UNIVERSIDADE CATÓLICA PORTUGUESA

Behavioral Economics: nudging towards weight loss

Final Work in the Dissertation
presented to the Portuguese Catholic University
to obtain the master's degree in Business Economics

by

Francisco Adriano Ribeiro

Under guidance of
Professor Carlos Mauro

Católica Porto Business School
April 2018

Acknowledgements

I would like to thank professor Carlos Mauro for his guidance during this thesis, my parents for the monetary and emotional support and my friends for helping me with whatever they could during this period.

Resumo

Esta tese final de mestrado tem o tema de Economia comportamental ligado ao conceito de uma nutrição saudável com o objetivo de utilizar as heurísticas e enviesamentos provenientes da racionalidade limitada do ser humano para dar um incentivo (nudge) as pessoas a mudar os seus hábitos alimentares com o objetivo de atingir e manter um peso saudável.

Para isso, depois de explicar e rever os conceitos mais importantes ligados a Economia comportamental, avanço para uma discussão acerca de algumas sugestões sobre como lidar com a tentação com particular enfase em incentivos económicos e de seguida um extensivo estudo de intervenções alimentares já efetuadas e agrupando estas por tipo de intervenção e classificando-as de acordo com a matriz classificativa do Kim Ly e Dilip Soman com o objetivo de perceber caso se verifiquem, as tendências do tipo de "nudges" e intervenções utilizados e verificar se há também melhores resultados obtidos com uns comparativamente a outros.

Palavras-chave: Economia comportamental, nudge, paternalismo libertário, heurísticas, enviesamentos, índice de massa corporal(IMC), nutrição, perda de peso

Abstract

This final master's thesis has the theme of behavioral economics linked to the concept of healthy nutrition with the goal of using heuristics and biases from the limited rationality of the human being to give an incentive (nudge) people to change their eating habits with the goal of attaining and maintaining a healthy weight.

For this, after explaining and reviewing the most important concepts related to Behavioral Economics, I advance to a discussion about some suggestions on how to deal with temptation with particular emphasis on economic incentives and then an extensive review of already tested nutrition interventions, grouping by type of intervention and classifying them according to the Kim Ly and Dilip Soman classification matrix in order to perceive if there are any trends in the type of nudges and interventions used and to verify if there are better results obtained with some compared to others.

Keywords: Behavioral Economics, Nudge, Libertarian paternalism, Heuristics, Biases, Body mass index (BMI), nutrition, weight loss

Table of contents

Table of figures

Table of tables

Introduction

Obesity and excess weight have been an increasing problem over the past decades and it is becoming a real issue that's needs to be addressed reaching proportions similar to the worlds hunger problem. (Sah, 2010)

According to the world health organization(WHO), in 2016 41 million children under 5 years old suffered from excess bodyweight or obesity, even in continents such as Africa that are associated with hunger and nutrient deficiency problems, the number of overweight children under 5 has increased about 50% since the year 2000.

Over 340 million children and adolescents aged 5-19 were overweight or obese in 2016. (World Health Organization, 2018)

In a study conducted since 1980 to 2013 by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington it was found that overweight levels in adults are also increasing with man going from 29 to 38% and women from 30 to 38%. (Murray et al. (2013)

WHO points as main consequences of overweight cardiovascular diseases, diabetes, musculoskeletal disorders and some types of cancer.

Behavioral Economics (BE) and nudging are concepts that might be able to help fight this tendency on increasing obesity worldwide. BE figures out how the context in which decisions are made alters the decision-making process and nudging means altering the way choices are presented at people in order to stimulate people into taking certain desired behaviors. (Bhargava and Loewenstein, 2015).

Since a very young age I started to take an interest in nutrition and health, as an overweight kid I always took an interest in finding out more about how to lose weight and as I educated myself I was able to help myself and others (friends

and family) reach their weight goals. When taking my management degree, I started taking an interest in behavior with the course organizational behavior that I took in my second year, ever since then this was a topic that raised my interest and when I had an opportunity to do my thesis based on both of this topic I did not hesitate in doing so.

With this in mind the goal of this master's degree thesis is to study how BE and nudging can improve eating habits specifically to reduce excess body weight and the problems associated with it and not necessarily looking at nutrient and vitamins intakes. This doesn't mean that these aren't relevant parts of a healthy and balanced diet, but the purpose of this thesis is just to assist weight loss whether or not nutrient intake is associated with it.

I will also not focus on the activity part of the weight loss, but just on the nutrition part of it. The reason for this is that there is a bigger importance for what we eat for weight loss than exercise which will be explained in the nutrition part of this thesis.

First, I will discuss in more depth what is BE and nudging and talk about how people have tendencies to make certain mistakes in their decision-making. The second step will be to analyze the science of weight loss. What causes people to lose and gain weight in order to understand what is it that is important to change when implementing the BE aspect. Then I will explain my method and move on to an extensive review of 35 nutrition interventions already tested and implemented and the results obtained in order to be able to take conclusions and discuss some suggestions of how all this can transfer into the real world.

There have already been conducted a lot of studies in this area which is why I decided to make this thesis almost like a wrap up of the interventions already tested and 1) classify them according to the matrix presented by Dilip Soman and Kim Ly (2013) for nudges classification and 2) group them by the type of intervention. The goal of this gathering and interpreting the information we have

available so far and learn from it to apply in the future. In both economics and management, it is important to think of public policies to be implemented that improve general wellbeing and quality of life of the population and health is a very relevant factor that contributes to these aspects. I also believe that this kind of work can be very helpful for future analyses on the topic since researchers can use this paper as a starting point for their investigation and go from there.

Chapter 1

What is behavioral economics

In this chapter will be discussed what behavioral economics means, its applications and the main concepts associated with it.

1.1 Definition, tools to influence behavior and libertarian paternalism

The traditional concept of economics assumes that individuals are sophisticated enough at a cognitive level that are capable of processing all the information available and make rational decisions. This concept is now known to not be the true in many situations and the context in which the choices are presented to the individuals (choice architecture) alters the way they make their decisions.

Behavioral economics is becoming a very important complement to traditional economics and is contributing heavily to the creation of new and more efficient politics and welfare programs. (Ly & Soman, 2013) Behavioral economics studies how the context in which decisions are made interacts with our understanding of human psychology and is a more realistic model than standard economics for people on how decisions are made. It differs from psychology by maintaining a focus on institutions and the context in which decisions are made. (Darling, Datta & Mullainathan, 2013)

This does not mean that behavioral economics is about people´s "irrationality". The human brain however is not a perfect computer and will make mistakes. Behavioral economics aims to understand the context that lead

to the commitment of a certain mistake in order to explore certain behavioral patterns. (Darling, Datta & Mullainathan, 2013)

Up until the appearance and gain of credibility of behavioral economics there were three main tools to influence people´s behavior: Regulation and restrictions, Incentives and Information, Education and persuasion. Behavioral economics adds to these a fourth tool which is Nudges and choice architecture which means influencing people´s behavior by changing how choices are presented in the environment. (Ly & Soman, 2013)

This fourth tool will complement the others and not substitute them and it is important to choose the appropriate policy tools based on whether enforcement is feasible and cost-effective, whether freedom of choice is important, the possible response from the market and the potential outcomes of the policy. (Ly & Soman, 2013)

This does not however mean that behavioral economics is about controlling people´s behavior, just like intelligent ads for fatty foods do not make you obligated to consume them, but they persuade people to do so, behavioral economics and nudging aims to push people in a certain direction. It differs from the ad example though because nudges are used to promote general well-being and is used in situations that if asked people realize that they would like or should behave differently but don't do so. There are examples of people utilizing behavioral economics in their life's without even realizing so, like when we set deadline for ourselves and apply some sort of punish and reward consequence if we are able to meet the that deadline or not. We do this because we know it is better for us to do a work over time and not right before the final deadline but many of us don't do it so some create these strategies to help them maintain the correct path. (Darling, Datta & Mullainathan, 2013)

This topic brings the notion of libertarian paternalism. The paternalist aspect resides in the fact choice architectures have legitimacy to influence people´s

behavior in that way that it improves their wellbeing and the libertarian aspect resides in the belief that people should be free to make their own decisions. Libertarian paternalism is a non-intrusive type of paternalism. The idea is not to force people into taking certain actions or decisions but to "stimulate" them in doing so. This stimulus is an aspect of choice architecture that alters a person´s behavior in a predictable way without forbidding them to choose others options. (Thaler & Sunstein)

1.2 Two systems, heuristics and biases

Nudges and choice architecture influence how people make decisions because individuals have heuristics and biases that influence their behavior. In this chapter, I will talk about the main heuristics and biases that humans incur to and after that I will discuss some of the main nudging policies that are well established to work based on those heuristics.

The human brain has two systems when we think, our system 1 is fast and intuitive like when we dodge a ball coming in our direction. The system 2 is more deliberate and self-conscious. We can think of our system 1 as the system we use when we are doing activities like driving, reading or any house activity that some of us do every day like washing the dishes or doing the laundry. Basically, this system is the one we use most of the time for our everyday activities, but because of this automatic, intuitive and mostly effortlessly response that it provides it also makes us prone to commit errors in our decisions, it works on heuristics that many time are not accurate. Our system 2 is the one we use when we perform activities in which has we usually call it have to "use our brain", for example when solving a (not basic) math problem. This system works slower, it reasons and focuses on completing the task consciously without jumping into conclusions. System 2 questions why things are the why they are, it tries to

understand rather than just accepting them. This system however requires a lot more effort to be used than system 1 and because of that it may also become subject to errors due to fatigue. (Thaler & Sunstein, 2008) (Kahneman, 2011).

Because thinking slowly affects our body making us feel fatigued we most of the times think fast and accept the most obvious answer or take the path that offers the least resistance in making a decision. We can easily observe the truth in this by simply asking someone to make a complicated calculus while walking. The person will just stop walking to concentrate on the task, it is energy draining to concentrate on the calculus. This energy being used is related to our ability of self-control which is why it is harder to resist temptation while being energy depleted or stressed. It takes effort to think about a problem and access our memory and that leads to us not doing so when making everyday life decisions most of the time. This leads to us having some behavioral influences and heuristics that affect our ability to make the best decision. (Kahneman 2011)

Amos Tversky and Daniel Kahneman (1974) identified three original heuristics or pre-conceived ideas. Anchoring and adjustment, representativeness and the availability heuristic.

The availability heuristic has to do with people estimating how frequently an event happens or how likely an event is to happen based on the information available to them at the time (Daniel Kahneman), for example if someone in Japan is asked how often earthquakes happen worldwide he will probably say a number larger than someone in Portugal.

Anchoring means that we create an anchor about something and we go from there when doing estimations, for example when trying to guess the population of a city A we don't know, we may know the population of a different city B that is for example twice as big so we guess the population of A is half of B. Here we created an anchor which was the city B and we guessed adjusting from there.

Representativeness means when being asked how likely it is for object A to belong to class B, people answer questioning themselves how similar is A to the idea they have of B. For example, we tend to think it is more likely that a 2-meter-tall man is more likely to be a basketball player than a 1.5 meters tall man. (Daniel Kahneman, 1974)

These were the three original heuristics when the concept first started to be studied but now there many more known like:

1) Choice overload is when a person is presented with too many possibilities when making a choice which leads to in many cases people not making the best decision, by limiting the amount of information presented it can help people understanding more clearly the differences and pros and cons of each option available and make better decisions. (ideas42)
2) Hassle factors are "inconveniences" that make it so that we avoid taking a certain path that we intended to because taking that path means having to go through this "hassle factors", for example, college applicants can fill the Free Application for Federal Student Aid(FAFSA) which can give low and medium income families grants and subsidized loans towards college but fail to do so because they need to fill an eight-page with 100 questions form. (ideas42)
3) Identity is the perception we have of ourselves, whether it is social status or age group our choices and the way we act is often according to our identity which makes it so that small identity priming interventions can have huge effects on behavior. (ideas42)
4) We also have limited attention, our ability to focus on different things is very limited which leads to people not choosing products or programs because they don't notice them and not necessarily because they are not desired, with this in mind we can make say a certain

product that we want people to choose more visually prominent or present it multiple times. Another effective tool is picking the right times to present the information, for example "You might be much more likely to pay attention to advice on healthy eating if you got it during your annual physical than if your doctor´s office sent you a flyer several weeks later". (ideas42)

5) We dislike losing more than we like winning. This concept is called loss aversion and can cause people to not make the best decisions because they are too afraid of a loss. This has to do with the concept of framing that comes from the prospect theory which tells us that people avoid risk when a positive frame is presented but seek it when a negative frame is; this theory shows that losses are more significant than an equivalent gain. (Kahneman, 2011)
6) Primacy bias means people pay more attention and take more into consideration the way the information is presented first, for example when describing someone with say three adjectives we pay more attention to the first then the second and then the third adjective used. (ideas42)
7) Procrastination means that we put off tomorrow things that we could and should start doing today, the most common area where we see this happening is when starting a diet, it's very easy to just keep delaying it by a day or two because it does not feel like a big deal in that moment and we are confident that we will be able to pull it through tomorrow but this cycle keeps happening over and over. One way to fight this is by giving people clear deadlines over when something has to be done. (ideas42)
8) We tend to act according to "social norms", meaning that we take more into consideration what other people are doing than what society says

we should be doing so we are more likely to act in a certain way if it goes in agreement with what others are doing. This means that informing people about what others are doing is a powerful tool for choice architects if they want to change behavior. (ideas42)

9) The status Quo Bias means that we don't like to change our current condition, which leads to choosing pre-set options when many other potentially better are available, realizing this is very important to understand that when making a decision, if there is a status quo people will be less likely to switch to an alternative. (Soman, 2013)
10) Priming has to with subconsciously being exposed to an idea "primes" us to think about things and behave according to that idea. For example, if we talk to someone about food we are primed to think about things associated with food. Not only talking but just being exposed to a certain type of environment or image can lead our next thoughts and actions to be based on that. (Kahneman, 2011)

1.3 Nudging

Now that we have discussed some of the main heuristics and biases let's move on to how we should take that knowledge into creating principles that every choice architect should keep in his mind. These principles were developed by Richard Thaler and Cass Sunstein in their book "Nudge" (2008).

As mentioned above many times people take the path that present the least trouble for them, this means that if when making a decision there is a default option it is very likely that a person will take that option even if it is not necessarily the best one.

Mistakes are unavoidable, humans will make mistakes and a well-designed system needs to take that into account and be able to forgive those mistakes with

intelligent design, for example a gas station having different mouthpieces for different types of fuel so that people don't make the mistake of using the wrong one.

Another important tool is giving feedback to how a person is doing, making sure people are aware if they are doing something right or wrong by giving them feedback is proven to be a very effective way to alter behavior or maintaining good behavior.

Mental maps have to do with being able to associate a certain choice to the well-being that choice will give, for example when choosing between chocolate, strawberry or vanilla ice cream people can associate the choice to the experience that choice gives, this is called "maping" the relation between choice and well-being. In other situations, it not so easy to do this and a good choice architecture system helps people to map and choosing better options.

Structuring complex choices, when choosing a bunch of options, it's hard to analyze the characteristics of each one and establish a logic of commitment, cases like this call for the application of what Amos Tversky (1972) named elimination on the basis of the aspects which means first deciding which are the most important characteristics and eliminate options that don't have those even if they have other amazing ones.

