ERASMUS UNIVERSITY OF ROTTERDAM

A physiological approach to hyperbolic discounting: Thinking healthy brings rational thinking

Marketing Master Thesis

Andreas Constantinou

15/10/2012

Student Number: 316530

Thesis Supervisor: Carlos Lourenco

Contents

Abstract

Understanding how consumers make decisions and how they behave when confronted with different options has and will continue to be one of the major questions in economics and specifically in the field of marketing. This paper deals with the theory of hyperbolic discounting under intertemporal choice scenarios, and uncovers the relationship between a person's health and lifestyle and their individual discount rates.

As obesity is a growing epidemic throughout the developed world, key fat indicators are taken into account, such as BMI (Body Mass Index) and waist circumference, as well as calorie intake and exercise habits. The effects of these variables are tested against the consumer's propensity to discount future benefits to present gains. An experiment is also undergone to see if individuals that have a "healthy" state of mind are prone to behave more rationally with respect to intertemporal choice than individuals with an "unhealthy" state of mind.

1. Introduction

Prolonging life has always been of primary importance to people. Whether that may be through medicine or a healthier diet, scientists and researchers have always been trying to find ways to better human life and increase life expectancy rates. At first, the development of medicinal practices and pharmaceutical substances were the major focus of scientists and doctors, as common diseases and unhealthy habitats would claim the lives of many individuals. The development of remedies and solutions seemed to be the way to go back then, as food was scarce and not everyone had the same opportunity to enjoy a healthier cuisine. Therefore, in a form of a damage control, people where usually treated after the harm had been made.

Today's environment is much different to what it was a century ago. The oversupply of a multitude of pharmaceutics has pushed people from trusting medicine, to avoiding any form of medication due to a fear of side effects or a hidden agenda of the pharmaceutical industry itself. Furthermore, with an increase in obesity in many developed civilizations, doctors themselves have understood that in order to prolong human life, people must be more proactive and lead healthier lives early in their years. As today's world grants easy access to better quality produce and readily available foods, which previous generations could only have dreamed of, proactive healthy dieting and exercise has become the main promotion of doctors in todays society.

However, many people knowingly engage in an unhealthy lifestyle. One can say that this phenomenon is linked to hyperbolic discounting, as people prefer to enjoy short term benefits rather than receive long term gains. This research attempts to take a closer look at the relationship between someone's health and lifestyle, and the way they behave in intertemporal choice scenarios. More specifically, we focus on people's eating habits, exercise rates, and actual descriptive statistics of one's health such as BMI in order to determine whether or not a healthier person is more forward looking than an unhealthy one. In addition, we go one step further and test whether a health related stimulus can influence people to become more forward looking, and whether an unhealthy stimulus can bring about the opposite results.

In the first part of this paper, a literature review will be provided on the topics of discounted utility theory, hyperbolic discounting, and finally research done with

respect to health and consumer discounting. Afterwards the hypotheses that will be tested will be stated and discussed. Thirdly, the methodology and data extrapolation processes used to test our hypotheses will be described. Thereafter, the results and a discussion will be provided before this paper is concluded.

2. Literature Review

2.1 Discounted Utility Theory and Hyperbolic Discounting

"*To secure a maximum benefit in life, all future events, all future pleasures or pain, should act upon us with the same force as if they were present, allowance being made for their uncertainty. The factor expressing the effect of remoteness should in short, always be unity, so that should have no influence. But no human mind is constituted in this perfect way: a future feeling is always less influential than a present one*" (Jevons 1871/1911, cited by Ainslie 1975).

Early economists were the first to understand how the human mind evaluates choices with respect to present and future options. Proposed by Samuelson in 1937, the Discounted Utility Theory or Expected Utility Theory describes how human beings behave under intertemporal choice scenarios. That is, the value of an option A, discounted against an exponential function Ft (where t denotes the delay of receiving the benefit of A) is preferred to option B if the utility derived from the present value of A is greater to that of B: V (A) > V(B). However, paradoxes such as the magnitude effect (Noor 2011, Frederic, Lowenstsin, and O'Donoghue 2002), gain-loss aversion (Kahnemann and Tversky 1979), and common ratio effect (Noor 2011) to name a few have proven the exponential discounting factor to be too simplistic, proposing that people do not discount exponentially but instead hyperbolically. For example, exponential discounting assumes a linear explicit discounting model, where discounting rates are assumed to decrease gradually with the delay of reward. Hyperbolic discounting however, assumed a decreasing hyperbola, thus rewards were discounted less after a certain point in the future.

The hyperbolic discounting model is widely accepted by today's researchers (to name a few, Ainsle 1975, Elster 1979, Laibson 1997, Marakovic, Kris, and Kirby 1995) as its downward sloping function captures the propensity of human psychology to discount future intertemporal choice scenarios lower than they would if those choices were set closer to the present.

"*Hyperbolic discount functions are characterized by a relatively high discount rate over short horizons and a relatively low discount rate over long horizons…For example, from today's perspective, the discount rate between two far-off periods,*

t and t +1, is the long-term low discount rate. However, from the time t perspective, the discount rate between t and t +1 is the short-term high discount rate" (Laibson 1997).

2.2 Health and Time Preferences

Consumer health related topics in economics have gained growing significance amongst researchers over the past years. Concerns about increasing trends in obesity have shifted focus towards understanding the reason for these worrying statistics. What seems to play a major role is the availability of high calorie foods due to technological improvements in the production and distribution processes, which have not only lowered the retail prices of such foods, but have also increased the ease of which they are accessible by the consumer (Cutler, Glaeser, and Shapiro 2003).

However, the manufacturers aren't the only ones to blame, as the psychological side of the consumer must also be taken into question. Anderson and Mellor found, amongst other results, that risk aversion was negatively correlated to obesity and the propensity to be overweight. That is, a person who is willing to take on more risk with financial situations, is more likely to be obese than someone who is risk averse (Anderson and Mellor 2008).

Furthermore, the ability of a consumer to avoid his/her impulses plays a significant role on whether that person will become obese or remain obese (Cutler, Glaeser, and Shapiro 2003). In other words the inability to discount future gains for present benefits appears to logically affect obesity, but the literature proves that the relationship between BMI and hyperbolic discounting is not the easiest to uncover.

In his paper "Understanding overeating and obesity", Ruhm adopted the dual process model of affective and deliberative thought processes, with the former proposing that consumers appeal instinctively to the immediate stimulus of the food, and discount the future gains involved with denying their initial impulse (Ruhm 2012). However, Ruhm does not correlate BMI with discounting, but rather with a propensity to lose weight, with which he finds a weak relationship.

