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A HEALTHY LIFESTYLE:

**THE PRODUCT OF
OPPORTUNITIES AND
PREFERENCES**

AN EXPLORATIVE STUDY

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A HEALTHY LIFESTYLE: THE PRODUCT OF OPPORTUNITIES AND PREFERENCES*

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Abstract: In this explorative study we examine factors explaining individual choice of lifestyle. The empirical analysis of smoking, exercising and diet show that the mechanisms determining people's lifestyle are complex. We argue that the economic models on the demand for health is a meaningful framework for analysing this issue, but that it needs some refinements. A suggestion for further analytical work is therefore to reformulate the model to incorporate own past behaviour (habits), the society individuals belongs to (traditions and norms), as well as a more immediate effect on utility of lifestyle.

JEL Classification: C35; I12; I18

Keyword: Health demand models, lifestyle, ordered probit analysis.

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1. Introduction

It is well documented that health promotion and illness prevention increases the probability of a longer and healthier life. Why is it that some people tend to ignore this information and live an unhealthy life: they smoke, they eat unhealthy fast-food and they don't exercise. In the economists' approach to choice of lifestyle, demand for health is typically derived from the maximisation of discounted future utilities. Hence differences in lifestyle across agents' may be due to the facts that people face different money and time constraints. Moreover, the production possibilities for health, and personal characteristics like time-preferences and attitudes toward risk differ. But is this the whole story? Or can it simply be that people choose the lifestyle that gives them the highest joy and satisfaction today, without bothering if their behaviour affects health? One might also raise the question if lifestyle follows from the habits, traditions and norms people are trained to follow.

The main intention of this explorative study is to get an impression of important factors explaining how people live their life. The starting point is a sample of Norwegians for whom three lifestyle aspects are examined: smoking, exercising and how much fruit and vegetables they eat. In accordance the sample's attitudes toward risk, their time-preferences and attitudes towards own lifestyle choices are explored.

This paper is organised as follows. In section 2 we briefly outline the health demand models, present possible hypotheses on why peoples' lifestyle differ and describe our empirical methods. A description of the data set is given in section 3. In section 4 reduced form equations for the three different lifestyle aspects are examined. We present results from ordered probit analysis as well as from non-parametric testing of differences between groups with a healthy and an unhealthy lifestyle. The results indicate that the mechanisms determining people's lifestyle are complex. It seems that while time- and health constraints to a great extent can explain exercising behaviour, individuals' diet can be explained partly by habits and partly by personal characteristics like time-preferences and attitudes toward risk. It also seems that when some individuals start smoking and some don't, one important reason is differences in personal characteristics. When people continue smoking on the other hand, it is a mean to cope with a hectic daily life. But smoking is also a result of habits or addiction. Based on our empirical results we discuss policy implications of our findings (section 5). We conclude that a healthy lifestyle is a product of both individuals' opportunities and their preferences. At this stage we are not able to predict their relative importance on lifestyle.

We also conclude that economic models on the demand for health is a useful analytical framework for understanding differences in lifestyle among individuals, but that both the analytical and the empirical modelling need some refinement.

2. Conceptual framework

The notion that individuals invest in their own human capital either by improving their physical capacity or by increasing their stock of knowledge are widely accepted among economists (see for instance Becker 1964, Fuchs 1986 and Mushkin 1962). This relation is an important starting point in Grossman's (1972a, 1972b) seminal work on the demand for health. According to his framework individuals inherit an initial stock of health that depreciates over time and can be increased through investment. Individuals demand health for two reasons. As a consumption commodity it directly enters their preference functions: sick days are a source of disutility while healthy days will increase utility. From a human capital point of view, investment in health capital determines the total time available for performance in the labour market and leisure activities. The version of the Grossman model presented here is based on the specification in Ehrlich and Chuma (1990).

$$LU = \int_0^T e^{-\rho t} U(Z(t), h(t)) dt \quad (1)$$

$$\frac{\partial H(t)}{\partial t} = I(t) - \delta(t)H(t) \quad (2)$$

$$\frac{\partial A(t)}{\partial t} = rA(t) + w(t)l(t) - Pm(t)M(t) - Pc(t)X(t) \quad (3)$$

Individual's lifetime utility (LU) are separable over time-periods and depends on an amount of healthy time $h(t) = \varphi(H(t))$ and on a flow of consumption services $Z(t)$. The utility function U and the amount of healthy time are assumed to be increasing, strictly concave and continuously differentiable in their arguments. ρ denotes the exogenous rate of time-preference and T is the time of death. LU is maximised subject to the law of motions in health (2) and non-human assets (3). The boundary conditions on the stock of health capital at $t = 0$ and the stock of non-human assets at $t = T$ are respectively, $H(0) > H_{min} > 0$ and $A(T) \geq 0$ (if T is finite). H_{min} is the health stock when death occur. Net investment in health capital in year $(t+1)$ equals gross investment $I(t)$ less the exogenous rate of depreciation δ in year t .

The depreciation rate depends on the individual's age, and on a vector of exogenous determinants of use-related depreciation, such as work environment, housing conditions etc. Gross investment in health capital is produced by a household production function whose inputs include medical services $M(t)$ and the amount of time used in health investment $m(t)$. Health investment include all types of health promoting behaviour: consumption of effective medical care, healthy food, exercising etc. (Grossman 2000). The health production function also depends on factors that influence the productivity of the health production, the most important of these factors is the level of education. Like investment in health, consumption services are produced by inputs of a composite market good $X(t)$ and consumption time $c(t)$. Both market goods and own time are scarce resources. The time constraint an individual face is given by:

$$I = l(t) + s(t) + m(t) + c(t) ; I - s(t) \equiv h(t)$$

where $l(t)$ is labour time and $s(t)$ is sick time. The goods budget constraint equates the present value of outlays on goods to the present value of earnings income over the lifecycle plus initial assets. r is market rate of interest, $w(t)$ market wage rate, $P_m(t)$ and $P_c(t) \equiv 1$ denote the prices of medical services and the composite market good. It follows that while a healthy lifestyle increase the stock of health capital, actions detrimental to health such as cigarette smoking and excessive alcohol consumption lowers the stock of health capital.

The value of health capital has two components: (i) the value of life extension or the discounted value of the terminal health stock and (ii) the value of healthy life or the discounted value of health benefits accruing over the remaining life span. The specific age profile of the value of health capital depends on the relative magnitude of these two components. A higher rate of time-preference is expected to lower the demand for longevity, and hence decrease the probability of having a healthy lifestyle. This happens because of the implicit trade-off between longevity and quality of life (through a higher initial consumption level). This holds unambiguously, provided that a higher rate of time-preference causes a decrease in lifetime wealth due to a lesser propensity to save¹. Ehrlich and Chuma (1990) assume that the value individuals ascribe to their health capital differs both across persons of a given age and over the life cycle². Because willingness to participate in activities involving health risks can be explained as a function of this value, people's exposure to health hazards will differ. Greater exposure to health hazards implies a lesser tendency to invest in health, and hence a less healthy lifestyle³.

Broadly this model introduce four factors that can explain differences in people's lifestyle, namely different

- Time-constraints
- Money constraints
- Health production functions (depreciation rates and knowledge are important factors)
- Personal characteristics (time-preference rate and attitudes towards risk are important factors)

The individual decision rule in the health demand models is to maximise lifetime utility. In each period t individuals choose a lifestyle that contribute to investment in health capital and as such it is a mean to get a long and healthy life: Because I know that eating fruit and vegetables will lower my probability of getting gastrointestinal cancer and that exercising every week will lower my probability of getting cardiovascular diseases I choose such activities in my daily life. But does it seem plausible that longevity and instantaneous health-effects are the motivation behind choice of lifestyle? Can it simply be that people choose a certain lifestyle because it gives immediate joy and satisfaction? They may still maximise utility, but they just care for today: their time-preference rate goes to infinity. It then follows that individuals' eat healthy because they like healthy food, they exercise twice a week because it is fun, and they stay away from addictive goods because they neither like to drink nor to smoke. One can of course argue that when something is fun individuals feel better and this implies that their health capital increase. But when individuals are not aware of this causality when they decide how to act, it follows that the influence on utility is not through better health. The effect on utility follows more directly through pleasure.