Stimulus is the last concept to be discussed here and is the one most closely linked to traditional economics since it believes in the concept of demand and supply, if price of something increases, its demand decreases and vice-versa. This means that choice architects need to think in stimulus when designing a system. One way to approach this is by making four questions about a given choice architecture: "Who uses it? Who Chooses? Who pays? Who wins?". There are a lot of conflicts regarding stimulus and visibility is the most significative approach to make to a standard analysis of stimulus because many times, who is choosing doesn't know the stimulus involved in his decision. The visibility can be

manipulated and choice architects can take measures that direct people´s attention to the stimulus.

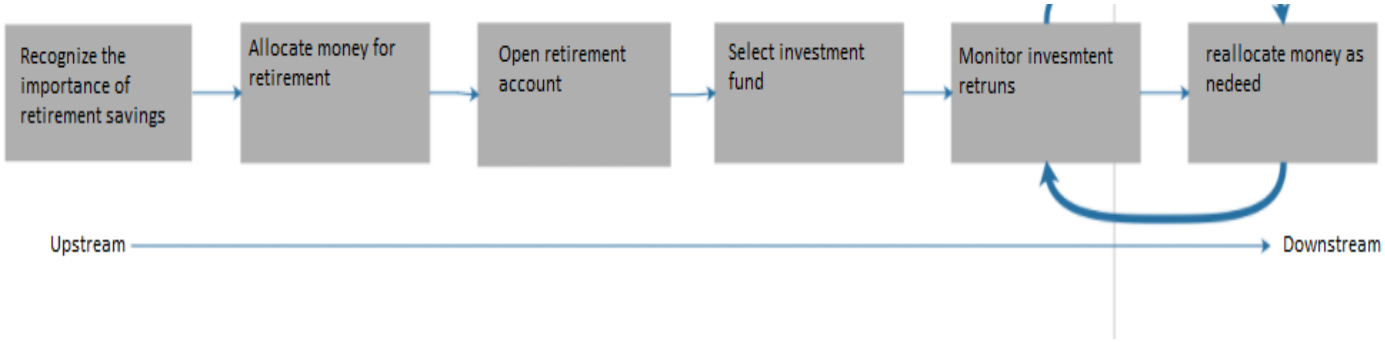
In the article "A Practitioners guide to nudging" by Kim Ly, Nina Mazar, Min Zhao and Dilip Soman (2013) they discuss how the process of nudging should be approached which has four different phases according to the authors which can be seen in the image below.

The first step is to **map the context** and has to do with the identification of the factors that prevent the individual to go through with his decision, these factors are called the bottlenecks, a term often used in management, for example in a company that produces, there are several phases the product goes through before it is complete. The bottleneck is the phase that has a low capacity and because of that the entire process suffers, making everything else operate below their full potential. (yourbusiness.com) Here it should be addressed the four aspects of the decision-making process. These aspects are:

1) "The properties of the decision including understanding the incentives and motivations associated with the decision, and how much attention the decision receives. It also includes identifying the choices presented to the individual, especially the default option."
2) "Information sources and how information related to the decision was gathered and presented."
3) "Features of the individual´s mindset and whether emotions influence the outcome of the decision."
4) "Environmental and social factors such as peer pressure and lengthy application processes. These factors can also influence the outcome."

After this process, there should be designed a map of the decision-making process which outlines the most important actions involved in being committed to the decision. Here is an example of what the map could look like, in this case using a retirement savings plan example:

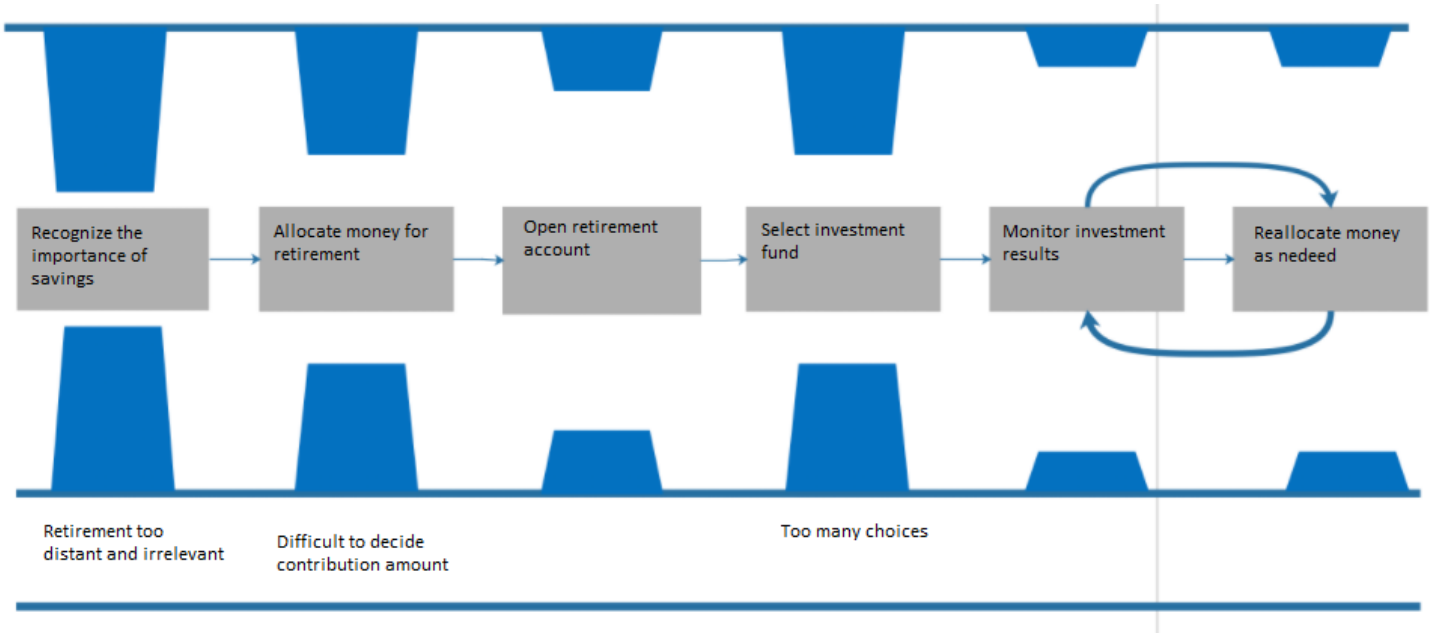
Figure 1- Decision map for retirement savings



Source: Soman, 2013

The second step described is to **select the nudge**. The bottlenecks involved in the decision-making progress are usually a good starting point. When going through the process of finding a solution for the bottlenecks it is recommended to follow four dimensions(questions). The first one has to do with whether or not the individual is aware of what he needs to do or if a desired behavior needs to be activated. The second one has to do with the individual being motivated enough to impose the nudge on themselves or not. The third one considers whether the action is taken with cognition or if he is hurt by cognitive overload. The final question asks if the nudge should be encouraging a certain action to be taken or discouraging the target action. These will help identifying the bottleneck meaning identifying where the action should be implemented. Continuing with the retirements saving plan here´s an example of what it would look like:

Figure 2-Decision map with bottlenecks



Source: Soman, 2013

These four questions are linked to how nudges have characteristics that can be classified according to four dimensions that will be discussed in chapter 3(metodologia) of this paper.

The third step is **called identifying the levers for nudging** which is heavily reliant on the types of nudges identified in the previous step, but it is still important to determine if the options below are available or not:

- "Implementing an automatic process."

- "Offering a default option or changing the current default option."

- "Modifying or changing the current choices that are available in the decision-making process."

- "Simplifying the process that facilitates the decision-making process.

-" Using technology to reduce the cost (per individual) or improve scalability."

The las step is **design and iterate.** In this final part of the process it is important to prioritize, meaning that there may have been identified several nudges in the previous steps and while it is possible to combine them, the aim should be

identifying which one is more important. For this it is relevant to think about implementation costs. Another aspect to consider is what bottlenecks should be addressed, the priority should be to resolve bottlenecks that are upstream in the decision making, meaning closer to the beginning of the decision. Nudges that people impose on themselves may not reach as many people as nudges that have an automatic enrolment, so the first has a smaller reach than the second. However, this does not mean that nudges that are automatic are better at every situation because individuals of the target audience may have different behavioral preferences. It is also important to keep in mind if the nudge will have a long-term effect one people, if it will create new habits in the long run and not just make the situation better in the near future.

Finally, the nudge needs to be **tested in order to prove its efficiency**, Richard Thaler provides two mantras for testing nudges which are; "if you want to encourage some activity, make it easy" and "you can't make evidence-based policy decisions without evidence". These two combines in what could be considered a third mantra which is to share the results in a worldwide base to create a database.

Both the process and the outcome should be evaluated because an outcome evaluation would simply confirm that the nudge achieved the desired outcome while the process evaluations is necessary to provide evidence that it worked because of the underlying mechanism.

For these tests randomization is a key aspect to avoid biased results, meaning that while the tested individuals should belong to the population that the nudge is supposed to target there need to be paid close attention to make sure there are not any kind of for example gender, age or ethnicity biases. The assignment should also be random to different group tests.

One thing to keep in mind is the occurrence of false positives, which means that the nudge tested positive results but because of factor that are not related to

the nudge itself (external factors), so the experiment should be designed with close attention to make sure that there are not any of these factors capable of influencing the final result.

Finally, it is better that the people that perform the interventions are not the same group of people that evaluate its results and that the people responsible for testing the result are experts in the domain that is being studied to make sure that they understand the variables that are being evaluated.

Chapter 2

Nutrition for weight loss

To be able to discuss how behavioral economics can contribute to helping people having healthier lifestyles and lower obesity rates it is important do first understand what are the causes of this high percentage of the population being overweight to know what needs to be "fought".

According to J. Alberto Martinez in the article "body weight regulation, what causes obesity" (2000), the main cause for obesity is a sustained imbalance between the amount of energy(calories) we consume and the amount of energy we spent. The great increase in obesity levels in modern society despite a constant genetic pool shows that environmental causes factors have a high level of importance when it comes to justifying this increase with the food system improving the availability of highly energetic foods and the more and more sedentary lifestyle with motorized transports and labor-saving devices.

Harvard Medical school published the article "why people become overweight" (2009). This article discusses how fat gain can be summarized by consuming more calories than our body burns and consequently our body restoring the excess energy consumed as fat in our body by enlarging our fat cells or creating new ones. It is once again discussed the importance of environmental factors as a cause for obesity with the availability of caloric dense food pretty much everywhere we go and the much more sedentary lifestyle among both adults and children caused by TVs and computers that make people stay still for long periods of time and stimulates consumption of extra calories. There is also a stress factor and lack of sleep that is associated with obesity, people tend to eat more when affected by emotional disorders.

Despite all the different diets and do´s and don'ts that we hear every day from tv shows and even nutritionists. Our bodies obey to the laws of thermodynamics

when it comes to weight loss This means that weight management must be a function of calories in (the total calories consumed by a person) – calories out (the total caloric expenditure, including metabolic processes, waste heat, exercise, and others). Thermodynamics must be obeyed and so if one wishes to lose weight they must burn more calories than they consume. (Novella, 2008)

Brian Wansink and David Just (2015) also discovered in a study that "there is no association between the intake frequency of fast food, soft drinks, and candy, and BMI" (Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in meters (kg/m2) (World health organization)). "These results suggest that focusing solely on restricting consumption of these foods for weight loss may be ineffective. A more effective weigh loss strategy could focus more on reducing the total calories of food eaten and frequency of snacking."

A study conducted earlier this year compared healthy low-fat diets vs healthy low carb diets and showed pretty much no differences between the two of them over the course of the 12 months the experiment lasted. (Christopher, D. et al, 2018)

The genetic component is also a part of how easy it is to gain weight for a given person but for this thesis we will not focus on this part of the equation since it is not something linked to the environment that is presented to us that leads to certain decisions and therefore it is not something that behavioral economics can influence. (Harvard Medical school, 2009).

All this does not mean that the classic "eat your fruits and vegetables" is not true for weight loss, but it is mostly for satiety reasons. These foods are very satiating compared to how many calories they have in them which makes them a very powerful tool to curve appetite on a weight loss diet. If someone consumes more fruits and vegetables it's likely that person will consume fewer calories as

a consequence. Therefore, focusing on increasing the consumption of these foods rather than just decreasing consumption of others can be a powerful tool to help people losing and maintaining weight. (National center for Chronic disease prevention and health promotion, 2015)

Chapter 3

Behavioral interventions classification method

Starting with a discussion based on Richard Thaler recommendations for dealing with temptation I will address the concept of mental accounting and economic incentives for helping people with weight loss. After that I will take a deep look into behavioral interventions designed towards weight loss and improving people´s eating habits and classify them according to the dimensions mentioned in the first chapter were Kim ly and Dilip Soman (2013) described four steps to create a nudge. In the second step (select the nudge) four dimensions in the form of questions are discussed.

The first dimension is boosting self-control to help individuals follow a decision that they made (such as going on a diet or starting to exercise) because many times in this situations individual do not end up doing what they initial intended to. This contrasts to activating a desired behavior which means to influence behaviors on people that they do not pay much attention to or don't think of them as important meaning that these are not behavioral standards and it is needed an exposure to conditions in which those standards are more noticeable in order to activate the desired behavior.

The second dimension that Soman describes is self-imposed nudges which people adopt voluntarily to "enact a behavioral standard that they feel is important". This could be for example buying a gym membership that punishes with a fee people that skip gym sessions that they had previously compromised to attend to which was implemented in a gym called gym-pacts created by Yifan Zhang and Geoff Oberhofer (2012).

The other end for this dimension is Externally-imposed nudges which passively change people´s behavior because of the way that choices are presented to them without taking away their freedom of choice, for example in the US there

is an application for financial aid needed to be filled (FAFSA) to make higher education accessible which is a long and complicated process. A researcher's team called H&R Block designed a software to help families fill the FAFSA form.

The third dimension is mindful nudges which means that individuals take a conscious deliberate approach to their decisions and the nudge guides them towards that behavioral standard that they would like to achieve but might be having trouble with. In opposition to this there are the mindless nudges which guide individuals in a more automatic and based on heuristics approach, these nudges include the use of human emotions and some of the mentioned heuristics like anchoring or framing to alter the way people make their decisions.

The fourth and final dimension covered by Soman has encouraging nudges meaning nudges that lead individuals towards taking a certain attitude or decision versus discouraging nudges which aims to stop or prevent them taking a certain behavior.

These four dimensions are combined to achieve twelve different types of nudges which are displayed on the table below with examples:

Table 1-nudge examples

		Mindful		Mindless	
		Encourage	Discourage	Encourage	Discourage
Activating a Desired behavior	Externally-imposed	Simplifying tax rules to make tax filling easier	Placing signs to remind people not to litter	Advertising that most people are recycling to increase recycling efforts	Using fake speed bumps to discourage speeding
Boosting self-control	Externally-imposed	Simplifying application processes for college grants to encourage higher level education	Installing car dashboard that track mileage to reduce gas usage	Automatically enrolling for prescription refills to encourage taking medication	Placing unhealthy foods in harder to reach places
	Self-imposed	Maintaining an exercise routine by agreeing to pay a small penalty if a gym session is missed	Avoiding drunk driving by hiring a limo service beforehand	Joining a peer savings group to encourage saving money	Channeling money into a separate account to reduce the like hood of it being spent

Source: Soman, 2013

Besides this classification I will group the case interventions by the type of policies implemented with the goal of comparing results of each one and be able to reach some conclusions on what type of nudges and policies work best to improve eating habits and make suggestions on how we should move forward on this topic based on the results obtained. The case studies were found by researching by "Weight loss nudges", or "improving eating habits nudges" or variation of these two using research tools such has google, google scholar, pub med, EBSCO and b-on.