Borghan's and Golsteyn's study, done on households in the Netherlands, tested the hypothesis that individual discount rates were to blame for the trend of increased BMI with respect to previous decade's recorded amounts. The results however were not clear cut, leaving questions pertaining to what the real relationship between Discount rates and BMI could be (Borghans and Golsteyn 2005). However, research done on households in Japan, Ikeda, Myong-II, and Ohtake found results showing in fact that BMI was highly correlated with Hyperbolic discounting, the Sign effect (probability of losses is valued higher than gains), procrastination, and impatience. (Ikeda, Myong-II, and Ohtake 2009 and 2010)

Although BMI and obesity are good statistical indicators of one's health, they are not the only variables that must be taken into consideration when trying to analyze whether someone is healthy or not. Smoking, eating, and exercise habits as well as family historical health also play an important role in assessing one's true health. In Fuch's 1980 working paper, 500 people underwent telephone surveys where discount rates were elicited, as well as smoking behavior, education, and health status. Health variables were extrapolated in two ways: 1) duplicating the LnHLTH variable of Grossmans study "The correlation between health and schooling", where the variable was elicited through a logarithmic function combining a one to five scale reply to "how healthy do u rate yourself?" and sick days from work (Grossman 1973) based on replies to questions referring to family illness history, pharmaceutical drug use, and a self-evaluation of whether the respondent can run or jog a mile. The latter proved to have a significant correlation to time preferences, that is, the healthier respondents discounted less than the unhealthy ones.

3. Research Questions and Hypotheses

The purpose of this research is to see how and if health influences intertemporal decision making and hyperbolic discounting. Therefore the research questions and hypothesis will be split into two parts. The first part will focus on the hypothesis that will be tested through a manipulation of the respondents. The second part will state hypotheses that will be tested on the control group with regards their Health, Lifestyle Dietary Habits and their intertemporal decision behavior.

3.1 Part 1: Manipulation Hypothesis

Based on the literature, a healthy individual is more forward looking and behaves more rationally than an unhealthy one, which brings about an interesting thought. Could an individual be primed to think "Healthy" in order to make better decisions? That is, if someone were to be manipulated, in one way or another, to behave and think in a more health conscious manner, would this in turn bring about rational decision making.

In following with this train of thought, certain subjects will be given a Healthy push whilst others will be given an Unhealthy push. Therefore, in this experimental part of the research we expect that the Healthy manipulated group will show lower discount rates with their responses throughout the intertemporal choice part of the questionnaire[1] in comparison to those of the Unhealthy manipulated group. Thus, our hypothesis is formulated as follows:

> *Hypothesis 1:* Respondents given the Healthy Push will respond more rationally than Respondents given the Unhealthy Push

[1] See section 4. Methodology

3.2 Part 2: Control Group Hypotheses

3.2.1. Health Statistics and Hyperbolic Discounting

As mentioned previously in this paper, the healthier a person is, the more rational they are expected to behave. Therefore, it is anticipated that a person with a high BMI and a large waist circumference will discount future gains more than a person who is not overweight. Consequently the second and third hypotheses to be tested are formed as follows:

Hypothesis 2: Obesity is positively correlated to the discount factor

Hypothesis 3: Waist circumference is positively correlated to the discount factor

3.2.2 Calorie Intake and Hyperbolic Discounting

The amount of calories consumed daily is also expected to influence the way consumers behave under intertemporal choice. The average adult should intake roughly 2000 calories a day, with the majority of those being consumed before dinner, leaving room for a light final meal. Therefore, as this paper involves subjects' responses before dinner, a maximum threshold of 1500 calories and minimum of 800 total calories is set, as well as a minimum 300 calories for breakfast. In such, a person is considered to be overeating if they have a total of 1500 calories after lunch and under-eating or malnourished if they eat less than 300 calories for breakfast, or have consumed a total 800 calories after breakfast and lunch (snacks and beverages in between included). In either situation, both sets of individuals are expected to behave irrational with respect to hyperbolic discounting and intertemporal choice. Thus, hypothesis 4, 5, and 6 are formulated as follows:

Hypothesis 4: Individuals with Breakfast Calorie Intake below 300 will discount more than individuals who are better nourished

Hypothesis 5: Individuals with Total Calorie Intake below 800 will discount more than individuals who are better nourished

Hypothesis 6: Individuals with Total Calorie Intake above 1500 will discount more than individuals who are better nourished

3.2.3 Exercise rates and Intertemporal choice

Exercise activity in itself is a display of healthy behavior. An individual who exercises regularly is considered to be healthier than one who does not. Moreover, the action of exercising can be seen as an investment in oneself, to be enjoyed later on in life. Therefore, it is reasonable to assume that a person who exercises is more forward-looking than one who does not. Furthermore, the intensity and frequency of exercise should also be taken into consideration. Hence, hypothesis 7 is logically derived as follows:

Hypothesis 7: Exercise rates are negatively correlated to the discount factor

3.2.4 Healthy and Unhealthy Food Consumption and hyperbolic discounting

Inherently, a person who consumes healthy foods instead of unhealthy foods should themselves, by definition, be healthy, and vise versa. Coherently, as mentioned throughout this section, a healthier person is expected to behave more rationally in intertemporal choice scenarios. Hypothesis 8 and 9 are derived precisely through this logic.

Hypothesis 8: Vegetable and Fruit consumption is negatively correlated to the discount rate

Hypothesis 9: Fast Foods/Take Away and Fried Foods consumption is positively correlated to the discount rate

4. Methodology and Variable Extrapolation

4.1 Methodology

A paper and pencil type questionnaire was administered to two hundred and four students of the Erasmus University of Rotterdam in the Netherlands. The research was conducted in the behavioral lab of the EUR so that no exterior influences could affect the results, and thus, provide for the most reliable dataset. Each respondent was taken to their own cubicle, where they would find a blank questionnaire which they had to fill in. The questionnaire consisted firstly of a series of questions aimed at eliciting their discount rates. The second part consisted of questions pertaining to dietary habits, exercise rates and calorie intake. The third and final part of the questionnaire was a set demographic based questions.[2] Afterwards, the respondents were taken to a separate room where their weight, height, and waste circumference were recorded. Upon departure, the respondents were given €5 as a reward for their participation. Participants preserved their anonymity throughout the entire experiment due to the sensitivity of certain parts of the research.