According to sociological theory the socialisation process is important to explain human actions. People do what they are raised and trained to do (Olson 1969)⁴, and follow the values and rules that have been important fundaments in the society through generations. They may for instance follow health norms of the type: eat fruit and vegetables and exercise to stay healthy and don't smoke to avoid lung cancer. Again utility maximisation can not be rejected as a decision rule, but health norms, traditions and values serves as constraints in the maximisation process.

The intention of this paper is to explore whether we can get empirical support for the hypothesis that both:

- longevity (the future),
- immediate pleasure (today)
- and habits, traditions and norms (the past)

are important when people choose their way of living. If we get empirical support for the last two of these hypothesis refinement of the utility function in the health demand models should follow.

Estimates from health production functions conform quite closely to the conventional wisdom from epidemiology and clinical studies: Practices such as smoking, drinking, exercising and diet are related to health status (see for instance Fuchs 1974 and Kenkel 1995). Health demand models may therefore be a fruitful way of analysing lifestyle. We should ideally have estimated a structural model of health where the relation between lifestyle and health, and also the influence on preferences of both risk, attitudes towards lifestyle choices and socio-demographic variables were accounted for. But for two reasons we instead choose to estimate reduced form equations for the three different aspects of lifestyle. First: If the influence on health of diet, exercise and smoking should be accounted for in any medical, meaningful way we would have needed a panel of individuals that we had followed for a rather long time period; presumable 20 years. Because our data set is cross sectional we are not able to account for the relation between lifestyle and health in this structural way. Second: The theory gives no clear answers on how risk, attitudes towards lifestyle choices and socio-demographic variables influence preferences, and hence the functional form of the utility function does not follow in any axiomatic way.

Although the outcome of our data is discrete, multinomial logit or probit-models would fail to account for the ordinal nature of the dependent variable (Greene 1993, ch.21). We therefore apply an ordered probit-model. The model is built around a latent regression in the same manner as the binomial probit-model. Let

$$y^* = \beta'x + \varepsilon$$

y^* is unobserved. What we observe is:

$$\begin{aligned}
y = 0 & \text{ if } y^* \leq 0 \\
y = 1 & \text{ if } 0 < y^* \leq \mu_1 \\
y = 2 & \text{ if } \mu_1 < y^* \leq \mu_2 \\
& \vdots \\
y = J & \text{ if } \mu_{J-1} \leq y^*
\end{aligned}$$

The respondents choose the answering category y that most closely represents how they act. There are J answering categories. x is a vector of individual characteristics, ε takes account of the unobservable factors. We assume ε to be normally distributed across observations⁵. The μ 's are unknown threshold parameters to be estimated together with β . The probabilities that the j 'th alternative is selected by the person with individual characteristics x are:

$$\text{Pr ob}(Y = 0) = \Phi(-\beta'x) = 1 - \Phi(\beta'x)$$

$$\text{Pr ob}(Y = 1) = \Phi(\mu_1 - \beta'x) - \Phi(-\beta'x)$$

$$\text{Pr ob}(Y = 2) = \Phi(\mu_2 - \beta'x) - \Phi(\mu_1 - \beta'x)$$

$$\text{Pr ob}(Y = J) = 1 - \Phi(\mu_{J-1} - \beta'x)$$

In order for all the probabilities to be positive, we must have

$$0 < \mu_1 < \mu_2 < \dots < \mu_{J-1}$$

With ordered probit analysis one estimates a probability function which depend on the underlying parameters. A t-test is used to test the threshold parameters and the null hypotheses that a specific explanatory variable makes no contribution to the choice among alternatives. In assessing the model's explanatory power the value of the log-likelihood are reported. In the empirical analysis the statistical software package TSP 4.4 (1997) is applied.

3. Data

To get more knowledge about people's lifestyle, in 1998 Center for Health Administration carried out a survey on a representative sample of the Norwegian population⁶. The representative sample constitutes 2.000 persons aged 16 to 79. 67.4 % accepted to be interviewed. There was no serious distortion between the net and the gross sample⁷.

Descriptive statistics of the sample can be found in Table 1. About half of the sample (51%) are females, 43 % are in the age group 25 to 44 and the majorities (67%) are couples. More than 80 % of the sample are at least educated at upper secondary school (level 2), 53 % work more than 35 hours weekly⁸ and the mean yearly income are NOK 176.000. 78 % answered that they consider their own health to be good or very good, while the rest answered medium or poor. 22 % have a chronic disease.

According to WHO's (1986) definition, lifestyle is taken to mean a general way of living based on the interplay between living conditions and individual patterns of behaviour as determined by sociocultural factors and personal characteristics. We have examined three individual behaviour patterns that from our point of view cover important aspects of lifestyle⁹:

- How many times they exercise each week,
- How much fruits and vegetables they eat every day,
- If they smoke or not, and if they smoke daily or now and then.

The answer categories and descriptive statistics can be found in Table 2. We did not specify certain criteria on what we understand by exercising, and dependent on individual perception a walk to the grocery store will count in the same way as a demanding hour at the gym. Fruit and vegetables are measured in portions, for instance one apple, one salad or one glass of juice. Because we are not interested in measuring absolute amounts, but rather individuals' intentions with their actions, we don't think this make any serious flaws to our analysis.

Table 1: Descriptive statistics of our sample.

Variables	Categories		% of the sample
GENDER	Males	1	49
	Females	2	51
AGE	16 – 24	1	16
	25 – 44	2	43
	45 – 66	3	29
	67 – 79	4	12
HEALTH Self-assessed	Very good	1	35
	Good	2	43
	Medium	3	17
	Bad	4	4
	Very bad	5	1
CHRONIC Chronic disease	Yes	1	22
	No	2	78
FAMILY	Single	1	28
	Couple without children	2	28
	Single parent	3	5
	Couple with children	4	39
EDUCATION ¹⁰	Level 1	1	18
	Level 2	2	56
	Level 3	3	26
WORKING HOURS Weekly	Other ¹¹	1	32
	1 – 34 hours	2	15
	35 hours or more	3	53
REGION	Akershus and Oslo	1	20
	Hedmark and Oppland	2	9
	Rest of Eastern	3	18
	Agder and Rogaland	4	15
	Western Norway	5	18
	Trøndelag	6	10
	Northern Norway	7	10

Table 2: Dependent variables

Variables	Categories		% of the sample
SMOKE 1 Do you smoke? (n = 1286)	Yes	1	44
	No	2	56
SMOKE 2 ¹² Do you smoke daily or now and then? (n = 569)	Daily	1	74
	Now and then	2	26
EXERCISE How often do you exercise weekly? (n = 1341)	Less than once a week	1	35
	1 – 2 times a week	2	31
	3 – 4 times a week	3	18
	5 times or more every week	4	17
FRUIT How much fruit and vegetables to you eat every day? (n = 1341)	1 or less daily	1	42
	2 daily	2	38
	3 daily	3	14
	4 daily	4	4
	5 or more daily	5	2