Chapter 4

How behavioral economics can improve eating habits and aid weight loss

Now that we have a better understanding of what is behavioral economics and what causes people to be overweight we can move on to discuss how we can use this knowledge about people´s heuristics and biases in their decision making to stimulate better choices and improve general well-being of the population.

In the Book Nudge (2008) Richard Thaler and Cass Sunstein dedicate a chapter discussing resisting to temptation which starts with an example how at a dinner where the guests were presented with a bowl of cashews before the meal would eat all of them if they stayed on the table but thanked Thaler when he took it from the table. To explain why this happens the concepts of temptation and recklessness are introduced. Temptation is hard to define even though we can all understand what it is, to simplify Thaler and Sunstein talk about how when a person is cool will consume less of something tempting than when that same person is excited. The loss of self-control happens when people underestimate the effects that being excited has on us. The behavioral economist George Lowenstein called this "hot-cold empathy". When we are relaxed we don't have the notion or the understanding of how our behavior will be when in a state of excitement. This brings us back to the discussion of our two systems, the reflective system tries to promote our well-being but it has to deal with the feelings and temptations associated with our automatic system. Those two parts of how our brain works are in constant conflict and eventually one loses to the other.

Temptation is not the only reason we make some irrational choices. People have a natural tendency to enter an auto-pilot mode and not paying much

attention to what they are doing at a given time which makes it very easy for our automatic system to prevail in our decision making. Eating is one of the most unreflective things we do in our every-day life's, which is why people emptied the bowl of cashews when it was on the table even though they knew it wasn't the most rational thing to do.

4.1 Self-control strategies

Richard Thaler ans Cass sunstein discuss in their book Nudge (2008) some strategies with examples of strategies to help people with self-control. The reflective system has notion of its weaknesses in some cases which is why people do lists to know what to buy in the grocery shop and ask friends to not let us eat desert. However, the automatic system is many times very hard to cool off and can easily put an end to the efforts made by the reflective system.

Two economists John Romalis and Dean Karlan made a deal to lose weight that involved losing 15 kilograms in 9 months and if one failed to do so he would have to pay 10000 dollars to the other. They both succeeded and to keep the weight of they agreed to pay the same amount if when asked the other to weigh in he was above a certain threshold. The agreement was a huge success, having this type of incentive really helped them to reach the goal according the Romalis and Karlan.

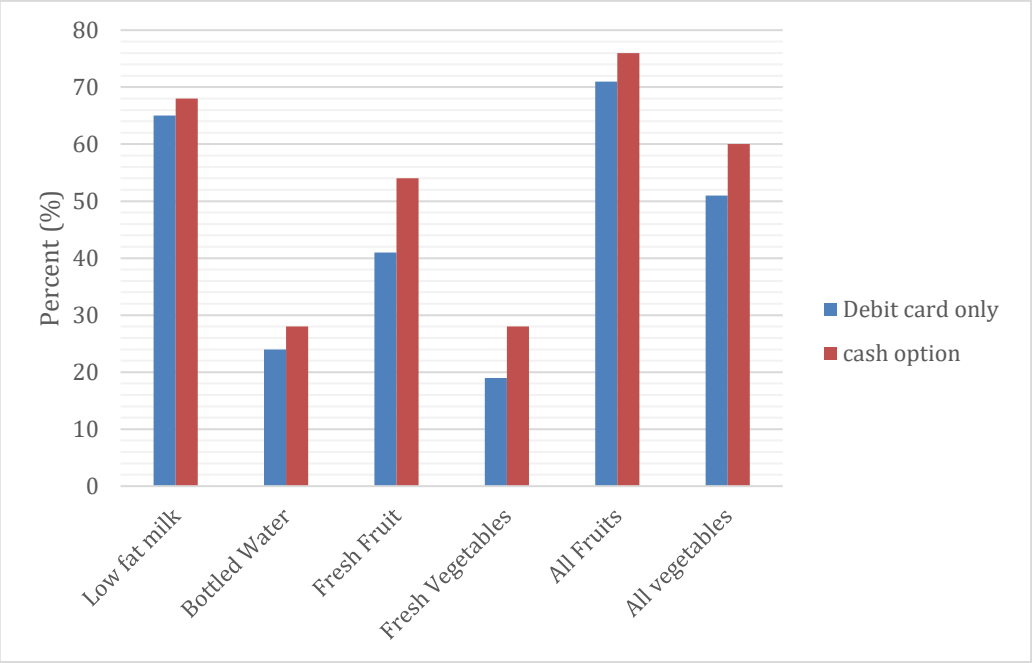
Another strategy has to do with the concept of mental accounting. This means putting labels on things like money or even food that are meant for specific situations, for example putting money on jars with "food" or "rent" on it to be used for specific situations can help not using that money for other things we don't need.

If the goal is to encourage saving it important to put the money on a mental account to help us deal with temptations.

4.1.1 Cash for Deserts

Requiring high school students to pay cash for desserts and soft drinks was an option analyzed by David Just and Brian Wansink (2009). Their desserts were not taken away, it was just told the students that "If you want that cookie bad enough, you can pay cash for it." They can't just "throw" their debit card to pay for junk food, they have to take out the dollar they might otherwise spend on something else and ask themselves how bad they want the cookie. It was found that the experiment did not make a negative difference in revenue and led to increased sales of more nutritious and less calorie dense items and a reduction of the sales of the less nutritious ones.

Figure 3-Cash for deserts



Source: Wansink, 2009

Classification: Boosting self-control, Mindful, externally imposed and discouraging.

Directly correlated to the mental calculus concept discussed above, this small adjustment to the payment method in the school's lunch system can have noteworthy influence on food choice. Over the years, this could significantly impact the weight and health of children. Restricting the use of prepaid debit cards to healthier foods allows parents to reclaim some control over their child's food choice set, without unfairly restricting them or without decreasing the revenue for school cafeterias.

4.2 Economic incentives and rewards

The friends experiment discussed in the book nudge mentioned before where they had cash prizes created to motivate weight loss is an interesting topic that may have some potential and be worth looking deeper into it.

Charness and Gneezy(2009) reported results from study on gym attendance. The study used college students divided into 3 groups were the first group was provided only information about the value of exercising. The second group was given the same info but given 25 dollars if they attended the gym in the following week. Finally, the third group was given the same as 1 and 2 but an additional 100 dollars if they attended the gym 8 times during the following 4 weeks. The results showed that students under the economic incentives were much more likely to go to the gym than students who only received the information which shows that economic incentives seem to be a good option to be introduced for weight loss.

One tool that can be used is the regret lottery which combines the individual's loss aversion with something called regret aversion which means as the name suggests that individuals do not like to feel regret. For example, in a regret lottery with the goal of motivating weight loss we can have a group of individuals that is given each a 1% chance of winning 100 dollars if their name is called by a random computer program provided they take a specific action (in this case, lose x amount of weight). Even if the 1% chance is not enough for motivation, knowing that they could have won it but didn't achieve the goal might make them do it to avoid the "loss" of those 100 dollars. "The regret lottery leverages overweighting of small probabilities through the lottery, loss aversion by framing the earnings as money that is lost, and regret aversion since it threatens individuals who fail to take the rewarded action with feelings of regret."

One of the problems associated with the usage of monetary incentives is that they may cause only short-term changes and benefits. It often happens that when monetary incentives are removed people usually go back to their unhealthy behaviors. In Volpp et al. (2008) it was noticed that after the effects of the regret lottery were removed the groups being studied both showed to regain a large amount of the weight they had lost during the initial part of the study were a contract to lose weight was involved. John et al. (2011) also did a similar study but with a longer-term analysis which had half of the individuals commit to a contract in order to lose weight for a period of 24 weeks and the other half without the contract. This study complements the first with individuals with the contract loosing significantly more weight but with both groups regaining the majority of their weight back after the contract expired.

This result indicates that while the usage of monetary incentives is a powerful tool it has a problem by not being able to provide lasting effect in the individual's behavioral changes. Since the health benefits of a healthy lifestyle are a long-term effect, maybe these incentives are not the best option to change behavior.

This is correlated with John Romalis and Dean Karlan experiment discussed in the beginning of this chapter. The only way they managed to maintain their weight loss was because they kept the money incentive to do so, otherwise the results would probably be different. Since giving money to people on the long term in order for them to keep a healthy weight then this form of tool is not really feasible on the long term also. This does not mean that it should be completely discarded, maybe there can be others ways to explore these economic incentives that aren't just giving people money prizes. For example, the case that opened up this discussion which was the "cash for deserts" case is an efficient tool that makes use of mental calculus to prevent people from buying unhealthy food. Also in cases where people are aware of their need to lose weight this kind of

money pacts with friends or regret lotteries can be a valid tool to be used for weight loss.

Chapter 5

Behavioral Interventions Cases

In this chapter as I explained in chapter 3 I will be presenting interventions on weight loss with nudges and grouping them by the type of policies implemented in order to be able to reach conclusions about the most effective ones.

5.1 Giving information

These are interventions that consist in providing consumers with the caloric and nutrient content in the foods they are consuming as well as daily or meal caloric recommendations.

5.1.1 Strategies for promoting healthier food choices. Calorie Posting in New York City: The Effect of Point of-Purchase Information on Food Choice.

Authors: Julie S. Downs, George Lowenstein, Jessica Wisdom, and Brian Wansink

Year: 2009

Goal: exploring ways to encourage shoppers to use more of their food budgets for fresh fruits and vegetables.

Solution: Post calorie information on their menu boards. Collected data at three locations (a coffee shop in Manhattan and two hamburger restaurant outlets of the same chain, one in Manhattan and the other in Brooklyn), both before and after implementation of the legislation.

Results: At the coffee shop and the Manhattan restaurant, "there was no impact of the legislation or of either calorie recommendation". At the hamburger restaurant in Brooklyn fewer calories were consumed after the legislation went into effect (-76.61). At the Brooklyn location, there was an interaction between dieting status and legislation such that dieters tended to be helped more than non-dieters by the information (-156.23 calories consumed by dieters). As for calories per meal recommendation it had a negative impact in both Brooklyn (+210.13 calories consumed) and Manhattan (+ 196.63 calories consumed) particularly harming dieters compared to non-dieters.

Classification: Information, Education and persuasion

5.1.2 Strategies for promoting healthier food choices. Promoting Healthy Choices: Information vs. Convenience.

Authors: Julie S. Downs, George Lowenstein, and Jessica Wisdom

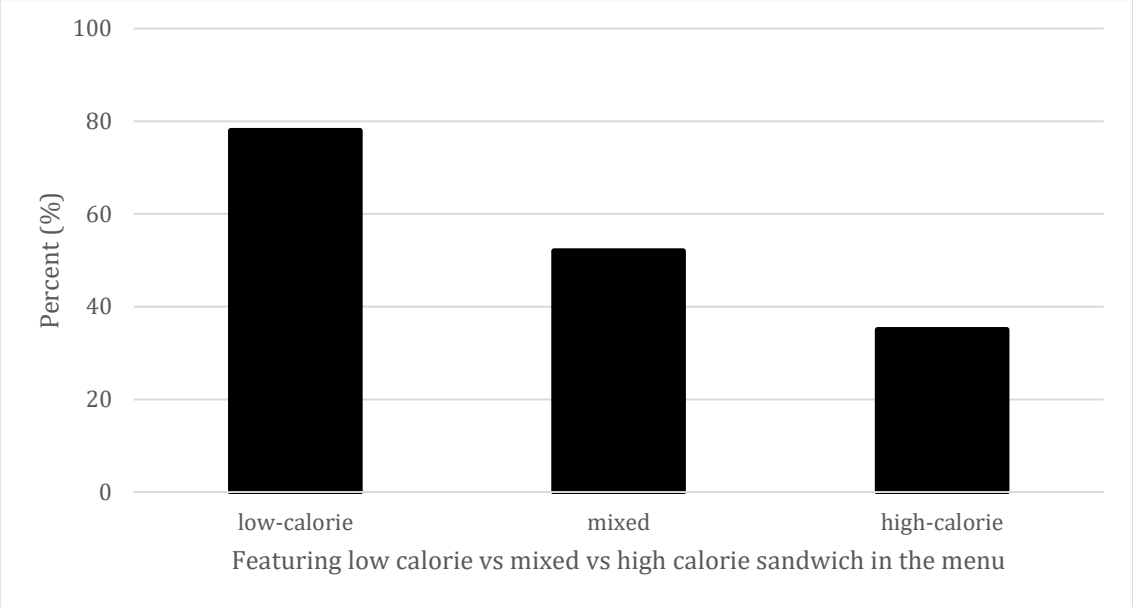
Year: 2009

Problem/Goal: Assess the effects of information versus an asymmetrically paternalistic intervention.

Method/solution: Provision of calories recommendation and calories of each item vs making more healthful sandwiches slightly more convenient to order. The experiment varied: (1) the provision (or not) of a calorie recommendation, which was presented in terms of daily targets for men and women with sedentary versus active lifestyles; (2) the provision (or not) of specific calorie information for all menu items; and (3) the relative convenience of healthful sandwich options.

Results: Presenting calorie information made had a result of less 48.05 calories consumed. Getting the healthful menu compared to the control menu made a big difference in calories consumed (-76.65 calories), but comparing the healthful one vs the mixed one made no differences indicating that people compensated the less calories in the sandwich with drinks or others snack. Information about caloric recommendation made close to no difference in the food choices and even showed a slight increase in calories consumed by dieters.

Figure 4-Sandwich experiment



Source: Lowenstein, 2009

Classification: Information, education and persuasion

Boosting self-control, externally imposed, mindless, encouraging (for the convenience increase test)

These first two studies imply that the provision of the caloric content in the food items results in little but noticeable impact on total amount of calories consumed in some occasions and no results in others, but may have a negative effect to the desired one among dieters when given the calories per meal or calories per day recommendation. On the other hand, increasing healthy food items convenience seemed to produce significant positive results in some situations but negligible results in others with people compensating the calories saved in the sandwich with other foods or drinks.

5.1.3 Nudge in a healthy direction. The effect of nutrition labels on food purchasing behaviors in university dining facilities.

Authors: Cioffi CE, Levitsky DA, Pakanowski CR, and Bertz F

Year: 2015

Problem: "scientific literature provides inconsistent support for the idea that adding labels to foods will change buying patterns."

Solution: Introduction of labels with caloric content and nutritional composition of foods at Cornell University in NY

Results: introduction of food labels resulted in a 7% reduction of the mean total kcals purchased per week.

Classification: Information, education and persuasion

In this study, the results of providing caloric information were positive by a small but significant amount. So far, the indications are that providing calorie information provides either positive changes in caloric intake (less calories consumed) or no changes. On the other hand, providing calorie recommendations for the meals showed very poor results with big increases in calorie consumption.