4.2 The Manipulation Groups

In order to test the first hypothesis of this research, a Healthy and Unhealthy manipulation had to be constructed. Both consisted of visual and tangible elements. The visual element in both cases was two sets of two images and were displayed on the questionnaire prior to the questions pertaining to intertemporal decision making. The tangible elements were placed alongside the questionnaire inside the cubicle, and the respondents were prompted to enjoy them through a small text on the cover page of the questionnaire:

1) Healthy manipulation
    a. Visual element: The first set of images the respondents were shown were two healthy females, both showing an active lifestyle engaged in some form of exercise, and were asked to choose which one they felt most connected

[2] See appendix for full questionnaire

to. In the second set of pictures, the respondents were shown two plates of food, both filled with healthy food types such as vegetables and grilled chicken, and were asked to choose which one they would prefer.

b. Tangible element: in this scenario two mandarins were offered. The mandarins were presented as a gift to the respondent for their assistance in the research, and were told they were allowed to consume them whilst answering the questionnaire

2) Unhealthy manipulation

a. Visual element: The first set of images the respondents were shown were two unhealthy looking couples, both presenting an unhealthy lifestyle, and were asked to choose which group they felt most connected to. In the second set of pictures, the respondents were shown two plates of food, both filled with unhealthy food types such as sausages and fried eggs and were asked to choose which one they would prefer.

b. Tangible element: in this scenario a small chocolate was given. The chocolate was presented as a gift to the respondent for their assistance in the research, and were told they were allowed to consume it whilst answering the questionnaire[3]

Both the mandarins[4] and the chocolate bar came out to the same amount of calories (approximately 80kcals). From the two hundred and four students, fifty four students were randomly selected to take part in the manipulation. Twenty six were given the Healthy manipulation and Twenty eight were given the Unhealthy Manipulation.

[3] See appendix for depiction of the actual manipulation images and wording of questions

[4] Besides the ease of equaling the calorie count of the chocolate bar, Mandarines were also preferred to other fruits as it would be more likely that the respondent would consume the fruit do to the fact that they would peel off the skin, thus the fruit itself would always be considered clean in their minds.

4.3 Variable Extrapolation

4.2.1 Eliciting Discount rates

In order to obtain the individual discount rates from our respondents we provided them with three sets of questions, each pertaining to an option A at a sooner date/now or an option B at a later date. The first set was purely monetary based and was a set of six questions each proposing receiving a smaller earlier Amount A or a larger Amount B in the future (Rachlin 1991, Borghans and Golsteyn 2006).

Not limiting the individual discount rates to monetary reward scenarios, this research was constructed under the understanding that intertemporal choices are not only existent when monetary gains are involved, but rather in most everyday situations concerning different products and service categories. Although, these types of choice scenarios are subject to the respondent's preference with respect to different products or services, they are still very useful as they put that respondent in a more realistic choice scenario, thus providing more honest results, and thus better data. Therefore, the second set of questions were a set of 4 similarly framed questions but with respect to a holiday vacation. Adapted from previous works (for example Prelec and Lowenstein 1997, Frederick, Lowenstein and O'Donoghue 2002), the question was framed as follows:

"On your birthday, your work gave you a holiday as a gift. However you had a prior appointment on the days they had booked and gave you the following options. Please indicate which one you would choose." The options which followed would again provide a sooner, but smaller in duration vacation or a future, larger in duration vacation.

The final set of questions were based again on another extensively used question format (for example Lowenstein 1988, Mowen and Mowen 1991, Malkoc and Zauberman 2006) which deals with the delay of receiving a good and a delay premium being offered by the distributor in order compensate the respondent for not receiving their product on time. The question was stated as follows: *"You recently purchased a highly requested game online, paying €50,that you have been waiting to be released for months. Due to overbooking the company provided you with certain*

options. Please indicate which one you would choose". The options would then be offered stating the sooner option of receiving the game earlier or receiving the game with a small monetary cash back later as a premium for the inconvenience of waiting[5].

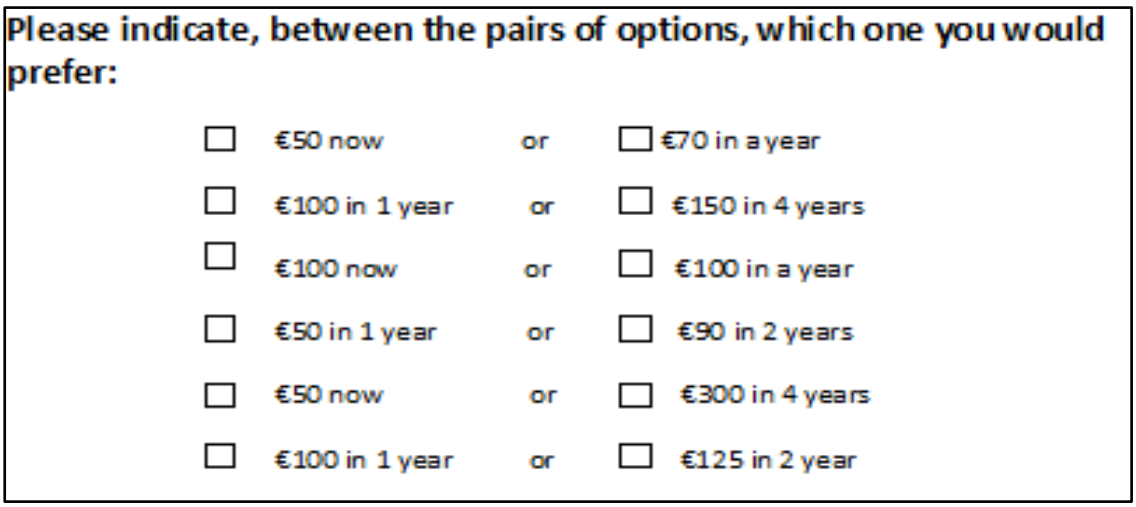

Figure 1 Monetary based questions used in the first set

Figure 1 depicts the six monetary questions used in the first set. As can be seen question 3 is a check question, to allow for elimination of unreliable respondent responses. Using the hyperbolic discounting formula (Rachlin 1991, Borghans and Golsteyn 2006) and adjusting with respect to d, we comprise:

$$(i) \qquad \frac{A}{(1+d)^{t1}} = \frac{B}{(1+d)^{t2}}$$

$$(ii) \qquad d = \left(\frac{B}{A}\right)^{\left(\frac{1}{t2-t1}\right)}$$

where d is the discount rate, A and B are the smaller sooner and larger future rewards respectively, and t1 and t2 denote the delay of receiving those rewards. Taking the first question as an example, receiving €50 now or €70 in a year; if the respondent were to choose the sooner choice, plugging the numbers into our equation, then it could be inferred that this individual discounts with a discount rate of at least 0.4.

[5] For full details about the questions proposed in this section see appendix pg. 42

After the discount rate is calculated for each question, the average discount rate is calculated within the three sets of questions, leaving us with individual discount rate variables **Discount rateQ1**, **DiscountrateQ2**, and **DiscountrateQ3.**[6]

4.2.2 BMI and other measures of obesity

The Body Mass Index is an easily calculated statistic and is formulated as a person's weight (in kilograms) divided by their height (in centimeters) squared. A person is considered to be at their normal weight if their BMI score is between 18.5 and 25. In general, they are considered to be overweight if they register above 25 and underweight if they are below 18.5. (Karvonen et al. 1971, World Health Organization 1995[7])

Waist circumference is also a very easily calculated statistic and is the second measure of obesity we will be using. Although not highly scientific, WC does a very good job at measuring obesity, as a characteristic of obesity is a large waist. Furthermore, WC has been linked to cardiovascular problems and diabetes. (Han et al 1995)

After the respondents answered the questionnaire they were taken to a room where their weight, height, and waist circumference were recorded. The fact that the weight and height was elicited by a researcher rather than filled in by the respondents is very important. This adds further validity to our dataset as, unlike all the of the aforementioned research done on the matter of BMI and hyperbolic discounting, the data is not liable to underestimation or overestimations of body weight and height respectively due to respondent's embarrassment or other possible self-esteem issues.[8]

[6] Seeing that the questions from which DiscountrateQ2 and DiscountrateQ3 were derived from were subject to biases and respondent preferences, DiscountrateQ1 will be the main discount rate tested during the result analysis as it is the most reliable.