From the health demand models it follows that differences in attitudes towards risk and time-preference rates are factors that can explain why investment in health differ among individuals. To indicate individuals' attitudes towards risk and uncertainty we asked the sample to answer five questions. We also examined individuals' time-preferences for money. The six different questions and the descriptive statistics can be found in Table 3. The best way of getting information about attitudes towards risk and time-preferences, is to observe individual behaviour over time, and as such questions like the ones we asked only serve as rough proxies. But even if these questions may not be very good measures of the concepts we are interested in, they are at this stage, the best we can come up with. The purpose of asking different questions related to risk is to take account of different aspects of the topic: it might be that an individual express risk-aversion when it comes to questions on economic matters, but not to questions related to physical or psychological matters. This is confirmed in the results: While nearly the whole sample (97 %) express risk-aversion when it comes to general safety for the future (Risk5), only 45 % of the sample expressed risk-aversion on a question related to a certain situation (Risk2) and 74 % of the sample expressed risk-aversion when it comes to a choice between participating in a lottery or receiving an amount of money (Risk1). Neither of the answers shows any correlation (the correlation coefficient varies between – 0.11 and 0.17). Assuming no inflation the answers on the question connected to time-preferences imply that 73 % of the sample had a zero time-preference rate for money, while the rest had a positive rate¹³, and this is in accordance with the results in Bretteville-Jensen (1999). One might of course argue that what this question accounts for is the market interest rate individuals face, and what we simply find is that the actual interest rates differ between individuals. But individuals that are willing to borrow money to a rather high interest rate will probably be more present oriented than individuals that are not willing to accept this interest rate, and as such we measure a kind of underlying impatience. Our interpretation is therefore that about one quarter (27 %) of the sample had a high time-preference rate, while most of the sample (73 %) had a rather low. Ideally we should have measured individuals' time-preference rate for health, but because questions that intend to measure this issue are rather hypothetical we chose not to include them in the survey. It is however important to note that people' time-preference rate for money may differ from their time-preference rate for health. While education was not a significant explanation of how individuals answered the six questions, age and gender could significantly explain the answers. We found that older and females are more risk-averse and more future oriented than respectively males and people in younger age groups. But there is no correlation between the answers of the questions on

attitudes towards risk and time-preferences, and the two variables age and gender (correlation coefficient between – 0.2 and 0.2).

Table 3: Attitudes toward risk and time-preference, descriptive statistics^{14,15}

Question	% of the sample
Risk1: Imagine that you were to be rewarded for voluntary work efforts. Which of the following two alternatives would you prefer? A: Receive NOK 8.000 (Risk-averse) B: By means of drawing where you have equal chance of winning NOK 100 and NOK 20.000 (Risk-seeker)	A: 74 B: 26
Risk2: I like challenges in unforeseen and complicated situations A: Agree (Risk-seeker) B: Disagree (Risk-averse)	A: 55 B: 45
Risk3: I would like to jump in a parachute A: Agree (Risk-seeker) B: Disagree (Risk-averse)	A: 29 B: 71
Risk4: I could imagine starting my own company or business A: Agree (Risk-seeker) B: Disagree (Risk-averse)	A: 48 B: 52
Risk5: I like to live in such a way that I can feel secure about the future A: Agree (Risk-averse) B: Disagree (Risk-seeker)	A: 97 B: 3
Time: Imagine that you have participated in a lottery. You learn that you have won NOK 100.000, but the money cannot be paid out until one year's time. What is the minimum amount you would sell your winning ticket for in order to receive the money today? A: Amount < 100.000 (Present-oriented) B: Amount = 100.000 (Future-oriented)	A: 27 B: 73

The sample was asked about their most important reason for exercising and eating fruit and vegetables and the most important reason for not doing it. Further smokers were asked about the most important reason why they smoke and the most important gain if they should quit smoking. For all six questions answering categories which should take account of different aspects behind choice of lifestyle were presented¹⁶ (Table 4). But even if the answering categories capture what we think is important reasons, they will of course not completely cover all major fields. The intention at this stage is to get a general impression of the influence on lifestyle of people' attitudes towards lifestyle choice. Nearly half of the sample (49 %) eat fruit and vegetables because it tastes good, and more than 50 % state that habits are important explanations for not eating fruit and vegetables. A majority (58 %) answers that the

most important reason for exercising is to stay vigorous, and a large share (17 %) that future health status is an important reason for exercising. The main reason (48 %) people give for not exercising is time constraints. Relaxation (34 %), enjoyment (29 %) and addiction (22 %) are the most important reasons for smoking. 56 % of the sample find the most important reason for quit smoking the reduced probability of getting lung cancer. Not surprisingly it seems that smokers are aware of the health risk of smoking.

Table 4: Most important reasons for living healthy/not living healthy.*

Eating fruit and vegetables¹⁷ (n=777)	Exercising (n=1341)	Smoking¹⁸ (n=569)
<ul style="list-style-type: none"> • It tastes good (49%) • It's healthy (42 %) • To control illness (4%) • Watch my weight (3%) • Red. the likelihood of cancer (3%) • Other reasons 	<p>Reason1: Active and in good shape (58%)</p> <p>Reason2: Red. the chance of illness (17%)</p> <p>Reason3: Fun/enjoyable (10%)</p> <p>Reason4: Watch my weight (11%)</p> <p>Reason5: Competitions (1%)</p> <ul style="list-style-type: none"> • Other reasons (3%) 	<p>Reason1: Enjoyment greater than risk (29%)</p> <p>Reason2: Relaxation in a stressful life (34%)</p> <p>Reason3: Keep my weight down (2%)</p> <p>Reason4: Not as dangerous as claimed (1%)</p> <p>Reason5: Customary in my circle (4%)</p> <p>Reason6: Don't manage to quit (22%)</p> <ul style="list-style-type: none"> • Other reasons (8%)
Not eating fruit and vegetables (n=1341)	Not exercising¹⁹ (n=880)	Quit smoking (n=569)
<p>Reason1: Doesn't taste very good (13%)</p> <p>Reason2: A matter of habit (54%)</p> <p>Reason3: Importance exaggerated (7%)</p> <p>Reason4: Expensive (18%)</p> <p>Reason5: Limited selection/poor quality in shops (4%)</p> <ul style="list-style-type: none"> • Other reasons (7%) 	<ul style="list-style-type: none"> • Time is used for other things (48%) • Like to relax (24%) • Not fun (16%) • Illness/disablement (6%) • Not any importance to health (2%) • Other reasons (5%) 	<ul style="list-style-type: none"> • Red. the risk of lung cancer (56%) • Save money (17%) • Improve physical condition (15%) • Avoid exposing others (6%) • More accepted (1%) • Other reasons (5%)

* **Reasons** correspond to the dummies used in the ordered probit analysis (table 5).

4. Results

The results from the ordered probit analysis²⁰ show that (Table 5):

1. Females eat more fruit and vegetables than males. The older, the higher educated and the better the self-assessed health is, the more fruit and vegetables do individuals eat. Region is also a significant explanation on diet: people living in the Mid and Northern part of Norway are less likely to eat a lot of fruit and vegetables. The variables working hours, family situation and chronic illness are not significant.
2. The better the self-assessed health is, the less demanding the family situation is and the lesser working hours are, the more do individuals exercise. The variables gender, age, chronic illness, level of education and region are not significant.
3. The older one is, the higher the level of education is and the fewer working hours are, the less likely it is that individuals smoke. The variables gender, self-assessed health, chronic illness, family situation and region are not significant.

Because we know individual income and household income we tested different models with income as an explanatory variable. Thus, we added income as an extra variable, included income and excluded working hours and included income and excluded the level of education. Income could significantly explain behaviour only in one of these models, namely in the model where we excluded working hours in explaining exercising²¹. In the models explaining diet, self-assessed health and education no longer were significant when income was included. For the rest of the models the significant variables did not change and the results correspond to those reported. The value of the log-likelihood was at the same level as in the reported analysis. It then seems that education and hours worked are more underlying explanations on people's lifestyle than income. We therefore conclude that income is not important to explain differences in exercising, smoking and diet among Norwegians.

Table 5: Results from the ordered probit analysis. Estimate (st.dev).