Now I will take a look to the concept of providing calorie content and nutrient composition information done in a more colorful or appealing way rather than just providing numbers.

5.1.4 A 2-Phase Labeling and Choice Architecture Intervention to Improve Healthy Food and Beverage Choices

Authors: Anne N. Thorndike, Lillian Sonnenberg, Jason Riis, Susan Barraclough, and Douglas E. Levy

Year: 2012

Problem: "New public health strategies are needed to combat the rising prevalence of obesity. A major contributor to obesity is the consumption of energy-dense food purchased outside the home."

Solution/Method: labeling foods with colors (red = unhealthy, yellow = less healthy, green = healthy) in the first phase and increase the visibility and convenience of healthier items on the second phase.

Results. "At baseline, 24.9% of sales were red and 42.2% were green. Sales of red items decreased in both phases, and green items increased in phase 1. The largest changes occurred among beverages. Red beverages decreased 16.5% during phase 1 and further decreased 11.4% in phase 2. Green beverages increased 9.6% in phase 1 and further increased 4.0% in phase 2. Bottled water increased 25.8% during phase 2 but did not increase at 2 on-site comparison cafeterias."

Table 2-Food and beverage choices

Sale item	**Baseline (%)**	**Phase 1: Relative % change**	**Phase 2: Relative % change from phase 1**
All red items	24.9	-9.2	-4.9
All yellow items	32.9	1.2	3.9
All green items	42.2	4.5	-0.5
All red beverages	26.1	-16.5	-11.4
All yellow beverages	21.6	-0.2	1.1
All green beverages	51.7	9.6	4.0
Diet Soda	19.6	9.2	-0.8
Regular	19.5	-23.1	-5.9
Bottled water	13.6	-2.4	25.8

Source: Thorndike, 2011

Classification: Information, education and persuasion

Classification: Externally imposed, mindless, activating a desired behavior, encouraging. (for the increased visibility)

Indicating the quality of an item choice with colorful labels appears to provide better results than simply indicating nutritional values like in studies 1,2 and 3. But increasing convenience combined with it provides an even greater increase in healthy choices and decrease in unhealthy ones.

5.1.5 Guiding Stars: The Effect of a Nutrition Navigation Program on Consumer Purchases at the Supermarket.

Authors: Lisa Sutherland, Lori Keley, and Lesley Fischer

Year: 2010

Problem: "To improve diet quality and overall population health, the need to develop nutritional rating systems that are comprehensive in scope and easy for the consumer to understand and use at the point-of-purchase has emerged."

Solution/Method: A program that classifies food items as 0,1,2 or 3-star items based on a score that takes into account measures like sodium, trans fat, sugars, vitamins and minerals, calories, etc.

Results: Products with starts purchases have increased over the two years being examined from 24.50% in 2006, to 24.98% in 2007 and 25.89% in 2008 which equates to a 2.9 million increase in number of items with stars being purchased.

Classification: Information, education and persuasion

5.1.6 Traffic light system

Authors: World Cancer Research fund

Year: 2011

Problem: "Health Survey for England data from 2010 show that in England almost three quarters of adults and a third of children were overweight or obese."

Solution: Traffic light labels use green, amber and red signals to show consumers whether a product is high, medium or low in fat, saturated fat, salt, sugar and, ideally, energy (in calories).

Results: Surveys that aimed to investigate consumer behavior when purchasing showed that the traffic light system does encourage for shifts towards healthier food items while not lowering the sales of the shops due to a shift in the type of products bought rather than ceasing to buy products

Classification: Information, Education and persuasion

5.1.7 This way to better health

Authors: Collin Payne, and Mihai Niculescu

Year: 2014

Problem/Goal: exploring ways to encourage shoppers to use more of their food budgets for fresh fruits and vegetables

Solution: design 6-foot-by-3-foot green arrow floor stickers to point shoppers toward the produce aisle, with messages like “Follow the green arrow for your health.”

Results: 10 percent jump in produce purchases without actually increasing consumer budgets

Classification: Externally imposed, Mindless, Encouraging, Activating a desired behavior

Studies 5 and 6 seem to confirm what had already been shown in study 4, that is, giving people information about the nutritional quality of the food in an appealing manner positively changes eating habits, leading people to change their food choices towards healthier food items without increasing the total amount spent in food which equates to a smaller total amount of calories consumed. In study 7 the provision of information was made in a different manner. The consumers were lead to healthy products by green arrows on the floor rather than just being presented calorie and nutrient information and this approach also led to positive changes in the type of items purchased.

5.1.8 Lack of efficacy of a salience nudge for substituting selection of lower-calorie for higher-calorie milk in the work place.

Authors: Wilson Al, Bogomolova S, and Buckley JD

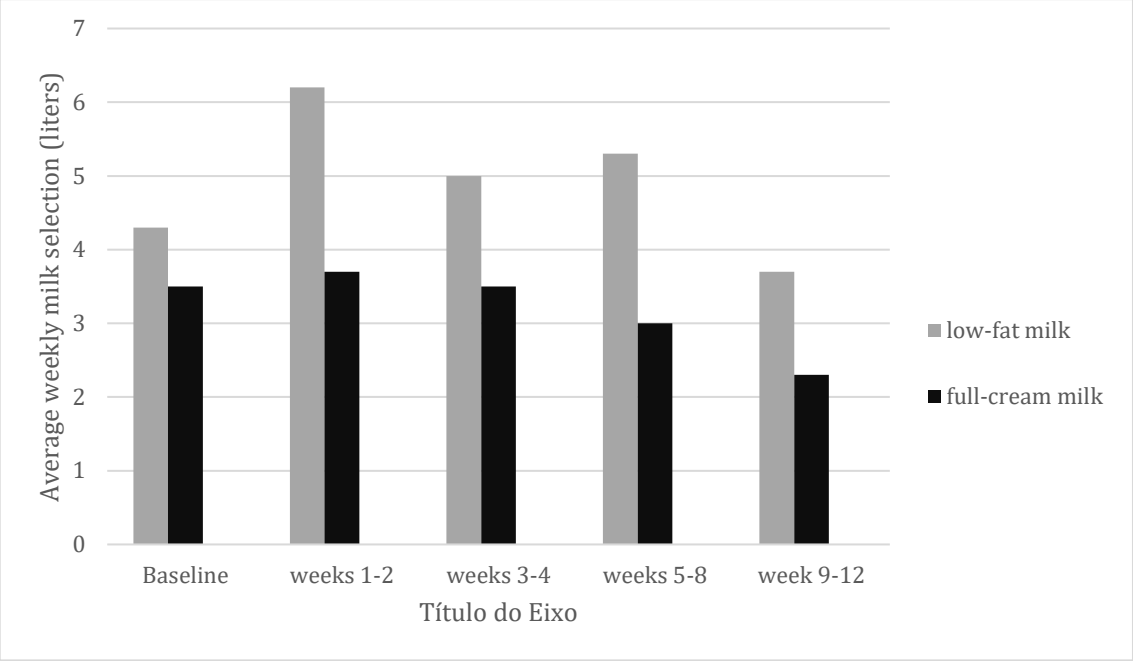
Year:2015

Problem: Levels of obesity are a major burden on healthcare system, requiring cost effective interventions to improve eating behavior.

Solution: Increasing salience of healthy items by placing a sign saying "Pick me! I am low calorie!" on a low-fat milk and compare its consumption with the full-cream milk.

Results: the two types of milk have an increase in consumption. Higher low-fat milk and lower full-cream milk consumption from week 5 and onwards.

Figure 5-low-fat vs full cream milk



Source: Wilson, 2015

Classification: Information, Education and persuasion.

After the intervention, the results were negative which makes it seem that the nudge was not effective however on a longer period (weeks5-12) results turned positive. Difficult to say how effective the intervention was with the results presented. Overall, providing information about calorie content showed positive results with the best results being obtained when coupling this principle together with increased visibility of healthy food items as well as presenting the information in a more engaging way.

5.2 Improved convenience or accessibility

These interventions consist mostly in placing healthier foods in easier to reach and more convenient places compared to unhealthy ones.

5.2.1 New Neighborhood Grocery Store Increased Awareness of Food Access but Did Not Alter Dietary Habits or Obesity

Authors: Steven Cummins, Ellen Flint, and Stephen A. Mathews

Year: 2014

Problem: "Residents of African American and low-income neighborhoods have poor access to healthy food, and that residing in these neighborhoods is an important risk factor for an unhealthy diet in the United States."

Solution: Increasing physical access to grocery stores and supermarkets in underserved neighborhoods.

Results: the intervention moderately improved residents' perceptions of food accessibility. However, it did not lead to changes in reported fruit and vegetable intake or body mass index

Classification: Activating a Desired Behavior, externally imposed, Mindful, Encouraging

5.2.2 Tittle: Increasing fruit and vegetable intake among male university students in an ad libitum buffet setting: A choice architectural nudge intervention

Authors: Ida Kongsbak, Laurits RohdenSkov, Brit KøpkeNielsen, Fie KathrineAhlmann, HannaSchaldemose, LouiseAtkinson, MariaWichmann, Federico J.A.Pérez-Cueto.

Year:2016

Problem/goal: "Insufficient consumption of fruit and vegetables (F&V) is associated with an increased risk of non-communicable diseases in the population"

Solution: Serving fruits and vegetables first in a Foodscape Laboratory for a single meal.

Results: "The quantity (g) of self-served fruits and vegetables was significantly higher in the intervention group. The total energy (kJ) was significantly lower in the intervention group (-316 calories) while there was no significant difference in the total amount (g) of self-served food between the two groups."

Classification: Activating a Desired Behavior, externally imposed, Mindless, Encouraging.

5.2.3 Move The fruit

Authors: Brian Wansink, David Just, and Laura Smith

Year: 2011

Problem/Goal: How can school lunchrooms increase fruit sales for less than $50?

Method: 560 students were put under an intervention that consisted in placing the fruit in a colorful bowl as well as in a convenient and well-lit part of the line. It was done with middle and high schools students for a semester.

Results: The Cornell researchers found that even three months after the intervention, fruit selection was found to be 105% higher than what it had been before the modifications were made.

Classification: Activating a desired behavior, externally imposed, mindless, encouraging.

5.2.4 Slim by Design: Serving Healthy Foods First in Buffet Lines Improves Overall Meal Selection

Authors: Brian Wansink, and Andrew S. Hanks

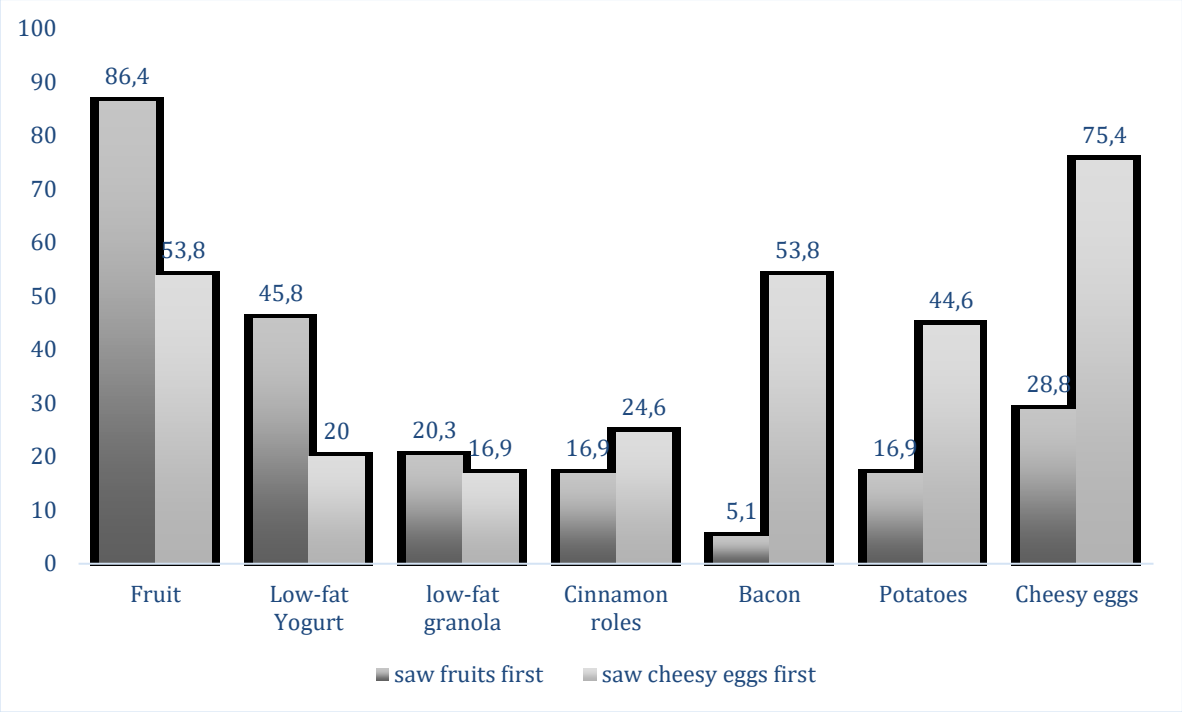
Year: 2013

Problem/Goal: Testing if the food order at a buffet triggers what a person selects which could be useful in guiding diners to make healthier selections.

Solution/Method: The breakfast food selections of 124 health conference attendees were tallied at two separate seven-item buffet lines that had the food order reversed (least healthy to most healthy, and vise-versa).

Results: "Over 75% of diners selected the first food they saw, and the first three foods a person encountered in the buffet comprised 66% of all the foods they took. Serving the less healthy foods first led diners to take 31% more total food items. "

Figure 6-Order of serving(%)



Source: Wansink, 2013

Classification: Activating a desired behavior, Externally, Mindless, Encouraging

5.2.5 Smarter lunchrooms: Using behavioral economics to improve meal selection. Surprising Salad Sales

Authors: Brian Wansink, David Just

Year: 2009

Problem/Goal: "Rising obesity rates among children have led many to lay the blame for this situation at the feet of the school lunch program."

Solution/Method: rotating the salad bar 90 degrees and moving it to the middle of the lunch room, it became something students had to walk around, not something they could mindlessly walk by.

Results: Sales increased right after the implementation of the new salad bar location and continued to increase after with a 21% increase from one year to the next.

Classification: Activating a desired behavior, Externally, Encouraging, Mindful

All these studies indicate that serving healthier food first or making them more convenient to reach/more accessible significantly changes the amount consumed of these items in a positive way in some cases substantially more than the previous concept of provision of information did.

5.3 Assortment size and structure manipulation

In this subchapter are analyzed interventions that manipulate variety and structure of the food items to see how it affects consumption.

5.3.1 and 2 Variety, Vice, and Virtue: How Assortment Size Influences Option Choice. Ice-cream. Fruits or cookies?

Authors: Aner Sela, Jonah Berger, and Wendy Liu

Year: 2009

Problem/Goal: Whether assortment size influences the type of options consumers select

Method: Changing the number of options of ice-cream. In the low-variety condition there were two options available, one regular and one reduced fat. In the high-variety condition there were 10 options available, five in each category.

Results: "Assortment size influenced the type of option people chose. Participants who chose from a larger assortment were more likely to select a reduced fat flavor. While only 20% of participants who chose from the smaller assortment selected reduced fat ice cream, 37% who chose from the larger assortment selected reduced fat."

Classification: Boosting Self-control, Externally, Mindful, Discouraging

Study 2

Method: Manipulate the number of options of a tray containing fruits and cookies placed at two building entrances.