[7] Extract from paper "Physical Status: the use and interprataion of anthropometry. Report of WHO expert committee, WHO technical Report Series 854.Geneva: World Health Organization 1995" found on website apps.who.int/bmi/index.jsp

[8] Due to possible privacy violations, consent was asked from the respondents before the researcher proceeded in taking their weight measurements. Any respondent who felt uncomfortable or unwilling to disclose such information was taken out of the data sample. This however only occurred in 1 or 2 situations, as most respondents were comfortable in disclosing their weight figures.

4.2.3 Calorie Intake

In order to monitor daily calorie intake respondents were asked to list what they had had for Breakfast and for Lunch (depending on the time of the day that they answered the questionnaire). Respondents were asked to be as specific as possible when stating the food and beverage choices they had made that day. For example, if they had had coffee to state how many cups, and whether they drank it with sugar (how much?) and milk; or with respect to food to describe how it was cooked as well: two small oven baked potatoes, 200g fried fish fillet etc. An example was given to them within the question to assist them with being as analytical as possible:

Can you recall what you ate and drank today for Breakfast? Please fill in the type of food or drink and the quantity with as much detail as you can. Examples have been given in order to assist you with your answers.

Breakfast	**Quantity**
Bowl of Coco Pops (30g) with semi-skimmed milk	1
Small Coffee with 2 sugars and milk	*1*
Slices of whole-wheat bread with butter (salted)	2

Figure 2 Questionnaire Example of Breakfast proposed to respondents

Using an internet database, the foods calorie intake was calculated in generalized terms for both Breakfast and Lunch[9]. Therefore, if we take the above figure as an example of a breakfast one respondent might have had:

[9] The website www.caloriecount.com was referred to in order to obtain the calorie information for most of the foods and beverages listed by the respondents.

Food or Beverage	**Calories**
Bowl of Coco Pops (30g) with semi-skimmed milk	170
Small Coffee *with 2 sugars* *and milk*	8 24x2 15 69
2 Slices of whole-wheat bread *with butter (salted)*	69x2 36x2 210
Total Calorie Consumption	**449**

Figure 3 Calorie Consumption Calculation

Thus this respondent would have consumed 449 kcals/calories for Breakfast that day. These numbers were then used to form the variables **CalorieIntakeBreakfast** and **CalorieIntakeLunch**. A third variable was also created **TotalCalorieIntake** comprised of the sums of the aforementioned variables**.**

4.2.4 Exercise Rates

Another crucial element of this research was the calculation of individual exercise rated. Respondents were asked to state how often they exercised and the type of exercise they did. Frequency was noted as (1) daily (2) 2-3 times a week (3) 4-6 times a month (4) Less. Afterwards an internet database was advised in order to retain the intensity of the exercise type[10]. The kcal/kg per half hour of exercise was able to be retrieved, and in combination with their weight and frequency the variable **CaloriesBurntWeekly** could be comprised. For example, if someone who weighed 80 kg reported that they engage in a basketball game daily, their Calories Burnt Weekly through exercise would be:

Kcal/kg for basketball per 30 hour:	*4.85 x 2*
Frequency per week:	*7*
Weight:	*80*
Calories Burnt Weekly:	***5432 kcals/week***

Figure 4 Calorie Burnt Weekly Calculation

As you can see, the kcal/kg was multiplied by two, as was done throughout the entire dataset, as it was assumed that the average amount of time one would exercise would be an hour at a time.

4.2.5 Types of Foods and Frequency Consumed

In order to get a clearer view their dietary habits, respondents were also prompted to answer questions pertaining to how often they ate certain categories of foods: (1) Daily (2) 2-3 times a week (3) 4-6 times a month (4) Almost never. The categories specified were: Fruits, Vegetables, Sweets, Fried Foods, Pasta or Rice, Meat, Fish or Poultry, and Fast Food/Takeout. Thusly, the variables created were **FruitConsumption**, **VegetableConsumption**, **SweetsConsumption**, **FriedFoods Consumption**, **PastaRiceConsumption**, **MeatFishPoultryConsumption**, and **FastFoodTakeoutConsumption** respectively. Afterwards, a factor analysis was

[10] The database used can be found at this website : weightloss.com.au/weight-loss-tools/exercise-energy-charts.html

undergone with respect to Vegetable, Fruit, FastFood/Take out, and Fried Food Consumption variables in order to eliminate correlation between the variables and minimize the variable count.

Rotated Component Matrix		
	Component 1	**Component 2**
FruitConsumption	-,054	,802
VegetableConsumption	-,064	,807
FriedFoods Consumption	,868	,068
FastFoodTakeoutConsumption	,818	-,213

Figure 5 Factor analysis of variables depicting the reduction to two variables

The figure above shows that the Factor analysis reduced the four variables to two. As expected Component 1 ranked high in Fried Foods Consumption and Fast Food/Take away Consumption, and Component 2 ranked high in Fruits Consumption and Vegetable Consumption. Therefore variables Component 1 and Component 2 were named **FastFoodandTakeawayConsumption** and **VegatableandFruit Consumption** respectively.

4.2.6 Other Variables

In order to help eliminate noise from our data sample, more generic variables were included as well such as: Age, Gender, Smoking (Yes/No), Sun Screen Usage (Yes/No), Investment Activity (Yes/No), Retirement Arrangement (Yes/No), Debt Existence (Yes/No), and Faculty which the student belonged to (as all respondents were Bachelor or Master students of Erasmus University of Rotterdam). Furthermore, the respondents were also prompted to provide their Weekly Grocery Shopping Budget and their Wage if they received any.