Parameter	FRUIT	EXERCISE	SMOKE
Constant	-1.973 (0.342)**	2.346 (0.353)**	-0.518 (0.335)
Gender	0.612 (0.071)**	0.037 (0.068)	-0.057 (0.079)
Age	0.177 (0.044)**	0.043 (0.042)	0.234 (0.049)**
Health	-0.091 (0.042)*	-0.229 (0.039)**	-0.054 (0.046)
Chronic	-0.031 (0.084)	-0.169 (0.080)	0.028 (0.092)
Family	-0.020 (0.029)	-0.092 (0.027)**	-0.014 (0.031)
Education	0.143 (0.053)*	0.068 (0.052)	0.258 (0.060)**
Working hours	0.000 (0.042)	-0.215 (0.041)**	-0.208 (0.047)**
Region	-0.063 (0.017)**	0.032 (0.017)	-0.001 (0.019)
Risk1 (dummy)	-0.032 (0.077)	0.024 (0.074)	-0.024 (0.084)
Risk2 (dummy)	-0.043 (0.068)	-0.088 (0.066)	0.162 (0.077)
Risk3 (dummy)	-0.003 (0.083)	-0.094 (0.083)	0.153 (0.090)
Risk4 (dummy)	-0.063 (0.070)	0.009 (0.070)	0.043 (0.078)
Time (dummy)	0.068 (0.076)	0.078 (0.079)	0.123 (0.086)
Reason1 (dummy)	1.377 (0.187)**	-0.859 (0.185)**	
Reason2 (dummy)	1.054 (0.162)**	-0.881 (0.194)**	
Reason3 (dummy)	1.338 (0.226)**	-0.483 (0.212)	
Reason4 (dummy)	1.414 (0.174)**	-1.531 (0.203)**	
Reason5 (dummy)	0.745 (0.229)**	-0.430 (0.303)	
D ₁	1.083 (0.022)**	0.942 (0.021)**	
D ₂	0.899 (0.031)**	0.767 (0.024)**	
D ₃	0.724 (0.054)**		
	n = 1227	n = 1236	n = 1239
	Log-likelihood = - 1362.44	Log-likelihood = - 1553.53	Log-likelihood = - 796.80

*: Significant at 5% level, **: Significant at 1 % level.

The threshold parameters

$$\text{Fruit: } \mu_1 = D_1^2 = 1.173, \mu_2 = D_2^2 + \mu_1 = 1.981, \mu_3 = D_3^2 + \mu_2 = 2.505$$

$$\text{Exercise: } \mu_1 = D_1^2 = 0.887, \mu_2 = D_2^2 + \mu_1 = 1.475$$

We included four dummies (Risk1 - Risk4) to take account of individuals' attitudes toward risk. The different dummies correspond to the questions in table 3. Because nearly the whole sample express risk aversion on Risk5 we choose not to include this as a dummy. We also include a dummy (Time) to take account of individuals' time-preferences. Risk-aversion and future-orientation implies that the dummies get the value one. Neither of these variables are significant in the analysis.

The indicators of attitudes toward risk and time-preferences are very rough measures that can only take two values. This implies that the variances are rather small, and might explain why they are not significant in the analysis²². To examine if we can identify differences between persons living healthy and person living unhealthy, we also examined this issue in a more ad hoc way by comparing the answers for groups of healthy and unhealthy respectively. We

grouped healthy and unhealthy both based on the initial questions on activity and based on the results from the probit analysis, and all types of grouping pointed in the same direction. The differences in means were tested by a non-parametric Mann Whitney test (Bhattacharia and Johnson, 1977, ch. 15). The results from the testing show that there were no significant differences in how individuals exercising 3-4 times or more and those exercising 1-2 times or less answered (Table A1, Appendix). For fruit and vegetables there are significant differences between the groups both for two aspect of attitudes toward risk (q. 3 and 4) and for time-preferences: On average individuals eating at least two fruits or vegetables daily don't like risk and care more for the future than those eating one or less. The results also show that non-smokers on average are more risk-averse than smokers (q. 2, 3 and 5).

For fruit and vegetables and exercise we include five dummies (Reason1 - Reason5) to take account of what individuals' answered on the questions related to lifestyle choices. We chose to include the reasons for not eating fruit and vegetables and the reasons for exercising because those questions are asked the whole sample (Table 4)²³. For fruit and vegetables all five dummies accounting for peoples motivations are significant. Regarding exercise three out of five dummies are significant. We also did the analysis without those variables. When motivation or attitudes is included the log-likelihood increase, and this serve as an argument for not only include socio-economic variables in the analysis.

We find that non-smokers both exercise more and eat more fruit and vegetables than smokers. This is in accordance with the findings in Whitchelow et al. (1991). If we define overall healthy as being non-smokers, eating at least two fruits and/or vegetables each day and exercising once a week or more, we find that about 25 % of our sample have a healthy lifestyle, while 10 % live overall unhealthy. The majority of the sample (65 %) live healthy in different ways: For instance independent of gender, people with a higher level of education smoke less. Independent of education, females eat healthier and independent of age, people with shorter working hours exercise more. It thus seems that different people use different means to increase their overall utility. These findings and the fact that we find the three different lifestyle components to be determined by very different factors are the reasons why we choose not to construct indexes of healthy and unhealthy life respectively. We assume that an aggregation of scores in the different areas will cover up our main findings. Below we describe the results in more details:

4.1 Fruit and vegetables

Gender is the most important factor explaining how much fruit and vegetables individuals eat. The second most important factor is age, while the level of education, region and self-assessed health have about the same impact on actual behaviour. To illustrate differences in probabilities between individuals we picked out a healthy person H (female, aged 45-66, good health, educated on level 3, living in Oslo or Akershus) and an unhealthy person U (male, aged 25-44, bad health, educated on level 1, live in Northern Norway²⁴). While person H's probability of eating one or less fruit and/or vegetable each day is 0.57 and the probability of eating two each day is 0.43, person U's probabilities of the same diet are respectively 0.96 and 0.04.

How individuals' answer the question on the most important reason for not eating fruit and vegetables differ significantly (Table A1, A2 and A3 in Appendix): the more fruit and vegetables individuals eat the more important is it that these goods taste good, the more important is the price and the less important is habits as an excuse for not eating fruit and vegetables. We also find that the taste of fruit and vegetables are more important to the unhealthy than to the healthy, and also that more healthy than unhealthy use the price as an excuse for not eating more fruit and vegetables. It is interesting to note that future health status is not an important explanation why healthy people eat fruit and vegetables. From the ordered probit analysis we find that individuals answering that fruit and vegetables "doesn't taste good", that "the importance are exaggerated" or that fruit and vegetables is "expensive" have a higher chance of eating more than four fruit and vegetables each day than others. While individuals answering "habits" or "limited selection or poor quality" have a higher chance of eating one or less each day.

4.2 Exercise

Self-assessed health is the most important factor explaining individuals exercising behaviour. Number of hours worked each week is also an important factor, while family situation is the least important explanation. The average person in our sample exercise between one and two times every week. Again we compare a healthy person H (good health, single, working part time) with an unhealthy person U (bad health, couple with children, working 35 hours or more²⁵). While H has a probability of 0.68 of exercising three times a week or more U's probability of the same behaviour is 0.13.

When the sample were grouped in accordance to activity level the reasons for not exercising differed significantly between the two groups (Table A5 in Appendix). The most interesting finding is that more unhealthy than healthy state that they exercise because it is a mean to reduce weight, and that more healthy than unhealthy exercise for fun. In other words some find that exercising is fun and enjoyable and they exercise a great deal. Others do it to stay slim, and they exercise less. We also find that more unhealthy than healthy use time constraints as an argument for not exercising. Individuals answering that they exercise to stay “active and in good shape” or to “reduce the chance of illness” has a higher chance of exercising three times a week or more than the rest of the sample. While those answering that they exercise to “watch their weight” have a higher chance of exercising once a week or less.