Results: “Participants were more likely to select healthy fruit over tempting cookies when choosing from a larger assortment. While 55% participants chose fruit over cookies from the smaller assortment, 76% of participants who chose from a larger assortment selected fruit.”

Classification: Boosting Self-control, Externally, Mindful, Discouraging

These studies seem to indicate that people tend to make healthier food choices when choosing from a wider variety of options.

5.3.3 The influence of assortment structure on perceived variety and consumption quantities. Assortment structure influences children consumption

Authors: Brian Wansink, and Barbara E. Khan

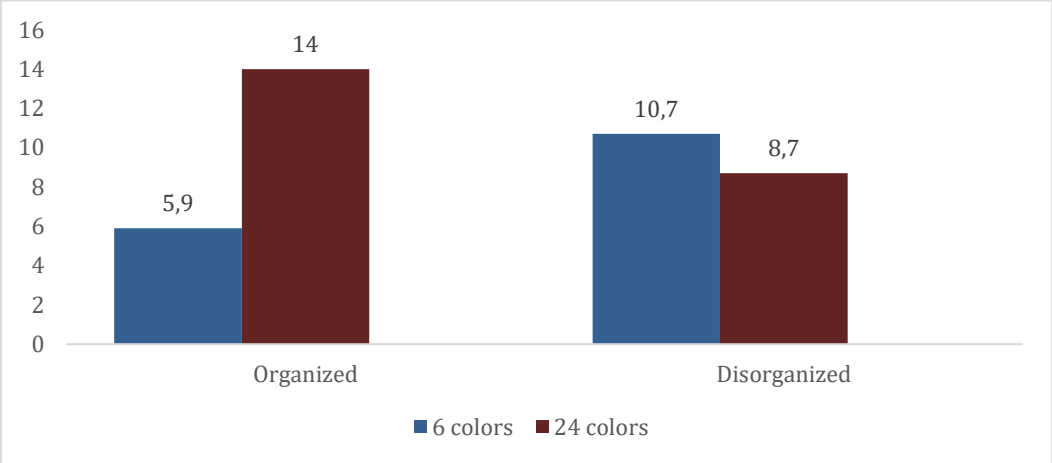
Year: 2004

Abstract: A total of six lab and field studies were conducted to show that the structure of an assortment regulates a consumer's perception of actual variety and impacts consumption.

Results: The structure of the assortment appeared to influence consumption with people eating more from organized assortments when facing a large number of choices, whereas if the assortment was disorganized, neither size nor number of options available influenced the quantities consumed.

Number of jelly beans chosen by children when manipulating assortment variety and structure:

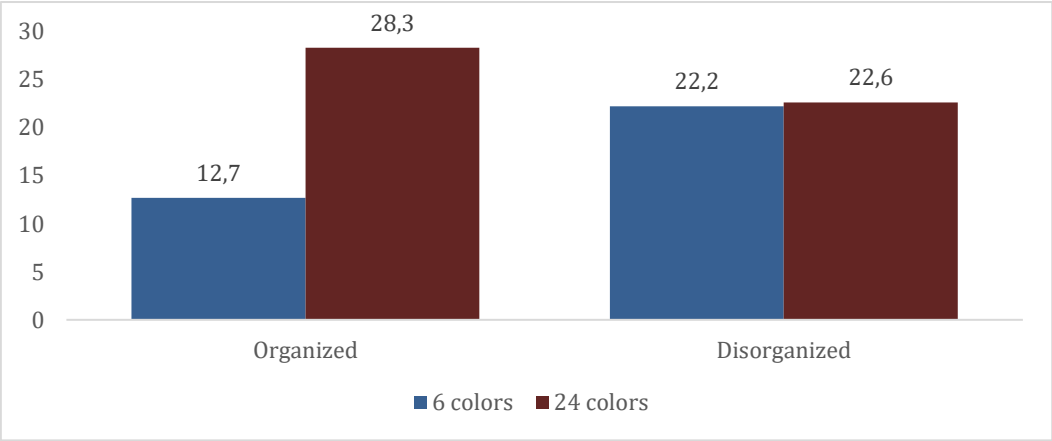
Figure 7-Jelly beans children experiment



Source: Wansink, 2004

Results on adults:

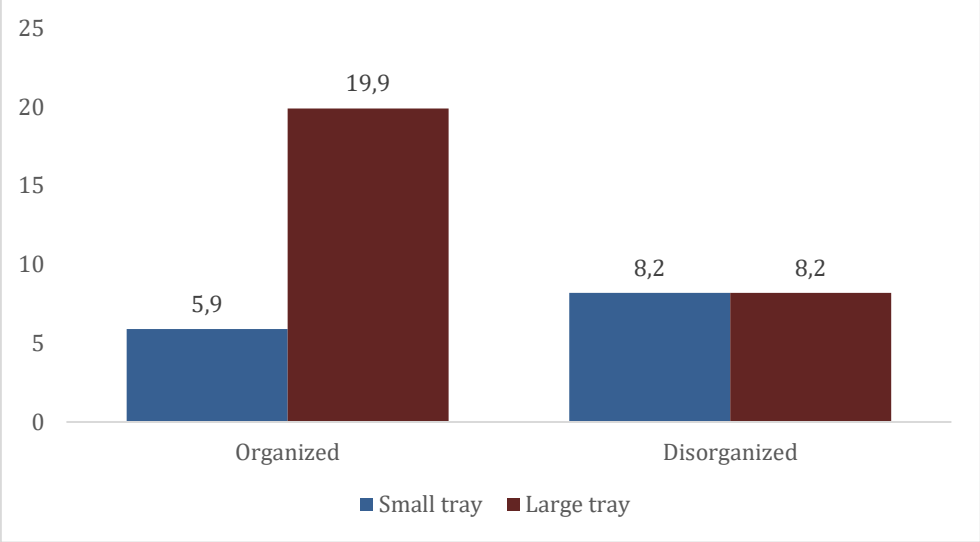
Figure 8-Jelly beans(adults)



Source: Wansink, 2004

M&M candies eaten with structure and tray size manipulation:

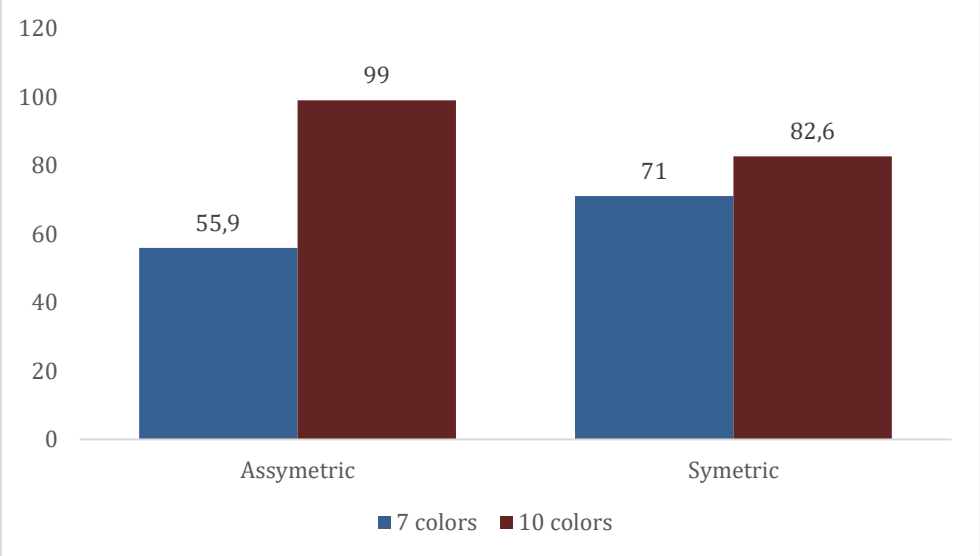
Figure 9 M&M candies



Source: Wansink, 2004

With symmetry and variety manipulation:

Figure 10 M&M candies 2



Source: Wansink, 2004

Classification: externally imposed, boosting self-control, mindful, discouraging

5.3.4 Apples vs. Brownies: A Field Experiment in Rearranging Conference Snacking Buffets to Reduce Short-Term Energy

Author: Pelle Guldborg Hansen

Year: 2016

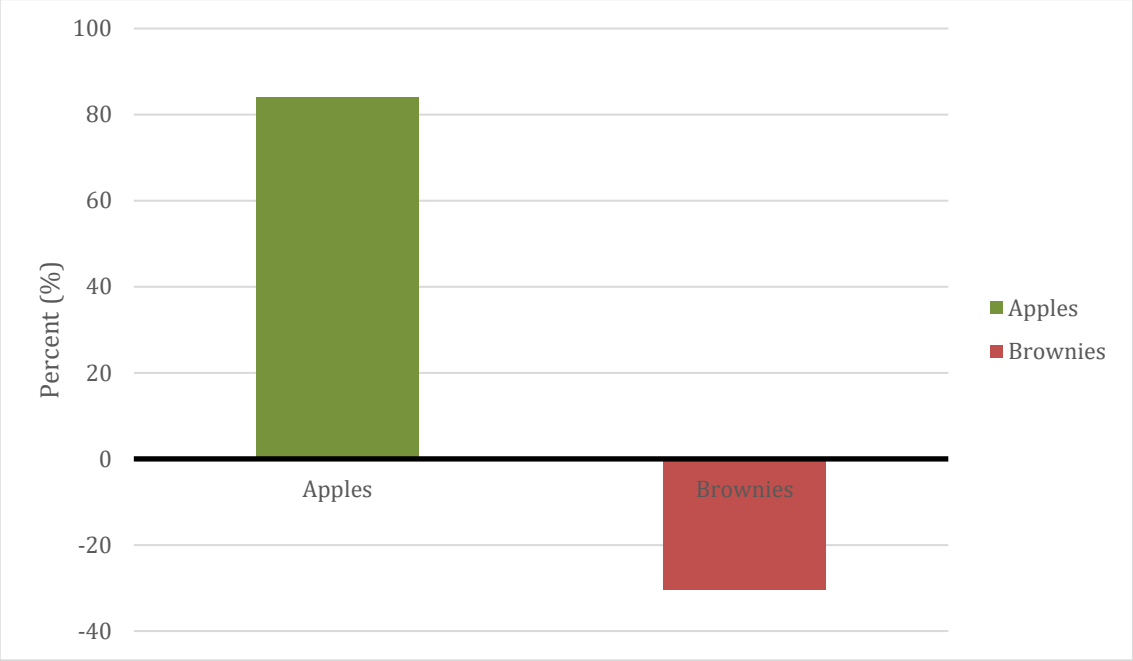
Method: arrangements were made so that the coffee break had two identically sized buffet tables. One featured a multilayered intervention buffet aimed at promoting healthy behavior while the other acted as a control table with reverse settings of the hypotheses underlying the experiment.

The nudges used to increase the intake of apples and decrease of brownies were (1) "Featuring apples at the front of the buffet and brownies at the back", (2) "slicing both apples (in pieces of 4) and brownies in half" and (3) "featuring more apples on the buffet relative to brownies".

Note: Featuring apples in the front is classified as increases convenience and the slicing in pieces and featuring more apples is classified as assortment size and structure.

Results: "Total consumption of brownies was lowered by 30,2% per person while apple consumption was increased by 83,9% per person at the intervention buffet compared to the control."

Figure 11-Apples and brownies



Source: Hansen, 2013

Classification: Externally imposed, activating a desired behavior, Mindless, encouraging

5.3.5 Slice that fruit!

Authors: Brian Wansink, David Just, Laura Smith, and Andrew Hanks

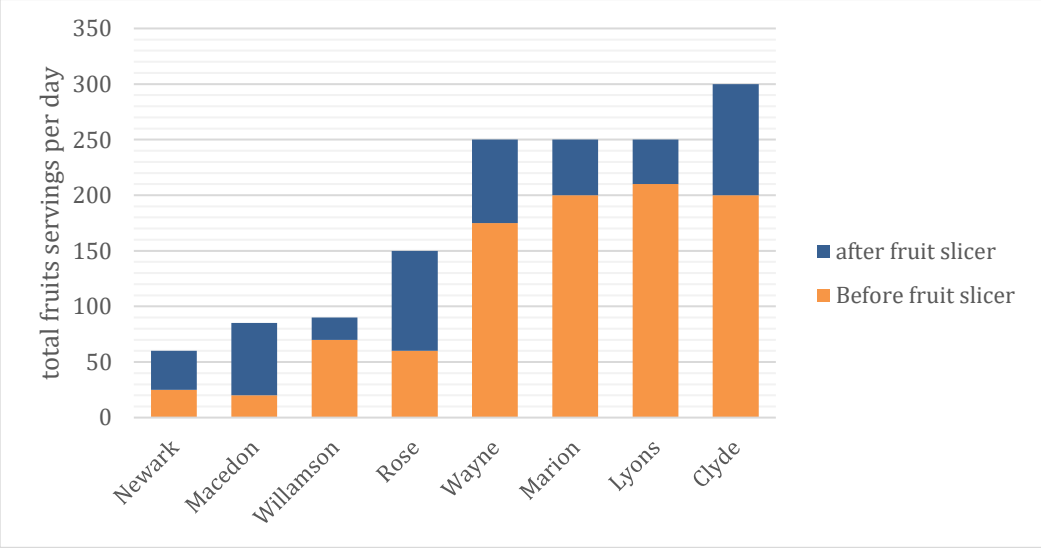
Year: 2013

Problem: Schools serve fruits whole which make them unattractive or even hard to eat, this study accesses how offering pre-sliced fruit can affect the sales of these items.

Solution/Method: Eight elementary schools in the same district were given a commercial fruit slicer and given instructions to use it to cut apples requested by the students.

Results: The first results of the experiment were positive and very significant with an 61% increase of fruit sales when sliced.

Figure 12-Fruit slicer



Source: Wansink, 2013

Another study was conducted to confirm the results previously obtained with six schools middle schools being given fruit slicers.

Apple sales in schools with fruit slicers increased by 71% compared to control schools. It was also found that the percentage of students who ate more than half of their apple increased by 73%, an effect that lasted long after the study was over. There was also a 48% decrease in those who wasted half or more.

Classification: Activating a desired behavior, externally imposed, Mindful, Encouraging

These studies reveal that people are influenced by the way options are presented to them. The amount of choice given changes the consumer behavior with a wider variety of choices leading to healthier ones when it comes to choosing one item. However, when the variety was increased in the jelly beans and M&Ms with freedom to pick and consume any amount they want freely it led to an increase in consumption. Organized assortments appear to provide cues to consume more contrary to disorganized assortments. Also, the presentation of the food being more appealing might have an impact, with the studies 4 and 5 increasing amount of fruit consumption by slicing it, although this also increases convenience and more testing would be necessary to access the importance of presentation.

5.4 Recipient Size and shape Manipulation

The next set of interventions are based on changing size and shape of the recipient's people eat from and its implications in quantities consumed.