5. Results

5.1 Manipulation

In order to test our first hypothesis, and whether or not our experiment worked, we must see how the manipulations affected our sample's discounting behavior. Let's first recall our hypothesis:

Hypothesis 1: Respondents given the Healthy Push will respond more rationally than Respondents given the Unhealthy Push

		DiscountrateQ1		DiscountrateQ2		DiscountrateQ3	
	N	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
0	150	,1879	,12998	,0245533	,02089749	,0155227	,01455055
1	26	,1606	,11889	,0222885	,01987570	,0133154	,01327171
2	28	,2369	,16414	,0324464	,02376519	,0268357	,01475640
Total	54	,2002	,14790	,0275556	,02236757	,0203259	,01550845

Figure 6 Mean discount rates and standard deviation between Healthy, Unhealthy Manipulation Groups, and Control Group

ANOVA										
		DiscountrateQ1			DiscountrateQ2			DiscountrateQ3		
	df	Sum of Squares	F	Sig.	Sum of Squares	F	Sig.	Sum of Squares	F	Sig.
Between Groups	1	,079	3,781	,057	,001	2,879	,096	,002	12,463	,001
Within Groups	52	1,081			,025			,010		
Total	53	1,159			,027			,013		

Figure 7 Results from ANOVA test showing difference between manipulated groups with respect to time discounting

In figure 6, The Healthy Motivated group (HMG) is depicted as 1, Unhealthy Motivated Group (UMG) is represented by the number 2, and the control group is represented by 0. Looking at this figure we see that the HMG's mean discounting rate was lower than that of the UMG based on all three discounting rates. Furthermore, Figure 7 shows that the differences between the UMG and the HMG, with respect to discount rates, are significant on all three discounting rates.

The results of the experiment show that the Unhealthy and Healthy manipulation did actually push the respondents in the desired directions. Respondents behaved less rationally when they were in the Unhealthy state of mind and more rationally when they were in the Healthy state of mind with respect to intertemporal choices and thus proving our hypothesis.

To go one step further, we also wanted to test if the differences between the HMG and UMG with respect to the control group were significant. That is, if someone in a Healthy state of mind would behave more rationally than a person in a in a normal state of mind, and if someone if in an Unhealthy state of mind would behave more irrationally:

Hypothesis 1a: The UMG will behave more irrationally than the control group

Hypothesis 1b: The HMG will behave more rationally than the control group

ANOVA

		DiscountrateQ1			DiscountrateQ2			DiscountrateQ3		
	Df	Sum of Squares	F	Sig.	Sum of Squares	F	Sig.	Sum of Squares	F	Sig.
Between Groups	1	,057	3,073	,081	,001	3,221	,074	,003	14,202	,000
Within Groups	176	3,245			,080			,037		
Total	177	3,302			,082			,040		

Figure 8 Determining the significance of the difference between control group and UM group

Comparing the means of group 0, 1, and 2 in figure 6 on the previous page, we can see that the trends are as expected as UMG respondents discount more, and HMG respondents discount less than those of the control group. Furthermore through figure 8, we see that the differences between the discount rates of the UMG and that of the control group are significant across all three discount rates. Therefore, hypothesis 1a is confirmed as someone who is in an unhealthy state of mind will behave more irrationally with respect to intertemporal choices, than someone who is of a normal state of mind.

ANOVA										
		DiscountrateQ1			DiscountrateQ2			DiscountrateQ3		
	Df	Sum of Squares	F	Sig.	Sum of Squares	F	Sig.	Sum of Squares	F	Sig.
Between Groups	1	,017	1,004	,318	,000	,264	,608	,000	,523	,471
Within Groups	174	2,871			,075			,036		
Total	175	2,887			,075			,036		

Figure 9 Determining the significance of the difference between control group and HM group

Looking at figure 9 however, the story is not the same with regards to respondents in the HMG. Although there is an observed difference in the correct direction between the HMG respondents and those of the control group, this difference is not large enough to be deemed as significant. Therefore hypothesis 1b is rejected, as a person in a healthy state of mind will not discount more than someone who is in a neutral state of mind. The data however is promising.

5.2 Health related statistics and hyperbolic discounting

Having gathered health statistics from the control group respondents, calculations were made in order approximate respondents BMI. Recalling our hypotheses:

Hypothesis 2: Obesity is positively correlated to the discount factor

Hypothesis 3: Waist circumference is positively correlated to the discount factor

In order to test for hypotheses 2, a variable was created based on the respondents' BMI. As mentioned earlier, based on the classifications of this index, one is considered to be obese if their BMI is exceeds 25. Therefore variable **ObeseBMI** scores a 1 if that respondent satisfies this criterion, i.e. is obese, and 0 otherwise.

	DiscountrateQ1		
BMIObese	N	Mean	Std. Deviation
0	40	,1596	,11720
1	14	,2911	,12134
Total	54	,1937	,13078

ANOVA

DiscountrateQ1

	df	Sum of Squares	F	Sig.
Between Groups	1	,179	12,824	,001
Within Groups	52	,727		
Total	53	,906		

Figure 10 Tables depicting comparison between Obese and non- obese discount rates (left) and a significant test of this difference (right)

As can be seen from the above figures, average discount rate of the obese group is higher than that of the normal group. Furthermore, the difference between the two groups is proven to be significant at the 1% level with a p-value of 0.001. From this we can conclude that our hypothesis is correct as Obesity is positively and significantly correlated to the discount factor.

Coefficients[a]

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	-,067	,158	-,424	,674
	Waist Measured in cm	,003	,002	1,675	,100

(a) Dependent Variable DiscountrateQ1

Figure 11 Relationship between waist circumference and individual discount rates

With regards to Hypothesis 3, the relationship between waist circumference and individual discount rates must be analyzed. Figure 11 depicts a regression analysis for which waist circumference was set to explain variations in DiscountrateQ1. The relationship uncovered was that waist circumference is significantly positively correlated with the discounting factor, with a p-value of 0.1, and thus proving our hypothesis.

5.3 Calorie Intake

Recalling the hypotheses:

> *Hypothesis 4*: Individuals with Breakfast Calorie Intake below 300 will discount more than individuals who are better nourished
>
> *Hypothesis 5:* Individuals with Total Calorie Intake below 1000 will discount more than individuals who are better nourished
>
> *Hypothesis 6*: Individuals with Total Calorie Intake above 1500 will discount more than individuals who are better nourished

In order to test these hypotheses, variables were constructed to break up the respondents into groups based on the cut off points we are testing. For hypothesis 4, variable **UndereatingBreakfast300** was created, which scores a 1 for persons eating less than 300 calories, and a 0 otherwise.

DiscountrateQ1			
Undereating Breakfast300	Mean	N	Std. Deviation
0	,1856	93	,12816
1	,1964	38	,13444
Total	,1888	131	,12958

DiscountrateQ1			
Undereating Breakfast200	Mean	N	Std. Deviation
0	,1901	115	,13145
1	,1793	16	,11875
Total	,1888	131	,12958

Figure 12 Tables depicting average discount rate amongst normal breaksfast eaters and people who ate under 300 (left) and under 200 (right) calories for breakfast

Figure 12 (left) depicts the average discount rates of those with breakfast calorie intake above 300 and below 300. What is apparent at first glance is that those with calorie intake below 300 are not behaving to what is expected, and although the statistics are close, it seems that they have an average higher discount rate than the group who is eating the right amount of calories for breakfast, and thus already disproving our hypothesis. In an effort to be definitive however, we created another variable **UndereatingBreakfast200**, lowering the cut off point for a healthy breakfast calorie intake. Figure 12 (right) shows that although on average these individuals are discounting less than the group eating more than 200 calories for breakfast, the

difference between the two groups is too low to be significant. Therefore, we reject hypothesis 4 as respondents eating less than 300 (and even 200) calories for breakfast do not behave significantly different to those with healthier breakfast eating habits.