4.3 Smoking

Age and the level of education are the most important factors explaining individual smoking behaviour. The number of hours worked each week means a little bit less than those factors. If a healthy person H (aged 45-66, educated on level 3, working part time) are compared with an unhealthy person U (aged 16-24, educated on level 1, working 35 hours or more²⁶), H's probability of smoking is 0.37 and of not smoking 0.63, while U's probabilities is 0.81 of smoking and 0.19 of not smoking.

Only smokers are, of course, asked about main reasons for smoking, and what they will state as the most important gain if they should quit smoking (Table A6, Appendix). There are significant differences between the groups of daily and now and then smokers in how they answer. Daily smokers use the cigarette as a mean to cope with a hectic daily life²⁷. Now and then smokers state that the pleasure of smoking is greater than the risk: smoking increases the quality of life. It is also interesting to note that while 28 % of the daily smokers state that they are addicted, only 4 % of the now and then smokers use the same argument.

To take account of individuals' motivation we did the ordered probit analysis on the group of smokers (Table A7, Appendix). None of the socio-economic variables from table 5 can explain why some people smoke daily and some now and then. Two of the dummies on risk attitudes and two dummies on attitudes towards lifestyle choices are significant. If you “want to jump in a parachute” your chance of being a daily smoker are higher than if you “like unforeseen/complicated situations”, and if you “don't manage to quit” your probability of being a daily smoker are higher than if “smoking provides relaxation”. This finding highlights

the difference between diet and exercising on the one hand and smoking on the other. Because smokers can be addicted their choice-set are reduced, and this of course influences how they answer. Questions on reasons why they started smoking might have been better, but answers on this type of questions are probably accidental.

5. Discussion

Economists are in general sceptical to hypothetical questions about behaviour. But both Grether (1980) and Thaler (1981) found no differences between how people act and the behaviour they hypothetical state that they have. Looking back on our results regarding time-preferences and the concern for future health status our findings are inconsistent. First: it seems that people with a healthy diet are more future oriented than people with an unhealthy diet are. But when it comes to questions on why they act like they do, few with a healthy diet state that their motivation is future health status. Second: people stating that they exercise “to reduce the chance of illness” or “to be active and in good shape” exercise more than others, but time-preferences are the same for the different groups. Following Føllesdal (1982) we can’t necessarily trust what people answer to a question on attitudes and motivation: (p.310) *“First we cannot always trust what a person says. He may give us a false story of what his reasons are for acting in the way he does. He may also lie to himself, he may rationalise. His behaviour may be due to reasons that he does not know”*. But because both long-term and short-term factors can be important elements in individuals’ preference-function, it might be consistent to answer with reference to short-term factors, like people with a healthy diet do, even if the underlying motivation is long-term. Our results can also be due to other types of measurement errors. First: because people do not perceive the question like we do, they don’t necessarily catch up with what we had intended. We might for instance think that we measure people’s time-preferences²⁸ and their attitudes towards risk, but we fail. Second: people are not concerned about their own motivation, and hence the answers are accidental. Third: the interviewer or the researcher interprets the answers in a wrong way. These points are important to have in mind when it comes to the interpretation of and the conclusions from our findings.

A majority of the sample state that the most important reason for exercising is that you get healthy and 17 % answered that exercising reduce the possibility of illness in the future.

Nearly half of the sample stated that the most important reason for eating fruit and vegetables is that it is healthy. And finally a majority of the smokers stated that the most important reason to quit smoking is that it reduces the possibility of getting lung cancer. Hence people are aware of the future health effects of lifestyle. Still a huge amount of the sample (44 %) smoke, the average person eat less fruit and vegetables than recommended and they exercise less than two times weekly. Following Akerlof (1991) this may happen because of procrastination (p.1): *"individuals postpone tasks until tomorrow without foreseeing that when tomorrow comes the required action will be delayed yet again"*. People have naive beliefs and certain, immediate rewards therefore win over probabilistic, remote costs. O'Donoghue and Rabin (1999a) have taken this a bit further. They emphasise two distinctions in modelling time-inconsistent, present-biased preferences or self-control problems: Do activities involve immediate costs or immediate rewards, and are people naive or sophisticated²⁹ about future self-control problems? If actions involve immediate costs you wait when you should do it, if actions involve immediate rewards you do it when you should wait. Irrespective of whether rewards or costs are immediate, sophisticated persons do the activity sooner than naives with the same preferences do. Hence, depending on whether individuals perceive the outcome of an action as a cost or a reward - some find it fun to exercise, others hate it - and depending on individual beliefs, people will differ in their health behaviour even if they are aware of future health effects of their lifestyle³⁰. Accepting people's tendency to procrastinate O'Donoghue and Rabin (1999c) examine how principals should design incentives to avoid inefficient delay in completing tasks, what the delivery date of rewards for completing a task should be and the usefulness of deadlines for completing tasks³¹. Taking their discussion into account we can think of some policy means to get people live healthier. If non-smokers are offered extra holiday, smokers get a reward if they quit smoking and become non-smokers, and this will probably get some smokers to quit. If persons using bicycle to work a specified number of times before a certain date will get a reward, for instance participating in a lottery where the prize is a holiday in Spain, this will probably get some people to exercise more. And if pupils in primary school get rewarded from their teacher if they have healthy lunch-packets, this will probably stimulate healthy dietary habits.

Table 6: Important factors in explaining differences in lifestyle. Summary.

		Exercise	Diet	Smoking
1	Time-constraints	X		X
2	Economic constraints			
3	Personal characteristics		X	X
4	Individual constraints in health production functions	X	X	X
5	Habits		X	X
6	Norms	X		
7	Immediate pleasure with the action	X	X	X

Our empirical findings can be summarised in the following way (Table 6):

1. Family situation and working hours are significant explanation of the number of times a person exercises each week. We also find that a majority of the sample use lack of time as an explanation of why they don't exercise more. The most important argument daily smokers use for smoking, is that it is relaxing and the more people work the more do they smoke. These results point to the importance of time-constraints for explaining healthy behaviour in the exercise and smoking areas. This is in accordance with the models based on Grossman's work. A mean to get people to exercise more might therefore be to organise exercising and gymnastic during working hours. Another strategy is to lowering job stress on the working place, which is one important suggestion from WHO (1986).
2. We have tried different empirical models where income was used as an explanatory variable, but in neither of the areas we found it to be a significant explanation on behaviour. It seems that education and hours worked are more underlying explanations on peoples' lifestyle than income. Because the variation in income is rather small in Norway, this is not a surprising result. People eating a small amount of fruit and vegetables are not concerned about the cost, but the more you eat the more important is the price. It then seems that lowering the price on healthy food only to a small degree is a mean to change an unhealthy diet. The fact that more daily smokers than now and then smokers express that an important reason to quit smoking is that one can save money is on the other hand, an argument for increasing the prices on cigarettes and tobacco³². On a more general basis Lave et al. (1996) evaluated a health program that extended coverage for health promotion like nutritional counselling, smoking cessation and health screening, to Medicare beneficiaries. Contrary to our finding they found that older, rural Americans will modestly increase their use of disease prevention/health promotion services if Medicare covers them. The type of health promotion in this study is connected to health education given

from the health care sector, while we understand health promotion much broader. Even if money and income is unimportant to lifestyle choices in general it is possible that expenditures to preventive health care are important to people³³. An interesting question in connection to our finding, is whether getting people to live healthier is a mean to improve health status for the whole population or if some groups' more than others privilege from improving social and material circumstances. In a study based on the British Health and Lifestyle Survey, Blaxter (1990) concluded that healthy behaviour has a strong influence upon health only if circumstances are good. Kooiker and Christiansen (1995) tested the main claims from this study on data from Dutch and Danish health surveys, but the data did not support the hypotheses. The most important explanation of this result is that the disadvantaged groups in Denmark and the Netherlands are relative better off than those groups in the UK, and hence the social and material circumstances they find themselves in do not outweigh behaviour. This is most likely the case in Norway as well, and we might conclude that for the whole population improving lifestyle is a mean to improve health status.