5.4.1 Ice cream illusions bowls, spoons, and self-served portion sizes.

Authors: Brian Wansink, Van Ittersum K, and Painter JE

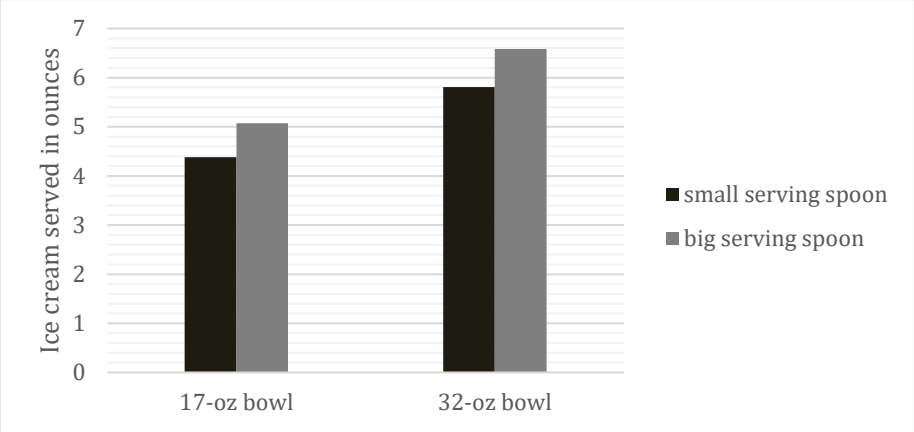
Year: 2006

Problem: "Because people eat most of what they serve themselves, any contextual cues that lead them to over-serve should lead them to over-eat."

Method/solution: 85 Nutrition experts were attending a social event and were given randomly given a bigger or smaller spoon and a bigger or larger bowl to eat ice-cream with.

Results: When given a larger bowl, people served themselves 31.0% more without being aware of it. Their servings increased by 14.5% when they were given a larger serving spoon.

Figure 13-Ice-cream bowl and spoon



Source: Wansink, 2006

Classification: Boosting Self Control, externally imposed, Mindless, Discouraging

This indicates that people seem to see the smaller bowls and serving spoons as a cue to consume less quantity.

5.4.2 and 3 Bottoms up! The influence of Elongation & pouring on consumption volume. How elongation influences the perceived and actual volume of juice poured by children.

Authors: Brian Wansink, and Koert Van Ittersum

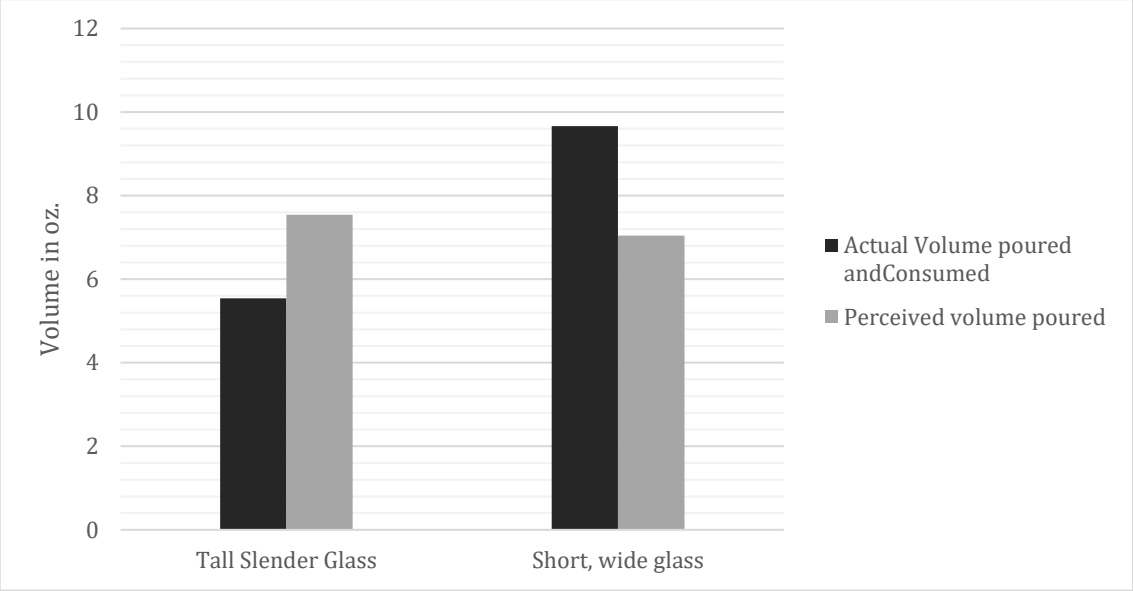
Year:2003

Problem/goal: Evaluate how the size and shape of the glasses affects the amount people pour in the glass and drink from it as well as access the awareness of how much they poured.

Method Solution: 44 males and 53 female (children) participants who were involved in a six-week health and fitness camp in northern New Hampshire were the subjects of the study. "Upon entering the cafeteria line for breakfast on the ninth day of the camp, the children were randomly given a 22.3- oz juice glass that was either relatively short or relatively tall. The height of the former was 10.6 cm, the latter 18.9 cm."

Results: "Campers who had been given short, wide glasses poured and consumed 74.37% more juice than those given tall, slender glasses but they perceived themselves as having poured less."

Figure 14-Glass elongation children



Source: Wansink, 2003

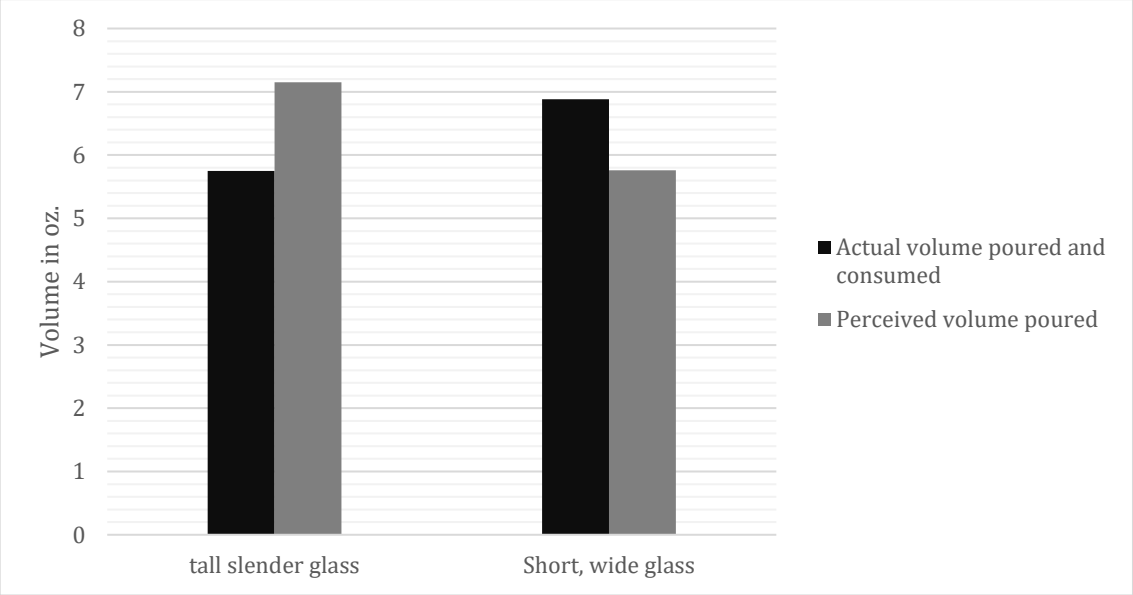
Classification: Boosting self-control, externally imposed, mindless, discouraging.

Study2

Method/solution: The study consisted in 69 males and 20 female participants eating breakfast in a cafeteria in western Massachusetts that were attending a weekend camp with ages ranging from 16 to 82(37.2 average). The procedure was similar to the previous study.

Results: Adults who were given short, wide juice glasses poured and consumed 19.44% more juice than those given tall, slender glasses. Both showed that both children and adults pour and consume more juice when given a short, wide glass compared to those given a tall, narrow glass, but they perceive the opposite to be true.

Figure 15-Glass elongation adults



Source: Wansink, 2003

Classification: boosting self-control, externally imposed, discourage, Mindless

These studies show that the shape of the glass can greatly influence consumption with shorter and wider glasses leading to an increase in consumption as opposed to taller and more narrow ones.

These two studies also reveal the difference between children and adults, with children being more susceptible and more influenced by these external changes.

5.4.4 Bad Popcorn in Big Buckets: Portion Size Can Influence Intake as Much as Taste

Authors: Brian wansink and Junyong Kim

Year: 2005

Problem: How packaging and container size can increase our intake of foods that are less palatable.

Solution/Method: "158 moviegoers in Philadelphia (57.6% male; 28.7 years) were randomly given a medium (120 g) or a large (240 g) container of free popcorn that was either fresh or stale (14 days old). Following the movie, consumption measures were taken, along with measures of perceived taste."

Results: "Moviegoers who were given fresh popcorn ate 45.3% more popcorn when it was given to them in large containers. Even when the popcorn was disliked, people still ate 33.6% more popcorn when eating from a large container than from a medium-size container."

Classification: Externally imposed, Mindless, boosting self-control, discouraging

Once again people tend to consume more when given bigger recipients even when given bad quality popcorn people still ate more of it than good quality popcorn in a smaller recipient.

All these studies indicate that changing the recipient size influences consumption, with studies 2 and 3 showing that the shape of the glasses

influences the amount they drink and also that children are more easily influenced by this type of tool than adults.

5.4.5 The influence of plate size on meal composition

Authors: Libotte E, Siegrist M, and Butcher T

Year: 2014

Problem: Access the effectiveness of different sized food containers to control portions size.

Solution: "Eighty-three participants were individually invited to serve themselves a lunch from a buffet containing 55 replica food items. Either a standard size plate (27 cm) or a large plate (32 cm) was provided to the participants."

Results: The size of the place didn't make any difference in the total amount of energy (calories) consumed.

Classification: Externally imposed, Mindless, boosting self-control, discouraging

5.4.6 Effect of plate size on meal energy intake in normal weight women

Authors: Ayaz A, Akyol A, Cetin C, and Beshler HT

Year: 2016

Problem: Examine it the size of the plate influences energy intake among normal weight women in a multi-itemed buffet.

Solution: Participants were normal BMI women with ages ranging between 19 and 25 years old that attended Hacettepe University. During breakfast, each one was randomly assigned to eat from either a small, medium or large plate.

Results: Plate size did not affect energy intake.

Classification: Externally imposed, Mindless, boosting self-control, discouraging

These last two studies contradict the previous ones, giving some evidence that manipulating food recipient sizes may not be an effective tool to reduce caloric intake. Both these studies were made with the size of a plate being manipulated so maybe that's the difference and the reason why it didn't work now but worked with the popcorn and the ice-cream.

5.4.7 This way to better health

Authors: Collin Payne, and Mihai Niculescu

Year:2014

Problem/Goal: "Exploring ways to encourage shoppers to use more of their food budgets for fresh fruits and vegetables."

Solution: grocery carts were marked off half the cart and place a placard telling them to fill the one half of the cart with fruits and vegetables and the other half with any other items.

Results: Consumers more than doubles their purchases of produce items without affecting supermarkets profit.

Classification: Boosting Self-control, externally imposed, Mindful, Encouraging

Mixed evidences in this chapter with some studies supporting the effectiveness of recipient size manipulation and others not. The context, type or recipient and the type of foods in which it is used can be a factor to the reason for dispersed results and more testing would be necessary to analyze that possibility to a full extent.

5.5 Persuasion by associations and priming

These interventions are based on the concept of the mental heuristic priming discussed in chapter one and has some comparison to how dieters and non-dieters react to the exposure of certain images and names.

5.5.1. The Impact of Product Name on Dieters' and Nondieters' Food Evaluations and Consumption

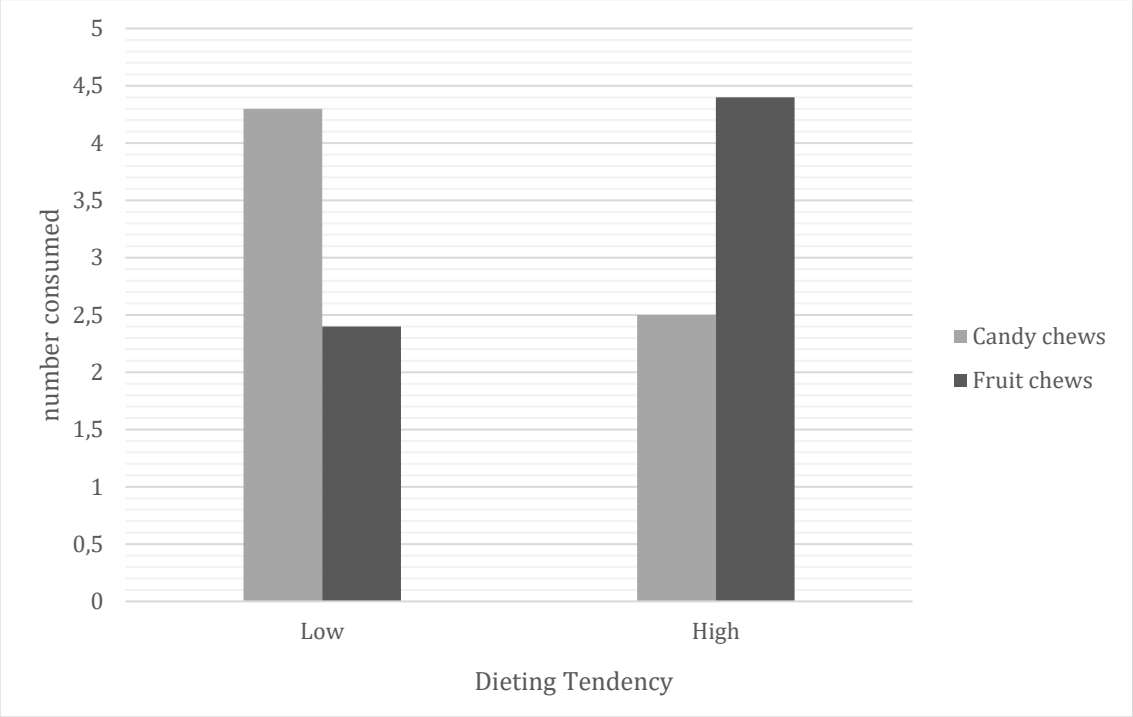
Authors: Caglar Irmak, Beth Vallen and Stefanie Rosen Robinson

Year: 2011

Goal: explore the impact of altering the name of a food on dieters and non-dieter's evaluations of the foods healthfulness, taste and consumption.

Results: The results show that when a certain food is called a relatively unhealthy name it alters the perception of dieters, considering it less healthy and less tasteful but not non-dieters. When the same food is given a healthy name dieters and non-dieters have similar evaluations. This results in differences in actual food consumption, revealing non-dieter's insensitivity to cues and dieter's reliance on them.

Figure 16-Candy vs fruit chews



Source: Irmak, 2011

Classification: Externally imposed, boosting self-control, mindful, encouraging

This indicates that people that are already on a diet are more sensitive to the perceived healthfulness of a certain food and will eat more of a food that they think it's healthy and less of a food they see as unhealthy.

5.5.2 Resistance reminders: Dieters reduce energy intake after exposure to diet-congruent food images compared to control non-food images.

