected to invest both in many years of schooling and in health or safety-producing behaviors. A particularly relevant study by Leigh (1990) corrects for self-selection in choice of schooling and finds that education still has a direct effect which leads to a greater probability of seat belt use. He too finds that individuals who smoke less than 1 pack of cigarettes per day use seat belts more. A third explanation is that education makes individuals more efficient in producing health (Grossman, 1975). Holding other factors the same, individuals with higher levels of education might be expected to understand and implement cost-effective ways of producing health and safety, such as the use of seat belts. In making decisions about seat belt use, those with more education may be better able to discern and evaluate all the costs and benefits involved. Kenkel (1991a) finds that, while part of the relationship between schooling and the consumption of cigarettes, alcohol, and exercise is explained by differences in specific knowledge related to the health consequences of lifestyle behaviors, a substantial schooling effect remains even after controlling for these differences in health knowledge. In our analysis, even though schooling is treated as exogenous and is potentially serving as a proxy for knowledge (or perceptions) of the risks of unhealthy lifestyle behaviors, there is still a strong correlation between lifestyle behaviors. This is consistent with Kenkel's (1991a) finding that a substantial proportion of even highly informed consumers engage in unhealthy lifestyle behaviors, and indicates that there may be some underlying differences between consumers who engage in healthy lifestyles and those who do not.

Viscusi (1992) distinguishes between differences in preferences with regard to values placed on the attributes of choices (in the case of seat belts: time, convenience, health and safety) and the rate at which individuals are willing to tradeoff higher risks for these attributes. Within a net benefit framework, this implies that even with similar information and attribute values, consumers may differ in their willingness to incur risk. Evidence from a labor market study by Hersch and Viscusi (1990) shows that workers who wore seat belts and did not smoke demanded as much as three times larger compensating wage differentials for workplace injury risk than workers who did not use seat belts and did smoke. Because we have included observable characteristics such as age, income, and children, to account for differences in attribute values, the persistence of the correlation in lifestyle behaviors implies that lifestyle is capturing some underlying characteristic motivating some individuals to engage in more health- and safety-producing behavior than others.

Thus, our results that lifestyle matters are made stronger by the fact that education, to which these health-producing behaviors are correlated,[6] as well as age, gender, income, and children are being held constant through the logit specifications. While earlier studies have indicated that lifestyle affects seat belt use, they have left doubt about correlated, potentially confounding factors. Moreover, earlier studies have not estimated the strength of the effect in terms of the probability of changes in seat belt use. If one were to simply look at the low correlations among seat belt use and the lifestyle variables, one might think their influence is weak. The highest correlation is -0.110 between seat belt use and time between dental visits. Our result is that other healthy lifestyle choices increase the probability of seat belt use by more than 50% for typical individuals. It is not clear from our analysis whether individuals with healthy lifestyles differ in terms of emphasis on present and future health benefits—risk and time preferences, or whether they are simply more efficient at producing health by recognizing and implementing these behaviors. It is clear that the lifestyle effect is strong. Whatever the underlying reason, it is evident that individuals who are engaged in health-producing activities are more likely to use seat belts and that individuals are consistent across these health and safety activities.

Existence of differences in underlying characteristics and their importance have policy implications. One implication concerns the plausibility of allowing different people to signal the type of individuals they are in order to increase the efficiency of insurance markets. As Bond and Crocker (1991) show, endogenous categorization of risk can mitigate problems of moral hazard and adverse selection. Another implication concerns the wisdom of directing health promotion programs toward people most likely to respond. As Kenkel (1991b) has shown, many people are likely to have information which they need to make decisions about health and safety behavior. In our case, use of belts less than always does not necessarily imply ignorance. In the case of smoking, Viscusi (1992) found that even smokers tended to overestimate the health risks associated with smoking. Given that the goal of policy is to promote social welfare as it is perceived by the individuals in society, efficient health promotion should be directed toward people who are likely to assess their own benefits to be greater than costs, but are thought to experience an information gap.

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NOTES

1. Using the net benefit approach, rationality means individuals engage in activity if net benefits are positive and refrain if they are negative and respond to factors which influence the marginal net benefits they perceive. Consistency across activities is implied. In the analysis which follows we can determine response rationality at the margin, but we cannot determine whether or not individuals engage in activities in all instances and to the extent that maximizes net benefits. Viscusi (1992, p. 10) makes this point in his book about smoking. Values for each individual for each activity and circumstance are necessary to make that determination. We will be able to determine consistency with respect to direction of change, but will not be able to address the optimal extent of change or overall level of activity. Formulation of socially optimal health and safety policy requires public decisions about all three aspects of individual behavior.
2. The total sample of 1229 observations contained numerous missing values which reduced the size of the usable sample to 878. While seat belt use was missing for only two observations the missing values for dental visits (138), comfort (100), income (63) and divided highway (37) combined with missing values for other variables reduced the usable sample.
3. Sindelar (1982), for example, shows that men and women may receive different benefits from health care. With respect to motor vehicle travel, Weber (1975) found that men more frequently drive for pleasure and at night, when fatal accidents are more likely. Also, according to 1983 NPTS data, average trip length for all males equaled 9.5 miles while for females average trip length was 7.9 miles (Hu *et al.*, 1993).
4. Since in the net benefit approach to seat belt use we interpret the three health lifestyle variables as similar measures of the value of future health, it is not surprising that one of the measures, exercise, is not statistically significant. Emphasizing the underlying unobservable values which are revealed by preventive behavior suggests another test of consistency across health and safety.

   Consider the three lifestyle variables and seat belt use to be endogenous and simultaneously determined. If the unobservable values are important, we expect the risk-reducing activities to be positively correlated, the risk-increasing activities to be positively correlated, and the risk-reducing activities to be negatively correlated with the risk-increasing activities. Furthermore, if (new), net benefit equations are estimated separately for each of the four activities, the correlations of the residuals from the four equations should be similar to the simple correlations among the four activities. With qualitative dependent variables correct estimation would be a formidable task.

   To get some indication we estimated ordinary least squares regressions for each of the four activities. The seat belt use equation had the same variables as the logits reported in the tables, but did not include the three healthy lifestyle variables. The equations for smoking, length of time between dental visits, and exercise used the same five explanatory variables: age, children under 5, income, education and gender.

   The simple correlations are shown below with the corresponding correlations of the residuals underneath and in parentheses. They show like activities are positively correlated and opposite activities are negatively correlated. All the correlations of the residuals tend to be numerically smaller, but three of the six correlations are essentially unchanged. Apparently the unobservable values still influence the health and safety activities even after rough estimation of net benefit equations for each of the four health and safety activities.

	Seat Belt use	Cig. Pks.	Dental Yrs.	Exercise
Seat Belts	–			
Cig. Pks.	−0.089 (−0.072)	–		
Dental Yrs.	−0.110 (−0.106)	0.041 (0.024)	–	
Exercise	0.094 (0.095)	−0.037 (−0.033)	−0.107 (−0.084)	–

5. The elasticity for any variable, x, equals the value for the derivative of the probability of seat belt use with respect to x multiplied times the mean of x and divided by the mean of the probability of use.
6. For the sample of 878 observations the simple correlations with education are: seat belt use 0.175, exercise 0.118, cigarette packs −0.105, and length of time between dental visits −0.163.

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