3. The level of education is the most important factor explaining whether an individual smoke, and it is also an important explanation of how much fruit and vegetables people eat. The meaning of education can be interpreted in three different ways. First: Knowledge stock directly affects productivity and hence the higher level of education, the greater qualifications and knowledge people has about the impact of lifestyle on health. This view is in line with the mechanisms in Grossman's model³⁴. Second: A more sociological explanation is to interpret it as an indicator for existing norms in the environment individuals belongs, time spent on exercising may for instance be important to a person's image. The third explanation is that the level of education is an indicator of personal characteristics which both explain why people choose a high level of education and a healthy lifestyle (Fuchs and Farrell 1982). Kenkel (1995) found education to be an important explanation of people's lifestyle, but he could not identify if this happens because of a higher effectiveness in the production of health or because of different personal characteristics. The non-parametric testing we did indicated that people eating healthy care more for the future and are more risk-averse than those eating unhealthy, and that non-smokers are more risk-averse than smokers. This finding points to the third explanation above. The connection between attitudes towards risk and smoking is in accordance with findings in several economic articles (see for instance Becker and Murphy 1988 and Hornik 1990). It is important to have in mind that at least after a certain

age, time-preferences and attitudes towards risk are something stable in a person, and as such these qualities form the basis for individuals lifestyle. It then seems that getting unhealthy people to live healthier is complicated. To inform a person that per se don't care about the future, about future health gains of changing lifestyle does not seem very fruitful. On the other hand it highlights the importance of training small children to care about the future and be aware of risk. In the ordered probit analysis we did not find a relation between lifestyle and attitudes towards risk and time-preferences, but we don't know if this is because our indicators are too rough. Future work must therefore include better measures of those characteristics.

4. While time- and economic constraints can be interpreted as external constraints individuals face, age and health status can be interpreted as internal or individual constraints. We find self-assessed health to be the most important explanation why individuals exercise, and the better health the more fruit and vegetables do individuals eat. An important question is whether lifestyle follows from health status or if health status follows from lifestyle. From our cross-section data we are not able to identify the causality between lifestyle and health³⁵. Contrary to Contoyannis and Jones (1999) and Blaylock and Blisard (1992) who assume that health and health behaviour is simultaneously determined we have used self-assessed health as an exogenous variable explaining behaviour. Because lifestyle has an effect on health in the long run we find it reasonable to interpret self-assessed health in a cross-section data set as an exogenous constraint to the individual's lifestyle-pattern. To test this assumption we did the ordered probit analysis without using self-assessed health as an explanatory variable. Excluding this variable did not change the estimates of the effects of the other variables. This is taken as an argument of a robust underlying correlation structure in the model, and hence no simultaneity problem between self-assessed health and respectively exercising, diet and smoking. We have found age to be the most important explanation why individuals smoke. One prediction from the health demand models is that if the rate of depreciation increases with age, the quantity of health capital demanded would decline over the lifecycle, but whether investment in health will increase or decline is ambiguous. According to our results investment in health measured as non-smoking and diet, will increase with age. The fact that the probability of smoking decreases with age might of course also be due to the fact that the heavy smokers in older cohorts are dead. Ippolito (1981) develops life-cycle models of the decision to consume hazardous goods. Smoking, drinking and eating unhealthy are hazardous goods characterised as having a rather long incubation period. A

rational reaction to health information regarding hazardous goods with such delayed effect is according to her results, an immediate drop in consumption, followed by additional movement down (up if the delay is short and the hazard is an increasing one) until the population has been totally replaced. The older you are the less likely it is that you are "born" with knowledge on the detrimental health effects of smoking, eating unhealthy and not exercising, a prediction is therefore that younger live healthier than older people. Our result do not confirm this hypotheses.

5. The importance of age on individuals smoking behaviour can also be interpreted as an effect of the habits people are trained to follow. Among other things lifestyle follow from education and publicity, and therefore there will exist similarities in lifestyle among individuals of the same age. We found gender to be the most important and region to be the third most important explanation of how much fruit and vegetables individuals eat, and these results also points to the effects of habits. The importance of habits for explaining why people eat healthy are strengthen by the fact that the most important reason stated for not eating fruit and vegetables are habits. An implication of this finding is that it can be costly and maybe also impossible to change an established lifestyle pattern. And it also highlights the importance of training children to have a healthy lifestyle, and aware them of dangers with unhealthy behaviour³⁶.
6. We did not find that risk-attitudes and time-preferences explain how much individuals exercise. But individuals answering that they exercise to "stay active and in good shape" or "to reduce the chance of illness" has a higher chance of exercising three times a week or more than the rest of the sample. It thus seems that people exercise because they are trained to be aware of the importance of living a physical active life. This result can be used as an argument for the importance of health norms in explaining exercising behaviour. In line with the conclusion in point 5 it is therefore important to train and teach children and youths to live healthy. The importance of weight control can also be interpreted as an effect of status: exercising is a mean to stay slim which is an important goal to me. In a reformulation of Grossman's model Kverndokk (2000) incorporated the status effect from investing in health. He found that if the budget is given, an individual that are concerned about look and fitness will seek to increase health capital and consume less than in the reference model.
7. Another interesting finding from this explorative study is that individuals focus on the importance of joy and pleasure with their behaviour. In the health demand models the direct effect of lifestyle on the overall utility is via better health, while we find the effect

on utility to be far more direct: people behave in certain ways without bothering if this action affect health. It thus seems that people choose a certain lifestyle because it gives a better life immediately. These findings are arguments for focusing on the feelings at the moment when campaigns for a healthier lifestyle are formulated.

It seems that while time- and health constraints to a great extent can explain exercising behaviour, individuals diet can be explained partly by habits and partly by personal characteristics like time-preferences and attitudes toward risk. It also seems that when some individuals start smoking and some don't, one important reason is differences in personal characteristics. When people continue smoking on the other hand, it is a mean to cope with a hectic daily life. But smoking is also a result of habits or addiction. We also conclude that a healthy lifestyle is a product of both individuals' opportunities and their preferences. At this stage we are not able to predict their relative importance on lifestyle.

Because choice of lifestyle can be interpreted as a long-term investment decision to an individual it is fruitful to use health demand models in analysing this issue. But the results also support the view that habits, traditions and norms are important to explain differences in lifestyle, and also that immediate pleasure are important when people choose a certain action. Individuals' may still maximise utility but their time-preference rate may be rather large, and health norms, tradition and values serve as constraints in the maximisation process. A suggestion for further analytical work is therefore to reformulate Grossman's model to incorporate own past behaviour (habits), the society individuals belongs to (traditions and norms), as well as an immediate effect on utility of lifestyle. In the empirical analysis the explanatory power increased when we included dummies for attitudes towards risk, time-preferences and attitudes toward lifestyle choices. This highlights the need for putting up models on how preferences affect behaviour. At this stage we conclude that this kind of information is important supplement to the more traditional socio-economic variables. Our analysis must be interpreted as a first approach, and future work must among other things, include better measures of these aspects. Estimating structural models where the relation between lifestyle and health are accounted for should also follow. This estimation requires better data, for instance from a panel of individuals' lifestyle choices in a rather long time period.

In an article on how people make decisions Pescocolido (1992) introduce a complementary approach to social action in general and decision making in special: the social organisation strategy (SOS). The SOS framework both take sociological premises like social interaction and the nature of the situation, and the assumption that individuals when they act do economic rational choices, into account. Lindbladh et al. (1996) on a theoretical basis, discuss the economic and sociological interpretation of social differences in health-related behaviour. They conclude that the encounter between the two different approaches provides valuable insights for future work in this field. The results from our analysis strongly support this view.

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Appendix A:

Table A1: Testobservator (*p-verdi i parentes*).