DiscountrateQ1

UndereatingLunchandBreakfast	Mean	N	Std. Deviation
0	,2016	59	,13060
1	,1859	61	,13076
Total	,1936	120	,13037

ANOVA

DiscountrateQ1

	Sum of Squares	df	F	Sig.
Between Groups	,007	1	,435	,511
Within Groups	2,015	118		
Total	2,023	119		

Figure 13 Average discount rate difference between groups of healthy and under-eating respondents with regards to Lunch and Breakfast (left) and a significance test of this difference (right)

For hypothesis 5, the variable **UndereatingLunchandBreakfast**[11] was created, behaving much like the previous under-eating variable, scoring 1 if total calorie intake was lower than 800 calories, and 0 otherwise. Figure 13 (left) depicts the averages between the 2 groups, showing that under-eaters discount less than overeaters, but this difference is deemed insignificant with a p-value of 0.511 (fig.13, *right*). Hypothesis 5 is therefore rejected as well.

DiscountrateQ1

Overeating	Mean	N	Std. Deviation
0	,1946	108	,12994
1	,1845	12	,13978
Total	,1936	120	,13037

Figure 14 Average discount rates between those with a healthy total calorie intake and overeaters

In order to test hypothesis 6, the variable **Overeating** was developed, labeling healthy eaters as 0, and scoring 1 for respondents with a total Calorie intake of over 1500. As can be seen in fig.14, hypothesis 6 is also rejected, as although the overeaters are discounting less than those consuming a healthy amount of calories, the difference between the two groups is minimal.

[11] Respondents with a LunchCalorieIntake of 0 were not taken into consideration when testing hypothesis 6 or 7, as they were respondents who had visited the lab early on in the day and did have lunch until that moment.

5.4. Exercise rates, Food Consumption, and Other variables

Recalling the hypotheses with respect to Exercise and Food Consumption:

Hypothesis 7: Exercise rates are negatively correlated to the discount factor

Hypothesis 8: Vegetable and Fruit consumption is negatively correlated to the discount rate

Hypothesis 9: Fast Foods/Take Away and Fried Foods consumption is positively correlated to the discount rate

Regression Analysis

Model		Unstandardized Coefficients		Sig.
		B	Std. Error	
1	(Constant)	-,390	,220	,084
	Exercise Activity	,000	,000	,074
	Fast Food and Fried Food Consumption	,007	,017	,703
	Vegetable and Fruit Consumption	-,025	,019	,192
	Pasta or Rice	,006	,026	,805
	Meat or Fish	-,007	,032	,836
	Gender (1) male (0) female	-,077	,053	,153
	Smoke	,003	,059	,963
	Sunscreen usage	,031	,045	,503
	Investment activity	-,071	,058	,223
	Retirement plan	,001	,054	,982
	Debt	,067	,048	,176
	Grocery shopping budget	,010	,030	,728
	Waist	,008	,003	,011

a.Dependent Variable: DiscountrateQ1

Figure 15 Regression Analysis with exercise rates, Food Consumption, and demographics

Through Figure 15 we can see that our hypothesis for exercise rates holds. With a very low B, but statistically significant with a p-value of .074, we see that Exercise rates play a significant role in explaining the variation in individual discount rates.

With respect to food consumption however, we see that the coefficient for **Fast Food and Fried Food** is positive correlated to the discount rate, whilst for **Vegetable and Fruit Consumption** the opposite is valid. However, although both variables are

behaving as expected, neither are significant at the 10% level with 0.703 and 0.192 respectively. Although **Vegetables and Fruit Consumption** is much more significantly correlated with the discount rate, both hypotheses 8 and 9 are rejected.

Regarding the other demographic based variables none are significant at the 10% level. However some do come close and are still worth mentioning. **Gender** for example has a negative coefficient signaling that female respondents responded more rationally than male respondents, and with a p-value of 0.153, it comes very close to being significant at the 10% level. Furthermore, variable **Investment activity** also has a negative coefficient, signaling that those who invest are naturally forward looking, and therefore are more rational when it comes to intertemporal decision making. Finally, **Debt** has a positive coefficient, inferring that a person with debt or prone to debt, has a higher discount rate than one who is not.

6. Limitations and Biases

1. The manipulation used in this paper was two tiered. The visual push in combination with the physical push does not allow for the elicitation of which one of the two manipulations did actually have an effect or if it was the combination of the two that did the trick. For example, was the chocolate bar the element that made the Unhealthy manipulation so successful, or was it the set of picture focused on unhealthy people and food that produced the effect.
2. With regards to the manipulation again, it was difficult to record whether or not the respondents had consumed the physical stimulus of the chocolate bar or the mandarins. Some respondents had registered either the chocolate bar or the mandarins in the calorie intake section of the questionnaire, but other than that, it was very difficult to monitor each person's behavior with respect to the tangible element of the manipulation. For example, certain respondents ate only one mandarin but left none behind (i.e. putting the other one in their bag for later consumption), a handful left both, some ate both, while some took both with them for later. Although it did not damage the data in any way, it could have added to the dataset if the usage of the tangible manipulation could have been recorded.
3. With respect to eliciting the discount rates from question 2 and 3 certain people behaved completed rational, disproving the theory of hyperbolic discounting. This however can be attributed to their preference for the product in question i.e. holiday or games. Furthermore, Quasi-hyperbolic discounting could have been used in order to uncover more specific discount rates. However, for the purposes of this research this route was not followed as such explicit discount rates were not deemed to be necessary

7. Further Research

Further research can be done with respect to the Healthy and Unhealthy manipulation. First off, a single tiered manipulation can be constructed in order to see which push actually had an effect or whether it was the combination of a visual and tangible/interactive push that had the desired effect. Furthermore, as the tangible push would be the most difficult to apply in real world situations, a different type of medium can be used in order to make the average consumer behave more rationally. For example, a short video describing the consequences of over-eating, obesity, or unhealthy lifestyles could also do the trick. In addition, as the Healthy push did not seem to be enough on its own to bring about the desired results, research can be made to construct a better health related stimulus.

With respect to hyperbolic discounting and obesity, other obesity measurement tools can be used such as the ABSI, a body shape index, instead of the BMI. ABSI is a new way of measuring obesity which takes BMI, height, and waist circumference into account. Although BMI is a good indicator when describing large populations, ABSI's ability to describe body shape gives it an advantage when it comes to a personal descriptive tool. Furthermore, ABSI has been proven to predict mortality rates much better than BMI (Krakauer and Krakaeuer 2012). However as this index is still in development, it might take some time before all the kinks are worked out.