Authors: Buckland NJ, Finlayson G, Edge R, and Hetherington MM

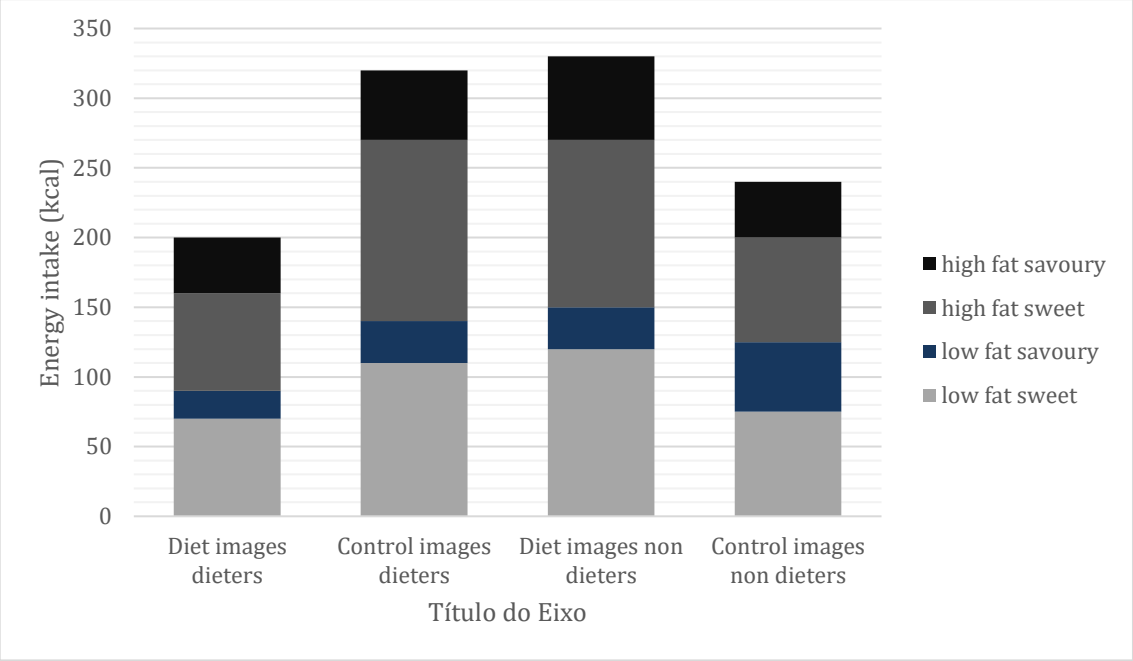
Year: 2014

Problem: "Dieters' long-term goals to lose weight often fail in the short-term due to hedonic temptations. Restrained eating coupled with disinhibition can lead to overconsumption when highly palatable foods are available."

Solution/method: Participants were exposed to diet-congruent foods or neutral non-foods images before being presented with a snack. The study involved 26 dieters and 41 non-dieters.

Results: When dieters were exposed to diet images they consumed less energy compared to the non-food images. Non-dieters however presented opposite behavior.

Figure 17-Exposure to images



Source: Buckland, 2014

Classification: boosting self-control, externally imposed, mindless discouraging

Once again dieters are much more sensitive than non-dieters, in this case being exposed to diet images before eating led to less consumption from dieters while non-dieters had an opposite response.

Putting these two studies together it seems that if people are conscious of the importance of improving their eating habits they are more sensitive to these types of policies that try to "remind" them of how important it is to eat healthier. So maybe a putting these types of policies coupled with providing people information about a healthy diet and the consequences of not doing so can achieve the best results.

5.5.3 Comparison of three nudge interventions (priming, default option, and perceived variety) to promote vegetable consumption in a self-service buffet setting.

Authors: Cioffi CE, Levitsky DA, Pakanowski CR, and Bertz F

Year: 2015

Problem/Goal: Test and compare three different types of nudges based on the the behavioral economics concepts of priming, default option and perceived variety.

Solution/Method: 88 participants were gathered from Denmark and randomly assigned to an experiment based on the three principles. The priming one was creating a leafy environment. The default option one was a salad pre-portioned into a bowl with vegetables and the perceived variety one was dividing a mixed salad into each of its components in order to increase visual variety.

Note: the priming situation is the one that fall under this chapter while the default option falls under improving accessibility and convenience category and the perceived variety one falls under the assortment size and structure category.

Results: "The default experiment successfully increased the energy intake from vegetables among the study participants (124 kcal vs. 90 kcal in control). Both the priming condition and perceived variety reduced the total energy intake among the study participants (169 kcal, and 124 kcal, respectively), mainly through a decrease in the meat-based meal component."

Classification: Boosting Self Control, externally imposed, Mindless, Encouraging

In this case being exposed to a leafy environment showed great results with a very significant calorie reduction for one single meal by increasing the consumption of vegetables.

5.5.4 What would batman eat?

Authors: Brian Wansink, Mitsuru Shizimu, and Guido Campes

Year: 2012

Problem: "Despite the fact that even fast food restaurants are offering more and more healthy choice options for kids, children just aren't asking for them when it comes time to order."

Solution: 22 children with ages ranging from 6 to 12 were shown before a meal 6 pictures of someone they admired and 6 pictures of people they didn't admire and were asked if that person would prefer apple fries or French fries if given the choice.

Results: Before the experiment was implemented, during the control period, only 9.1% of the children selected apple fries and after, during the experiment 45.5% of the children chose the apple fries. From the children who picked the French fries an average of about 227 calories was eaten compared to an average of 34 calories from those who picked the apple fries.

Classification: Externally imposed, activating a desired behavior, mindless, Encouraging

Although this was a small experiment with a small number of children tested, the results were extremely positive which indicates that this can be a powerful tool to influence children eating habits.

In general, this seems to be a useful instrument to use although in some situations it has an opposite effect to the desired one, under the right circumstances it provides very significant positive results. The main problem was when studies compared dieters to non-dieters showing that non-dieters had a negative response to this type of tool. Like discussed before, coupling together this with information about a healthy diet might be a good approach to it.

5.6 Giving people the option

This subchapter is based on interventions that allow people to decide themselves on what they want, rather than externally exposing them to stimulus.

5.6.1 Healthier by precommitment

Authors:Janet Schwartz, Daniel Mochon, Lauren Wyper, Josiase Maroba, Deepak Patel, Dan Ariely

Year: 2014

Goal/method: Households were offered to put their 25% discount of price in eligible groceries at risk by compromising to increase their healthy items purchases by 5% above their baseline for each month during 6 months. If they failed to do so, they would lose the discount. Otherwise the discount would work as normal.

Results: 36% of the households accepted the offer and the results were an average of 3.5% increase in healthy grocery items during the six-month period being examined. Other households didn't show an increase of amount purchase of these items.

Classification: Boosting self-control, mindful, Self-imposed, Encouraging

5.6.2 Preordering School Lunch Encourages Better Food Choices by Children

Authors: Andrew S. Hanks, David R. Just, and Brian Wansink

Year: 2013

Problem: "Nearly one-third of children between ages 6 and 19 years are considered obese and their choosing of less healthy foods in school lunchrooms may contribute."

Method: "In 2 elementary schools in upstate New York, students use an electronic system to preorder their lunch entrée. Over a 4-week period, 14 classrooms (grades 1-5) were randomly assigned to 1 of 3 conditions. In weeks 1 and 2, all classrooms preordered as usual. In week 3, 4 classrooms discontinued preordering but resumed preordering in week 4. In week 4, 5 classrooms discontinued preordering. Five classrooms never stopped preordering."

Results: "When students preordered their entrée, 29.4% selected the healthier entrée compared with 15.3% when preordering was not available. Conversely, the less healthy entrée was chosen 70.8% of the time by students who preordered, and students who ordered in the lunch line selected the less healthy entrée 85.7% of the time. When students did not order but instead selected their entrée as they entered the lunch line, it appears that hunger-based, spontaneous selection diminished healthy entrée selection by 48% and increased less healthy entrée selection by 21%."

Table 3-Preordering school lunch

	Preordered Entrée in the morning (%)	Purchased Entrée at lunchtime (%)	Change (%)
Selected a healthy entrée	29.4	15.3	-48.0
Selected a less healthy entrée	70.8	85.7	21.0

Source: Wansink, 2013

Classification: self-imposed, boosting self-control, Mindful, Encouraging and discouraging.

Making a decision on what people want to eat before lunchtime shows to produce significant results. When people order with time they are more capable of controlling their impulses of going for the less healthy entrée. Connected to the hot-n-cold empathy discussed in Nudge (2008) previously mentioned in this thesis when discussing behavioral economics and some of the heuristics we incur in a daily basis.

5.6.3 Inviting Consumers to Downsize Fast-Food Portions Significantly Reduces Calorie Consumption

Authors: Janet Schwartz, Jason Riis, Brian Elbel, and Dan Ariely

Year: 2012

Problem: "Obesity, which is primarily caused by overeating, has become a major public health issue. An intervention already in effect in some communities and to be required nationally in 2012 is mandatory calorie labeling on chain and fast-food restaurant menus. Such information-based interventions, however, often fall short of changing behavior."

Objective: Asking costumers at a Chinese fast food restaurant if they wanted to downsize their portions of three starchy side dishes.

Results: the study found that 14–33 percent of customers accepted the downsizing offer. The total number of calories consumed was reduced on average by more than 200 and there was no difference in amount of uneaten food by accepting the downsizing offer.

Classification: Boosting Self-control, Self-imposed, Mindful, Discouraging

All these studies lead to the conclusion that giving people the option to make their decisions before they are exposed to the food increases the amount of healthy food consumed and decreases the amount of unhealthy food consumed which equates to a decrease in total amount of calories consumed as well.

5.7 Restricting Choices

The next two interventions are based on restricting choices and how it affects what type of foods and the amount eaten.

5.7.1 Choose your own vegetable

Authors: Brian Wansink and David Just

Year: 2009

Problem: Schools require their students to take vegetables as part of their meal which results many times in waste with only about 35% of the students consuming their vegetables.

Solution: students were given the choice between carrots and celery instead of being forced to take the carrots as previously happened.

Results: From the students that kept being required to take the carrots, 69% (83 of 120) consumed it, while the students who were given a choice between carrots and celery, 103 of them chose the carrots and from those 103, 94 consumed them (91%). Such results suggest that requiring a vegetable, while offering an active choice between at least two options substantially reduces the waste from vegetables, and increases the nutritional content of the foods consumed.

Classification: Activating a desired Behavior, externally imposed, Mindful, Discouraging

The students on group one that were forced to take the carrots were under restrictions and regulations, they were being forced to take carrots, which seems to have a bad outcome when it comes to improving consumption quality and in reducing waste.

5.7.2 Keep Your Tray?

Authors: David R. Just and Brian Wansink

Year:2009

Problem: The type of tray used for carrying the food can also play heavily into the food decisions of the individual

Solution/method: In order to reduce waste, many colleges are phasing out the use of trays—especially in all-you-can-eat buffet-style cafeterias—forcing students to carry individual plates and glasses. This move was made in the hopes that they might reduce waste.

Results: By not having a tray to put several items, students simply reduced the side dishes of which fruits and vegetables made part of. The study of a 1200-person dining hall at Cornell revealed that when reducing those side dishes, the majority reduced was coming from salads (26% less) while unhealthy items like ice-cream only reduced about 8%. Without trays, students took larger portions of things they liked which also resulted in more waste. Overall taking away the trays showed negative results even if there was a reduction in the consumption of items like ice-cream.

Classification: Regulations and Restrictions

This indicates that restricting people´s behavior in this case by taking away trays and therefore limiting the variety of foods they can carry, has negative impacts on food choice and increases waste levels which confirms what happened in the previous study.

Conclusion

With the first chapter, it was possible to understand what does behavioral economics mean and studies as well as the most important concepts associated with it such as libertarian paternalism, system 1 and 2, heuristics and biases. When discussing nutrition, it became clear that weight loss comes down to the number of calories we consume versus the number of calories we burn a lot more than the type of foods we consume, however the consumption of fruits and vegetables is very important for weight loss as well since these foods are very satiating and voluptuous for the number of calories they contain. It is very hard for people do deal with temptation and make the best choices on a daily basis because as it was discussed in chapter one, our mind has two systems when we think and we have heuristics and biases associated with the way these systems work which leads to people not being able to always make the best decision. Because of this it becomes important to help people in this area. A lot of interventions have already been made with the goal of promoting healthier diets and in this thesis, I analyzed them and classified them according to the matrix discussed in chapter three with the goal of seeing if there are certain patterns when creating these interventions or not. They were also grouped by the type of intervention in order to analyze if there are some that work better than the others.

After analyzing all of these case studies it is possible to make some conclusions on what the practical history has shown so far.

Giving people information about nutritional value of food provides little or no results when it comes to reduce calorie intake (Wansink et al. 2009; Cioffi et al., 2015; Lowensteins et al., 2009), however when done in a more appealing way we can observe some positive changes (Sutherland et al., 2010; Thorndike et al. 2012; World cancer research fund UK, 2011) except for the milk experiment which was a very simple sentence of incentive. (Wilson et al. 2015)

Increasing convenience of healthy foods showed promising results with people trading higher calorie snacks by fruits and vegetables (Kongsbak et al., 2016; Wansink et al., 2011; Wansink & Hanks, 2013; Wansink & Just, 2009) except for increasing convenience of groceries shops (Cummins et al., 2014) but coupled together with the provision of information showed even better results (Thorndike et al., 2012). This is a tool that makes use of the Hassle factors heuristic and how people want to take the easier path to do things.

When it comes to assortment size and selection it seems that increasing variety tends to lead to people making healthier food choices (Sela et al., 2009) which seems to contradict the concept of choice overload discussed but in this case the reduction of options can be linked to just being restrictive which has shown above has negative results in improving eating habits.(Wansink & Just, 2009; Wansink & Just, 2009)Organizations also seems to affect how much people will eat with a tendency to consume more when eating from organized assortments (Wansink & Khan, 2004). On the other hand, slicing fruit showed extremely positive results in increasing its consumption (Wansink et al. 2013) especially when coupled together with increased visibility like in the apples and brownies experiment. (Hansen, 2016)

Recipient size manipulation showed mixed results with in some cases larger recipient leading to more consumption (Wansink et al., 2006; Wansink & Kim, 2005) and in other cases making no significant difference. (Libotte et al., 2014; Ayaz, 2016). Also, the shape of the recipient seems to affect consumption with tall and long glasses leading to less consumption than shorter wider ones. (Wansink & Ittersum, 2013)

Priming people to eat healthier showed promising results with a noticeable difference in response between dieters and non-dieters (Irmak et al., 2011; Buckland et al., 2014). Dieters being more aware of how important eating habits are become more susceptible to being “reminded” of it which can be related to

the hot-n-cold empathy. These reminders help them not falling into temptation while with non-dieters a possible explanation for divergent results is that it's not really a matter of falling into temptation but rather just consume what they prefer. They just don't have the notion of the importance of making healthier food choices. Which is why coupling this tool with provision of information about a healthy balanced diet might be a good combination. Eating in a leafy environment as a priming tool showed very good results (Cioffi et al., 2015) and children were extremely sensitive to being shown pictures of people or characters they admired and being asked if those characters would prefer apple fries or French fries before being asked to them the same question. (Wansink et al., 2012)

When people are actually presented a choice to participate on a program in order to improve their healthy habits or given a choice to choose a reduced calorie menu and choose to do so, the results are always positive (Schwartz et al., 2014; Wansink et al., 2013; Schwartz et al., 2012) meaning that the creation of programs that consist of self-imposed nudges for people that are aware of the importance of a healthy weight is an effective tool to promote weight loss. These however only work if people choose to enroll on those programs which once again makes it important that people are informed about the importance of a healthier nutrition.