QUESTION	Exercise	Fruit and Vegetables	Smoking
1.Reward for voluntary efforts	-0.883 (0.377)	-1.174 (0.240)	-0.805 (0.421)
2.Like unforeseen/ complicated situations	-0.901 (0.368)	-1.135 (0.256)	-3.714 (0.000)*
3.Like to jump in a parachute	-2.179 (0.029)	-2.897 (0.004)*	-3.470 (0.001)*
4.Starting my own company/business	-0.251 (0.802)	-2.595 (0.009)*	-1.942 (0.052)
5.Feel secure about the future	-0.090 (0.928)	-0.047 (0.962)	-3.060 (0.002)*
6.Participation in a lottery	-1.780 (0.075)	-3.101 (0.002)*	-1.689 (0.091)

*: significant

Exercise:

Healthy: 3 – 4 times a week or more, Unhealthy: 1 – 2 times or less a week

Diet:

Healthy: At least two fruits and vegetables daily, Unhealthy: One or less fruit and vegetables daily

Smoking:

Healthy: Non-smokers, Unhealthy: Smokers

Table A2: Important reasons for eating/not eating fruit and vegetables.

	Whole sample	Healthy Females, aged 45-66	Unhealthy Males, aged 25-44	Mann-Whitney
Most important reason for eating fruit and vegetables³⁷	1.It tastes good (49%) 2.It's healthy (42 %) 3.To control illness (4%) 4.Watch my weight (3%) 5.Red. the likelihood of cancer (3%)	1.It's healthy (44%) 2.It tastes good (40%) 3.Watch my weight (6%) 3.To control illness (6%) 5.Red. the likelihood of cancer (5%)	1.It tastes good (53%) 2.It's healthy (40%) 3.Watch my weight (3%) 4.To control illness (3%) 5.Red. the likelihood of cancer (3%)	-2.405 (0.016)
Most important reason for not eating fruit and vegetables	1.A matter of habit (54%) 2.Expensive (18%) 3.Doesn't taste very good (13%) 4.Other reasons (7%) 5.The importance exaggerated (7%) 6.Limited selection/poor quality in shops (4%)	1.A matter of habit (52%) 2.Expensive (26%) 3.Doesn't taste very good (12%) 4.Other reasons (5%) 5.The importance exaggerated (3%) 6. Limited selection/poor quality in shops (2%)	1.A matter of habit (58%) 2.Doesn't taste very good (12%) 3.Expensive (12%) 4.Other reasons (8%) 5. Limited selection/poor quality in shops (6%) 6.The importance exaggerated (4%)	-3.14 (0.002)

Table A3: Reasons why some people eat a lot of fruit and vegetables.

Categories	2	3	4	5 or more
It tastes good	49	48	41	62
Because it is healthy	42	43	48	28
In order to watch my weight	2	3	7	3
In order to control illness	4	5	2	7
In order to reduce the likelihood of cancer	3	2	2	0

Table A4: Reasons why people eat little fruit and vegetables.

Categories	1	2	3	4	5 or more
It doesn't taste very good	9	16	17	15	14
It's expensive	12	20	24	21	28
It's a matter of habit	57	53	52	57	41
Believe the importance to health is exaggerated	3	5	4	0	7
Too limited selection and poor quality in shops	5	2	2	4	10
Other reasons	14	3	2	2	0

Table A5: Important reasons for exercising.

	Whole sample	Healthy Exercising once a week or more	Unhealthy Exercising less than once a week	Mann- Whitney
Most important reason for exercising	1.Active and in good shape (58%) 2. Red. the chance of illness (17%) 3.Watch my weight (11%) 4.Fun/enjoyable (10%) 5.Other reasons (3%) 6.Competitions(1%)	1.Active and in good shape (58%) 2.Red.the chance of illness (17%) 3.Fun/enjoyable (13%) 4.Watch my weight (6%) 5.Other reasons (4%) 6.Competitions (1%)	1.Active and in good shape (56%) 2.Watch my weight (21%) 3.Red. the chance of illness (18%) 4.Fun/enjoyable (4%) 5.Other reasons (1%) 6.Competitions (1%)	0.428 (0.669)
Most important reason for not exercising³⁸	1.Time is used for other things (48%) 2.Like to relax (24%) 3.Not fun (16%) 4.Illness/ disablement (6%) 5.Other reasons (5%) 6.Not any importance to health (2%)	1.Time is used for other things (42%) 2.Like to relax (29%) 3.Not fun (22%) 4.Illness/ disablement (3%) 5.Other reasons (3%) 6.Not any importance to health (2%)	1.Time is used for other things (54%) 2.Like to relax (20%) 3.Not fun (10%) 4.Illness/ disablement (9%) 5.Other reasons (6%) 6.Not any importance to health (1%)	-6.068 (0.000)

Table A6: Important reasons for smoking and quit smoking.

	Whole sample	Smoke daily	Smoke now and then	Mann-Whitney
Most important reason for smoking	1.Relaxation in a stressful life (34%) 2.Enjoyment greater than risk (29%) 3.Don't manage to quit (22%) 4.Other reasons (8%) 5.Customary in my circle (4%) 6.Keep my weight down (2%) 7.Not as dangerous as claimed (1%)	1.Relaxation in a stressful life (38%) 2.Don't manage to quit (28%) 3.Enjoyment greater than risk (23%) 4.Other reasons (4%) 5.Customary in my circle (4%) 6.Keep my weight down (2%) 7.Not as dangerous as claimed (1%)	1.Enjoyment greater than risk (48%) 2.Relaxation in a stressful life (22%) 3.Other reasons (18%) 4.Customary in my circle (5%) 5.Don't manage to quit (4%) 6.Keep my weight down (2%) 7.Not as dangerous as claimed (1%)	-3.410 (0.001)
Most important reason for quit smoking	1.Red. the risk of lung cancer (56%) 2.Save money (17%) 3.Improve physical condition (15%) 4.Avoid exposing others (6%) 5.Other reasons (5%) 6.More accepted (1%)	1.Red. the risk of lung cancer (55%) 2.Save money (19%) 3.Improve physical condition (15%) 4.Avoid exposing others (6%) 5.Other reasons (4%) 6.More accepted (1%)	1.Red. the risk of lung cancer (61%) 2.Improve physical condition (15%) 3.Save money (10%) 4.Avoid exposing others (8%) 5.Other reasons (6%) 6.More accepted (1%)	-0.460 (0.646)

Table A7: Results from ordered probit analysis. Estimate (st.dev).

Parameter	SMOKE (daily, now and then)
Constant	0.527 (0.625)
Gender	-0.036 (0.145)
Age	-0.127 (0.103)
Health	-0.128 (0.093)
Chronic	-0.148 (0.163)
Family	0.059 (0.056)
Education	0.248 (0.111)
Working hours	-0.015 (0.087)
Region	-0.030 (0.037)
Risk1 (dummy)	0.003 (0.152)
Risk2 (dummy)	0.401 (0.145)*
Risk3 (dummy)	-0.437 (0.153)*
Risk4 (dummy)	-0.162 (0.140)
Time (dummy)	0.075 (0.149)
Reason1 (dummy)	-0.375 (0.237)
Reason2 (dummy)	-1.030 (0.240)*
Reason3 (dummy)	-0.442 (0.483)
Reason4 (dummy)	-0.900 (0.598)
Reason5 (dummy)	-0.735 (0.393)
Reason6 (dummy)	-1.853 (0.310)*
	n = 520
	Log-likelihood = - 235.482

*: Significant

Appendix B:

For all six questions we presented possible answers which should take account of different aspects behind choice of lifestyle: Does time- or money-constraints limit the possibilities of living healthy? Is it a mean to stay healthy in general? Is future health status the final goal? Is the motivation joy and pleasure today? Or does the lifestyle follow from habits, tradition or norms?

On this card you will find some reasons why people exercise.

- What is the most important reason for you³⁹?
 1. Want to be active and in good shape
 2. Reduce the chance of illness in the future
 3. Watch my weight
 4. Do as well as possible in competitions
 5. It's fun/enjoyable
 6. Other reasons

On this card you will find some reasons why people exercise very little.