Further research could also be done on the subject of calorie intake and hyperbolic discounting. The difficulty with this research however lies in the ability to receive a large amount of reliable data over a period and not referring to an instance, as was done in this study. Respondents could be asked to note what they consume throughout a specific period prior to or even after the day of the questionnaire pertaining to their discount rates. Another way this could be achieved is by acquiring respondents who for one reason or another are given and must stick to a specific diet. These can be clients of dieticians or someone who has visited a doctor or a hospital and was advised to follow a strict diet due to an illness or problem they are experiencing. This second idea would provide more reliable calorie consumption data, but at the same time be open to biases from the beginning as the respondents in this situation are most

likely already in a forward looking state of mind (especially the ones visiting the dietician).

Finally, Quasi-hyperbolic discounting can also be taken into consideration for further research. Although not undertaken in this research, as such specific extrapolation was unnecessary for the purposes is this paper, future research can take this model into consideration for uncovering more precise discount rates.

8. Conclusions

This paper attempted to uncover how different aspects of a person's health could have an influence on their propensity to discount preferences over time. In order to evaluate a person's health and their lifestyle variables such as BMI, waist circumference, eating habits, and exercise rates were all taken into consideration, and the relationships between these variables and individual discount rates were analyzed.

It was proven that BMI and waist circumference do have a positive and significant effect on a person intertemporal decision making processes. In addition, exercise activity was shown to have a negative effect on the discounting factor, as a person who exercises regularly is more forward looking than someone who does not. Together, these results prove that a healthier human being is more prone to rational behavior and less susceptible to hyperbolic discounting than an unhealthy individual.

Furthermore, through a manipulation, we were able to see that a person with a healthy oriented mindset is more like to behave rationally with respect to intertemporal choices. In addition, we saw that by giving someone a subconscious "unhealthy" push, they could be made to behave irrationally.

On the other hand Food Consumption did not fair so well in reflecting a person's discount rate. The same can be said for calorie intake as, all in all, calorie intake was found to not have any significant effect on time discounting. Although overeaters and under-eaters behaved in the expected way, they did not differ significantly than the rest of the respondents. This however is not surprising, as a calorie consumption of a single day cannot be inferred upon as could calorie consumption over a specific time like one week, or one month.

Obesity does not only diminish a person's way of living and decrease their life expectancy, but it also influences the way they see and value the future. Living a healthy lifestyle and taking care of one's self provides you with psychological benefits such as self-esteem, but additionally increases the chances that you make better decisions with respect to your future. Thus, exercising regularly and watching what you eat ensures a healthier body and a healthier mind.

Reference List

Ainslie, G.G. 1975, "Specious reward: a behavioral theory of impulsiveness and impulse control", *Psychological bulletin*, vol. 82, no. 4, pp. 463-496.

Anderson, L.R. & Mellor, J.M. 2008, "Predicting Health Behaviors with an Experimental Measure of Risk Preference", *Journal of health economics*, vol. 27, no. 5, pp. 1260-1274.

Bleichrodt, H. & Gafni, A. 1996, "Time preference, the discounted utility model and health", *Journal of health economics*, vol. 15, no. 1, pp. 49-66.

Borghans, L.L. & Golsteyn, B.H.H. 2006, "Time discounting and the body mass index. Evidence from the Netherlands", *Economics and human biology*, vol. 4, no. 1, pp. 39-61.

Cutler, D.M., Glaeser, E.L. & Shapiro, J.M. 2003, "Why have Americans become more obese?", *The Journal of Economic Perspectives*, vol. 17, no. 3, pp. 93-118.

Elster, J., 1979. *Ulysses and the Sirens: Studies in Rationality and Irrationality*. Cambridge, UK: Cambridge U. Press.

Fersterer, J. & Winter-Ebmer, R. 2003, "Smoking, Discount Rates, and Returns to Education", *Economics of Education Review*, vol. 22, no. 6, pp. 561-566.

Frederick, S., Loewenstein, G. & O'Donoghue, T. 2002, "Time Discounting and Time Preference: A Critical Review", *Journal of Economic Literature*, vol. 40, no. 2, pp. 351-401.

Fuchs, V., 1982. Time preference and health: an exploratory study. In: Fuchs, V. (Ed.), Economic Aspects of Health. University of Chicago Press, Chicago, pp. 93–120.

Grossman, M. 1972, "On the Concept of Health Capital and the Demand for Health", *Journal of Political Economy*, vol. 80, no. 2, pp. 223-255.

Grossman, M. 1973, *The Correlation Between Health and Schooling*. NBER Working Paper Series. Working Paper, no. 22.

Han, T.S., van Leer, E.M., Seidell, J.C. & Lean, M.E. 1995, "Waist circumference action levels in the identification of cardiovascular risk factors: prevalence study in a random sample", *BMJ (Clinical research ed.)*, vol. 311, no. 7017, pp. 1401-1405

Ikeda, S., Kang, M. & Ohtake, F. 2009, *Fat Debtors: Time Discounting, its Anomalies, and Body Mass Index*, Rochester, Rochester.

Ikeda, S., Myong-Il Kang & Ohtake, F. 2010, "Hyperbolic discounting, the sign effect, and the body mass index", *Journal of health economics*, vol. 29, no. 2, pp. 268-284.

Kahneman, D. & Tversky, A. 1979, "Prospect Theory: an Analysis of Decision Under Risk", *Econometrica (pre-1986)*, vol. 47, no. 2, pp. 263-292.

Keys, A., Fidanza, F., Karvonen, M.J., Kimura, N. & Taylor, H.L. 1972, "Indices of relative weight and obesity", *Journal of chronic diseases*, vol. 25, no. 6, pp. 329-343.

Kirby, K.N. & Marakovic, N.N. 1995, "Modeling myopic decisions: Evidence for hyperbolic delay-discounting within subjects and amounts", *Organizational behavior and human decision processes*, vol. 64, no. 1, pp. 22-30.

Krakauer, N.Y. & Krakauer, J.C. 2012, "A new body shape index predicts mortality hazard independently of body mass index", *PloS one*, vol. 7, no. 7, pp. 1-10.

Laibson, D. 1997, "Golden Eggs and Hyperbolic Discounting", *Quarterly Journal of Economics*, vol. 112, no. 2, pp. 443-477.

Levy, A. 2002, "Rational eating: Can it lead to overweightness or underweightness?", *Journal of health economics*, vol. 21, no. 5, pp. 887-899.

Li-Lin Rao & Li, S. 2011, "New paradoxes in intertemporal choice", *Judgment and Decision Making*, vol. 6, no. 2, pp. 122-129.

Loewenstein, G.F. 1988, "Frames of Mind in Intertemporal Choice", *Management Science*, vol. 34, no. 2, pp. 200-214.