Figure 18- Classification of the interventions analyzed matrix

		Mindful		Mindless	
		Encouraging	Discouraging	Encouraging	Discouraging
Activate a Desired Behavior	Externally imposed	1.Cummins et al. (2014) 2.Wansink and Just (2009) 3.Wansink et al. (2013) Payne and Niculescu (2014)		1.Payne, Niculescu (2014) 2.Kongsbak et al. (2016) 3.Wansink, Just and 4. Smith (2011) 5.Wansink and Hanks (2013) 6.Hansen (2013) 7.Wansink, Shizumu and Campes (2012)	
Boosting self-control	Externally imposed	1.Irmak et al. (2011)	1.Sela, Berger and liu (2009) 2.Sela, Berger and liu (2009) 3.Wansink, Khan (2004) 4.Wanisnk and Just (2009)	1.Cioffi et al. 2015) 2.Lowenstein, Downs, Wisdom (2009)	1.Wansink et al. (2006) 2.Wansink and Ittersum (2003) 3.Wansink and Junyong (2005) 4.Libotte et al. (2014) 5.Ayaz et al. (2016) 6.Buckland et al. (2014)
	Self-imposed	1.Schwartz et al (2014) 2.Wansink, Hanks and Just (2013)	1.Schwartz et al. (2012)		

As it has been discussed in chapter one, nudging has appeared has a fourth tool to influence behavior, with the tools before this being: 1) Education,

education and persuasion, 2) Regulations and restrictions and 3) Incentives. Some of the interventions studied fall under one of these tools:

-Information, education and persuasion: 1. Wansink et al. (2009); 2. Cioffi et al. (2015); 3. Thorndike et al. (2012); 4. Sutherland et al. (2010); 5. World cancer research fund (2010); 6. Wilson et al. (2015); 7. Lowenstein et al. (2009)

-Regulations and Restrictions: 1. Wansink and just (2009), 2. Wansink and Just (2009)

As for the classification of the nudges according to the Dilip Soman Matrix for the classification of nudges, there is some subjectivity when analyzing the interventions, it is particularly hard to classify an experiment as mindful or mindless. Almost all of the interventions could be considered to be cases of mindless decisions of the consumers because even though they are making a choice they are being guided or given stimulus to make a certain one. The decision to classify them as one or the other was based on how strong the stimulus were. In the end, the majority was classified as mindless but not by a huge difference. Most of the studies analyzed were cases of externally imposed nudges. This makes sense since the idea is to "nudge" people towards better nutrition then the studies are based on people´s limited rationality, heuristics and biases that happen every day making them taking them take options by taking advantage of those heuristics.

However, the interventions analyzed that represented self-imposed nudges showed promising results. This however only works when people are informed enough to voluntarily enroll in a situation where they the "nudge themselves".

In terms of boosting self-control or activating a desired behavior there is no clear tendency between one or the other even though there are more cases of boosting self-control. Again, this classification is difficult to make due to the lack of objectivity. As for whether they are encouraging or discouraging a certain behavior, the results between these don't show significant differences which

leads to the conclusion that these two parameters are not very relevant to how successful a nudge in the area of nutrition.

All these types of interventions can have good results, a clear tendency noticed is that nudges work better on people that are already aware of the importance of a healthy diet as we see with dieter's vs non-dieters and when the nudge is incorporated together with the provision of information. The Classification according to the Dilip soman Matrix didn't allow to any conclusions about whether or not there is a certain type of nudge that works better than the others with probably a more in-depth analysis being needed to reach final judgements.

The main difficulties when writing this thesis were that many of the interventions found were not available for free as many of them are in books and others are not accessible to the full document even in the platforms provided by Catolica or anywhere and the classification of them being in many situations subjective.

For future investigation, it can be interesting and useful to analyze more in depth coupling together education about a healthy diet and nudges, since the few studies that did this or studies that had dieters showed that when people are aware of the importance of a healthy diet they are more sensitive to other external stimulus and may also be interested in participating in programs that consist of self-imposed nudges which as seen before presented always positive results. Also, most interventions only analyze on stimulus at once and it could be beneficial studies several stimulus taking place at the same time and testing combinations of different ones.

Bibliography

Anup Sah (2010, November 21) Obesity. Retrieved from http://www.globalissues.org/article/558/obesity.

Bhargava, S., & Loewenstein, G. (2015). Behavioral Economics and Public Policy 102: Beyond Nudging. American Economic Review, 105(5), 396–401. DOI: 10.1257/aer.p20151049.

Buckland, N. J., Finlayson, G., Edge, R., & Hetherington, M. M. (2014). Resistance reminders: Dieters reduce energy intake after exposure to diet-congruent food images compared to control non-food images. Appetite, 73, 189–196. DOI: 10.1016/j.appet.2013.10.022.

Cioffi CE, Levitsky D, Pacanowski CR, Bertz F. (2015) A nudge in a healthy direction. The effect of nutrition labels on food purchasing behaviors in university dining facilities. Appetite. DOI: 10.1016/j.appet.2015.04.053.

Cummins, S., Flint, E., & Matthews, S. A. (2014). New Neighborhood Grocery Store Increased Awareness Of Food Access But Did Not Alter Dietary Habits Or Obesity. Health Affairs, 33(2), 283–291. DOI: 10.1377/hlthaff.2013.0512.

Daniel Kahneman (2015). Thinking, fast and slow. New York: Farrar, Straus and Giroux.

David Just and Brian Wansink (2015). Fast Food, Soft Drink, and Candy Intake is Unrelated to Body Mass Index for 95% of American Adults. Obesity Science & Practice, 1(2), 126-130. DOI: 10.1002/osp4.14.

Downs, J. S., Loewenstein, G., & Wisdom, J. (2009). Strategies for Promoting Healthier Food Choices on JSTOR. American Economic Review: Papers & Proceedings, 99(2), 159–164. DOI: 10.1257/aer.99.2.159.

Gardner C.D., Trepanowski J.F., Del Gobbo L.C., Hauser M.E., Rigdon J., Ioannidis J.P.A., Desai M., King A.C. (2018). Effect of Low-Fat vs Low-Carbohydrate Diet on 12-Month Weight Loss in Overweight Adults and the Association with Genotype Pattern or Insulin Secretion: The DIETFITS Randomized Clinical Trial. JAMA, Feb 20;319(7):667-679. DOI: 10.1001/jama.2018.0245.

Hanks AS, Just DR, Wansink B. (2013). Preordering School Lunch Encourages Better Food Choices by Children. JAMA Pediatr. 2013;167(7):673–674. DOI:10.1001/jamapediatrics.2013.82.

Hansen, P.G., Skov, K.L., Skov, L.R., Jespersen, A.M., Schmidt, K. (2016) Apples vs. Brownies: A Field Experiment in Rearranging Conference Snacking Buffets to Reduce Short-Term Energy. Journal of Foodservice Business Research, 19(1), 122-130. DOI: 10.1080/15378020.2016.1129227.

Ideas42 (2018). Principles. Retrieved from http://www.ideas42.org/learn/principles/.

Irmak, C., Vallen, B., & Robinson, S. R. (2011). The Impact of Product Name on Dieters' and Nondieters' Food Evaluations and Consumption. Journal of Consumer Research, 38(2), 390–405. DOI: 10.1086/660044.

Just, D. R., & Wansink, B. (2009). Smarter lunchrooms: using behavioral economics to improve meal selection. Choices, 24(3), 1–7. DOI: 10.2139/ssrn.2079843.

Kahn, B. E., & Wansink, B. (2004). The Influence of Assortment Structure on Perceived Variety and Consumption Quantities. Journal of Consumer Research, 30(4), 519–533. DOI: 10.1086/380286.

Kessler, J. B., & Zhang, C. Y. (2014). Behavioral Economics and Health. Oxford Textbook of Public Health, 1–50.

Kongsbak I., Skov L.R., Nielsen B.K., Ahlmann F.K., Schaldemose H., Atkinson L., Wichmann M., Perez-Cueto F.J.A. (2016) Increasing fruit and vegetable intake among male university students in an ad libitum buffet setting: A choice architectural nudge intervention, Food Quality and Preference, 49, 183-188. DOI: 10.1016/j.foodqual.2015.12.006.

Leslie K. John, George Loewenstein, Andrea B. Troxel, Laurie Norton, Jennifer E. Fassbender, Kevin G. VolppJ. (2011). Financial incentives for Extended Weight Loss: A Randomized, Controlled Trial. Gen Intern Med. Jun; 26(6): 621–626. DOI: 10.1007/s11606-010-1628-y.

Libotte, E., Siegrist, M., & Bucher, T. (2014). The influence of plate size on meal composition. Literature review and experiment. Appetite, 82, 91–96. DOI: 10.1016/j.appet.2014.07.010.

Ly, K., & Soman, D. (2013). Nudging Around the World. Rotman School of Management.

Ly, K., Zhao, M., & Soman, D. (2013). A Practitioner's Guide to Nudging. Rothman School of Management: University of Toronto, 1–28.

Martinez, J. A. (2000). Body-weight regulation: Causes of obesity. Proceedings of the Nutrition Society, 59(3), 337–345. DOI: 10.1017/S0029665100000380.

Matthew Darling, Saugato Datta, S. M. (2013). The Nature of the BEast: What Behavioral Economics is Not. Center for Global Development, (October).

National Center for Chronic Disease Prevention and Health Promotion. CDC. (2015). Can eating fruits and vegetables help people to manage their weight? Research to Practice Series, (1), 1–6.

Ng, M., et al. (2014). Global, regional, and national prevalence of overweight and obesity in children and adults during 1980-2013: A systematic analysis for the

Global Burden of Disease Study 2013. The Lancet, 384(9945), 766–781. DOI: 10.1016/S0140-6736(14)60460-8.

Obesity and overweight (2018). Retrieved from http://www.who.int/mediacentre/factsheets/fs311/en/.

Payne, C.R., Niculescu, M., Just, D., Kelly, M. (2015), "Shopper Marketing Nutrition Interventions: Social Norms on Grocery Carts Increase Purchases without Increasing Shopper Budgets," Preventive Medicine Reports, 2, 287-291. Retrived from https://newscenter.nmsu.edu/Articles/view/10840/this-way-to-better-health-professors-want-to-push-your-cart-toward-the-produce-aisle.

Payne, C.R., Niculescu, M., Just, D., Kelly, M. (2016), This Way to Produce: Strategic Use of Arrows on Grocery Floors Facilitate Produce Spending without Increasing Shopper Budgets, Journal of Nutrition Education and Behavior, 48 (7), 512-13. DOI: 10.1016/j.jneb.2016.05.001.

Rasmus Friis, Laurits Rohden Skov, Annemarie Olsen, Katherine Marie Appleton, Laure Saulais, Caterina Dinnella, Heather Hartwell, Laurence Depezay, Erminio Monteleone, Agnès Giboreau, and Federico J. A. Perez-Cueto. (2017) Comparison of three nudge interventions (priming, default option, and perceived variety) to promote vegetable consumption in a self-service buffet setting. PLoS One., 12(5). DOI: 10.1371/journal.pone.0176028.

Richard H. Thaler, Cass R. Sunstein (2008). Nudge: Improving decisions about health, wealth and happiness. London: Penguin.

Schwartz, J., Mochon, D., Wyper, L., Maroba, J., Patel, D., & Ariely, D. (2014). Healthier by Precommitment. Psychological Science, 25(2), 538–546. DOI: 10.1177/0956797613510950.

Schwartz, J., Riis, J., Elbel, B., & Ariely, D. (2012). Inviting consumers to downsize fast-food portions significantly reduces calorie consumption. Health Affairs, 31(2), 399–407. DOI: 10.1377/hlthaff.2011.0224.

Sela, A., Berger, J., & Liu, W. (2009). Variety, Vice, and Virtue: How Assortment Size Influences Option Choice. Journal of Consumer Research, 35(6), 941–951. DOI: 10.1086/593692.

Steven Novella (2012, November 15) Calories, Thermodynamics, and Weight. Retrieved from https://sciencebasedmedicine.org/calories-thermodynamics-and-weight/.

Sutherland, L. A., Kaely, L. A., & Fischer, L. (2010). Comment on Guiding Stars: The effect of a nutrition navigation program on consumer purchases at the supermarket. Nutrition in Clinical Practice, 25(5), 560–561. DOI: 10.1177/0884533610379856.

Tara Siegel Bernard (2012, January 2) Gym-Pact Fines You for Not Exercising. Retrieved from https://bucks.blogs.nytimes.com/2012/01/02/gym-pact-fines-you-for-not-exercising/.

Thorndike AN, Sonnenberg L, Riis J, Barraclough S, Levy DE. (2012) A 2-phase labeling and choice architecture intervention to improve healthy food and beverage choices. Am J Public Health., 102(3), 527–533. DOI: 10.2105/AJPH.2011.300391.

Volpp KG, John LK, Troxel AB, Norton L, Fassbender J, Loewenstein G. (2008) Financial Incentive–Based Approaches for Weight LossA Randomized Trial. JAMA, 300(22):2631–2637. DOI: 10.1001/jama.2008.804.

Wansink, B. (2006). Mindless eating—Why we eat more than we think. New York: Bantam-Dell.

Wansink, B., & Kim, J. (2005). Bad Popcorn in Big Buckets: Portion Size Can Influence Intake as Much as Taste. J Nutr Educ Behav. 37(5), 242–245. DOI: 10.1016/S1499-4046(06)60278-9.

Wansink, B., & van Ittersum, K. (2003). Bottoms up! The influence of elongation on pouring and consumption volume. Journal of Consumer Research, 30(3), 455–463. DOI: http://dx.doi.org/10.1086/378621.

Wansink, B., Just, D., & Smith, L. (2011). Move the Fruit: Putting Fruit in New Bowls and New Places Doubles Lunchroom Sales. Journal of Nutrition Education and Behavior, 43(4), S1. DOI: 10.1016/j.jneb.2011.03.013.

Wansink, B., Just, D.R., and Payne, C.R. (2009). Mindless eating and healthy heuristics for the irrational. American Economic Review, 99(2, May), 165-169. DOI: 10.1257/aer.99.2.165.

Wansink, B., Shimizu, M., & Camps, G. (2012). What would Batman eat? Priming children to make healthier fast food choices. Pediatric Obesity, 7(2), 121–123. DOI: 10.1111/j.2047-6310.2011.00003.x.

Wansink, B., van Ittersum, K., & Painter, J. E. (2006). Ice Cream Illusions. Bowls, Spoons, and Self-Served Portion Sizes. American Journal of Preventive Medicine, 31(3), 240–243. DOI: 10.1016/j.amepre.2006.04.003.

Why people become overweight (2009, June). Retrived from https://www.health.harvard.edu/staying-healthy/why-people-become-overweight.

Wilson AL, Bogomolova S, Buckley JD. (2015) Lack of efficacy of a salience nudge for substituting selection of lower-calorie for higher-calorie milk in the work place. Nutrients, 7(6), 4336–44. DOI: 10.3390/nu7064336.

World Cancer Research Fund UK. (2011). Traffic light labelling – helping people make healthy choices, (1000739), 4200–4202.

Appendix