- What is the most important reason for you⁴⁰?
 1. Like to relax
 2. Don't think it is fun
 3. Time is used for other things
 4. Don't think it is of any importance to health
 5. It is difficult due to health/illness/disablement
 6. Other reasons

On this card you will find some reasons why some people eat a lot of fruit and vegetables.

- What is the most important reason for you?
 1. It tastes good
 2. Because it is healthy
 3. In order to watch my weight
 4. In order to control illness
 5. In order to reduce the likelihood of cancer
 6. Other reasons

On this card you will find some reasons why people eat little fruit and vegetables.

- What do you think is most important for most people ⁴¹?
- 1. It doesn't taste very good
- 2. It's expensive
- 3. It's a matter of habit
- 4. Believe the importance to health is exaggerated
- 5. Too limited selection and poor quality in shops
- 6. Other reasons

On this card you will find some reasons why people smoke.

- What is the most important reason for you?
- 1. I consider the enjoyment greater than the risk
- 2. Smoking provides relaxation in a stressful life
- 3. It helps to keep my weight down
- 4. It is not as dangerous as claimed
- 5. It is customary in my circles
- 6. I don't manage to quit
- 7. Other reasons

On this card you will find some of the advantages of giving up smoking .

- What would be the most important reason for you if you were to stop smoking ?
- 1. Reduce the risk of lung cancer
- 2. Save money
- 3. Improve my physical condition
- 4. More accepted in society
- 5. Avoid exposing others to passive smoking
- 6. I don't manage to quit
- 7. Other reasons

¹ This result is in accordance with Becker and Murphy (1988) which find present oriented persons to potentially be more addicted to harmful goods than future oriented.

² According to Grossman's original work the marginal cost of health investment (the value individuals ascribe to their health capital) is assumed to be essentially a function of individual efficiency in health production.

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- ³ This result is in accordance with Cropper (1977) which find that individuals desire to increase their stock of health capital in order to decrease the probability of illness.
- ⁴ We here refer to the sociologist literature associated with Talcot Parson.
- ⁵ As in the binomial probit-model we normalise the mean and variance of ϵ to zero and one.
- ⁶ It was carried out as part of Statistics Norway quarterly omnibus survey (Statistics Norway 1998). Everybody in the sample is asked to get a visit from an interviewer.
- ⁷ Persons under the age of 44 are slightly over-represented. Persons living in the region Oslo and Akershus are slightly under-represented while persons living on the South coast (Agder, Rogaland) and in Mid Norway (Trøndelag) are slightly over-represented.
- ⁸ Normal working time is 37.5 hours weekly.
- ⁹ At the time when we collected our data The National Council on Nutrition and Physical Activity in large campaigns recommended “five fruit and/or vegetables a day”. This recommendation is an important reason why we choose fruit and vegetables as indicators of diet. In Statistics Norway omnibus survey The National Council on Tobacco and Health regularly include questions on smoking. We choose to use their questions and not to include new questions related to how much individuals smoke (which for instance could be measured in pack-years). Because the data are collected through personal interviews, questions on excessive alcohol consumption are not recommended.
- ¹⁰ Level 1: primary and lower secondary school. Level 2: upper secondary school. Level 3: University/college education.
- ¹¹ People not working, for instance pensioners, pupils/students and home makers.
- ¹² This question is only asked smokers.
- ¹³ Assuming a positive rate of inflation the answers imply that those choosing 100.000 have negative rate, while the others have negative or zero rate.
- ¹⁴ Gunnar Breivik, Norwegian State College on Physical Education and Sports developed Risk2-Risk5.
- ¹⁵ Anne Line Bretteville-Jensen, SIFA, developed Time.
- ¹⁶ The different answering categories can be found in Appendix B.
- ¹⁷ This question is only asked those who eat 2 or more fruit and/or vegetables daily.
- ¹⁸ This question is only asked smokers.
- ¹⁹ This question is only asked those who exercise 1-2 times a week or less.
- ²⁰ We also tested models where all the variables were included as dummies. The results from this analysis pointed in the same directions as the models reported. The most important advantage of reporting the ordered probit-model is that it is easier to get an overview of the results.
- ²¹ Wagstaff (1986 p.226) argues that “*in many studies in this field education is acting as a proxy for the real lifetime wealth*”. It is also reasonable to assume that working hours serves as a proxy for income. In our data set the correlation coefficient between income and working hours and between income and education is respectively 0.6 and 0.3.
- ²² A better way would be to ask the sample to answer these questions on a scale from 1 (agree completely) to 4 (disagree completely).
- ²³ Statistics Norway follows certain rules when they interview people. For instance did they not want to ask individuals’ exercising a great deal questions on why they don’t exercise. This is the main reason why not everybody in the sample is asked all questions.
- ²⁴ The insignificant variables are the same: Working more than 35 hours, couples with children, no chronic illness. All dummies equal zero.
- ²⁵ The insignificant variables are the same: Females, aged 25-44, no chronic illness, educated on level2, Oslo and Akershus. All dummies equal zero.
- ²⁶ The insignificant variables are the same: Females, good self-assessed health, no chronic illness, are couples with children and live in Oslo and Akershus. All dummies equal zero.
- ²⁷ This finding is in accordance with Loken (1982).
- ²⁸ A discussion on problems with measuring people’s time-preferences can be found in Fuchs (1982).
- ²⁹ Sophisticated persons foresee that they will have a self-control problem in the future while naive persons do not.
- ³⁰ In O’Donoghue and Rabin (1999b) they extend the framework to partial naive persons and introduce the possibility that a person has different tasks to complete. They found that having more than one task can make procrastination less likely because it causes a person to perceive delay as more costly. This result has an interesting application on lifestyle: a businessman with tight time schedule completes his exercising task simply because procrastination implies that he have to forego other important tasks if he choose to procrastinate exercising.

³¹ For procrastinators the principal in general, must punish delay more severe than the true cost of delay in order to counteract procrastination, and even if the true cost of delay is constant optimal incentive schemes should involve increasing punishment for delay as time passes.

³² Whether an excise tax on cigarettes is a valuable tool in health policy is discussed in the literature. Studies both from the US and Great Britain found price elasticities to be significant and inelastic (for a short review see Warner 1984). Hu et al. (1995) found that controlling for other health behaviours, like alcohol use and obesity, reduced the estimated price elasticity for smoking participation, but had no effect on the price elasticity for quantity smoked.

³³ The result in Lave is maybe more a confirmation of the theoretical results in Hey and Patel (1983): Lowering the prices on preventive health care will increase demand.

³⁴ Berger and Leigh (1989), Blaylock and Blisard (1992) and Wagstaff (1993) find empirical evidence for the hypotheses that schooling has a direct effect on health.

³⁵ A discussion of the causality between health and lifestyle in general and an empirical testing of the importance of lifestyle to self-assessed health in special, can be found in Ericsson (1997).

³⁶ Whether publicity or taxes are the most effective policy tools to affect health behaviour is an interesting discussion. The empirical finding that teenagers' demand of cigarettes is quite price elastic (Warner 1984) points to the importance of both policy tools in the striving to affect health behaviour. This is also supported in Leu (1984), which argue that because anti-smoking publicity has created a negative climate toward smoking the majority of the smokers would prefer to quit, and (p.....): *"Cigarette price increases, therefore, seem to have provided the final trigger for many to drop the habit"*.

³⁷ This question is only asked those who eat 2 or more fruit and/or vegetables daily.

³⁸ The question is asked people who exercise 1-2 times or less every week.

³⁹ Persons who reported that they exercised less than once a week were asked the question: what do you think is the most important reason for most people?

⁴⁰ Persons who exercised 1-2 times a week were asked the question: what do you think is the most important reason for most people?

⁴¹ Persons who reported that they eat 1 fruit/vegetable or less daily were asked: what is the most important reason for you ?