Malkoc, S.A. & Zauberman, G. 2006, "Deferring Versus Expediting Consumption:

The Effect of Outcome Concreteness on Sensitivity to Time Horizon", *Journal of Marketing Research*, vol. 43, no. 4, pp. 618-627.

Mowen, J.C. & Mowen, M.M. 1991, "Time and Outcome Valuation: Implications for Marketing Decision Making", *Journal of Marketing*, vol. 55, no. 4, pp. 54-62.

Noor, J. 2011, "Intertemporal Choice and the Magnitude Effect", *Games and Economic Behavior*, vol. 72, no. 1, pp. 255-270.

Pavlo, R.B. 2010, "Reverse common ratio effect", *Journal of Risk and Uncertainty*, vol. 40, no. 3, pp. 219-241.

Physical status: the use and interpretation of anthropometry. *Report of a WHO Expert Committee* 1995, SWITZERLAND.

Prelec, D. & Loewenstein, G. 1997, "Beyond time discounting", *Marketing Letters*, vol. 8, no. 1, pp. 97-108.

Rachlin, H., Raineri, A. & Cross, D. 1991, "Subjective probability and delay", *Journal of the experimental analysis of behavior*, vol. 55, no. 2, pp. 233-244.

Ratner, R.K., Soman, D., Zauberman, G., Ariely, D., Carmon, Z., Keller, P.A., Kim, B.K., Lin, F., Malkoc, S., Small, D.A. & Wertenbroch, K. 2008, "How behavioral decision research can enhance consumer welfare: From freedom of choice to paternalistic intervention", *Marketing Letters*, vol. 19, no. 3-4, pp. 383-397.

Ruhm, C.J. 2012, "Understanding overeating and obesity", *Journal of health economics*, vol. 31, no. 6, pp. 781-796.

Samuelson, P.A. 1937, "A note on measurement of utility", *Review of Economic Studies*, vol. 4, no. 2, pp. 155-161.

Appendix

A.1 Healthy Manipulation- title page and visual element

Dear Participant,

Thank you very much for your time and for your collaboration on our study about charity, time, and choices!

Please read all instructions carefully and answer what first comes to mind. There are no wrong answers.

As a reward for your participation we offer you a MANDARINE, which you are free to eat while answering to this survey.

Please write your Student Number:

……

Please take a look at the following options and make a cross "X" on the one that appeals THE MOST to you:

☐

☐

Please take a look at the following options and make a cross "X" on the one that appeals THE MOST to you:

☐

☐

Now, please answer to the questions in the following pages.

A.2 Unhealthy Manipulation- title page and visual element

Dear Participant,

Thank you very much for your time and for your collaboration on our study about charity, time, and choices!

Please read all instructions carefully and answer what first comes to mind. There are no wrong answers.

As a reward for your participation we offer you a CHOCOLATE, which you are free to eat while answering to this survey.

Please write your Student Number:

……

Please take a look at the following options and make a cross "X" on the one that appeals THE MOST to you:

☐

☐

Please take a look at the following options and make a cross "X" on the one that appeals THE MOST to you:

Now, please answer to the questions in the following pages.

A.3 Questionnaire handed out to all respondents including Title page given to Control Group

Dear Participant,

Thank you very much for your time and for your collaboration on our study about charity, time, and choices!

Please read all instructions carefully and answer what first comes to mind. There are no wrong answers.

Please write your Student Number:

……

Please indicate, between the pairs of options, which one you would prefer:

☐	€50 now	or	☐ €70 in a year
☐	€100 in 1 year	or	☐ €150 in 4 years
☐	€100 now	or	☐ €100 in a year
☐	€50 in 1 year	or	☐ €90 in 2 years
☐	€50 now	or	☐ €300 in 4 years
☐	€100 in 1 year	or	☐ €125 in 2 year

On your birthday, your work gave you a holiday as a gift. However you had a prior appointment on the days they had booked and gave you the following options. Please indicate which one you would choose:

☐	3 days now	or	☐ 7 days in 6 months
☐	5 days now	or	☐ 10 days in 12 months
☐	7 days now	or	☐ 14 days in 18 months
☐	9 days now	or	☐ 19 days in 24 months

You recently purchased a highly requested game online, paying €50, that you have been waiting to be released for months. Due to overbooking the company provided you with certain options. Please indicate which one you would choose:

☐	Receive tomorrow	or	☐ receive €5 to wait 3 days
☐	Receive in 4 days	or	☐ receive €5 to wait 6 days
☐	Receive in 7 days	or	☐ receive €5 to wait 9 days
☐	Receive tomorrow	or	☐ receive €10 to wait 6 days
☐	Receive in 7 days	or	☐ receive €10 to wait 12 days

What is your weekly grocery shopping budget in EUROS? Please indicate your answer by circling the letter of your choice

a. less than 35 euros

b. 35 -70 euros

c. 71- 115 euros

d. 116-140 euros

e. more than 140 euros

Can you recall what you ate and drank today for Breakfast? Please fill in the type of food or drink and the quantity with the most detail that you can. Examples have been given in order to assist you with your answers.

Breakfast	**Quantity**
Bowl of Coco Pops with semi-skimmed milk	1
Small Coffee with 2 sugars and 1 creamer	*1*
Slices of whole-wheat bread with butter (salted)	2

Can you recall what you ate and drank today for Lunch? Please fill in the type of food or drink and the quantity with the most detail that you can. Examples have been given in order to assist you with your answers.

Lunch	**Quantity**
Grilled chicken breast	1 (200 grams)
Small salad with tomatoes, lettuce ,carrot strips, and blue cheese dressing	*1 (100 grams)*
500 ml of Diet Coke	2

How often do you eat the following foods? (Please indicate your answer by circling your choice for each food type)

Fruits:	Daily	2-3 times a week	4-6 times a month	Almost Never
Vegetables:	Daily	2-3 times a week	4-6 times a month	Almost Never
Sweets:	Daily	2-3 times a week	4-6 times a month	Almost Never
Fried Foods:	Daily	2-3 times a week	4-6 times a month	Almost Never
Pasta or Rice:	Daily	2-3 times a week	4-6 times a month	Almost Never
Fast Food/Take out:	Daily	2-3 times a week	4-6 times a month	Almost Never
Meat, Fish, or Poultry :	Daily	2-3 times a week	4-6 times a month	Almost Never

How often do you exercise?

Daily	2-3 times a week	4-6 times a month	Less

Which exercise do you usually do?

_____

Fill in or encircle your answer to the following questions:

What is your age? _____

What is your gender? **Male** **Female**

What is your faculty?

Law (FRG) RSM ESE Philosophy (FWB) FHK Erasmus MC ISS

Do you smoke? **Yes**

No

Do you use sunscreen when sunbathing? **Yes**

No

Do you invest in funds, stocks, other? **Yes**

No

Did you arrange something for retirement yet? **Yes**

No

What is your monthly income approximately? _____

Do you have any debt at the moment? **Yes** **No**