Radboud Universiteit

Master Thesis:

Traffic light labeling system, evidence from the field

Abstract

This research examines the application of a traffic light labeling system on the purchase behavior of consumers at vending machines. Literature has shown that a traffic light system is an effective way to inform people about the healthiness of specific products. By exploring the potential of this behavioral intervention and nudging in dealing with the food choice problem, behavior of consumers in a real-life context is observed creating an original database. Additionally, this study looks into the mental process of food decisions by conducting a survey and inquiring about the motivations of purchases of consumers.

Key words: Traffic light color system, vending machines, Obesity, nutritional labels, nudging

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1. Introduction

We live in a time that is characterized by an overabundance of food. Where hunger was once the driving factor of human misery, most of the world's population now live in countries where overweight and obesity kills more people than underweight (World Health Organization, 2018). One of the most important reason for this trend is a societal and environmental change in the global food system (Swinburn et al., 2011). There is more processed, affordable, and effectively marketed food than ever before with a glaring lack of supportive policies in sectors such as environment, agriculture, health and education to counter this development. Increases in obesity can be seen in almost all countries and consequences of widespread obesity are numerous, from decreased life expectancies to diseases like diabetes, musculoskeletal disorders and sometimes cancer. These consequences put increased pressure on public health costs associated with this and other diet-related chronic conditions which, in turn, puts a burden on all of society.

Obesity, however, is preventable. There is little doubt that no one gets obese on purpose. We want to live healthy lives and take good care of ourselves. However, people are often unable to act in accordance to their principles. With the limited ability to make sufficient choices and the vast majority of misleading and inaccurate stimuli and information, people sometimes need some help with making the choices that are best for them. Food decisions are often mindless and efforts to increase health should not be focused on convincing people on what is ‘right’, but on using and channeling their unconsciousness by changing the environment in which their decisions are made.

This phenomena has become known as ‘nudging’. In the act of choosing food, nudges can be of great value to get people to make healthier choices as the choice environments in which nutritional decisions are made are often riddled with adverse information and misleading stimuli. In this paper, we will introduce a low cost nudge to get people to make healthier choices by implementing insights from behavioral economics. Specifically, we will focus on the implementation of a traffic color system. Literature has pointed out that food labels, when combined with a color coding system, can be highly effective in getting consumers to choose healthier. To get insights in its real-life application, we will conduct a field experiment by applying the traffic light system on several vending machines located at the Radboud University in Nijmegen.

By exploring the potential of this behavioral intervention and nudging in dealing with the food choice problem, behavior of consumers in a real-life context will be observed and an original database will be created. Additionally, we will look into the mental process of food decisions by conducting a survey and inquiring about the motivations of purchases of consumers.

2. Literature overview

In this chapter, we will discuss the theoretical background of the researched subject. First, we will explain how individual fallacies and societal changes in the global food system have led to an increase in the rates of obesity. We will then go deeper into how nutritional labels have (not) helped to inform consumers on the healthfulness of their choices, what the most effective labels are and how insights from behavioral economics can help improve the effectiveness of these labels. Lastly, the case of vending machines will be discussed and why this is an appropriate and beneficial environment for intervention.

2.1 Explaining the rise in obesity

Throughout the world, weights have been steadily rising during the 20th and 21st century. Obesity has tripled since 1975 and on average people's food intake has far exceeded the medical recommendations (World Health Organization, 2018). The cause for increased weights could simply be described by a rise in calorie intake and a decline in physical activity, thus resulting in a surplus of energy. However, it would be more interesting to look at the underlying reasons that lead to this calorie imbalance as it can be traced to causes that are both societal and inherent in human behavior.

Up until the 1960s, meals were prepared by families and cooked at home. Lacking a proper division of labor, this was a time consuming and central part of the day. However, with the introduction of technological innovations like deep freezing, microwaves and vacuum packaging that caused a decline in both the time- and monetary costs of food, a change occurred from individual to mass preparation (Cutler, Glaeser & Shapiro, 2003). The focus shifted toward rapid consumption as food is now prepared quicker and is more readily available than ever before. Because of this, people now do not necessarily eat more calories per meal, but more meals in a day as it is more likely to be readily available to them. This increased frequency of meals then causes people to eat more calories overall.

Another consequence of the decline in the time needed to prepare food is that these productivity gains made food cheaper than ever before. Standard economics would view the affordability and accessibility of more and different kinds of food as a utilitarian gain. However, this view relies on the assumption of rational human beings that order, combine and judge every piece of information with a knowledge of both current and future outcomes to come to the most optimal allocation. In reality, Self-control issues complicate this interpretation.

Despite good will, many people are unable to adhere to a healthy diet, even when it is their intention to do so. This is reflected in the ironic and contradicting findings showing that, on the one hand, people are increasingly concerned about their weights (De Ridder, et. al., 2014), while on the other hand getting heavier than ever before (Finuccane, et. al, 2011). Clearly, there is a discrepancy between people's actions and their preferences. This divide is likely caused by the mindless nature in which food decisions are often made. People have a limited ability in making the best choices for

themselves and therefore rely on impulses, heuristics and feelings to make their decisions. Because of this, there are numerous biases and irrationalities we suffer from that interfere with getting to the most optimal and valued outcome. For example, there is a large tendency toward present bias preferences when food is presented to us (O'Donoghue & Rabin,1999). The gratification of a meal is immediate while the consequences of eating that meal is only seen on the long term. Because of this, short term enjoyment is overvalued and unhealthy choices are promoted. Furthermore, people suffer from inherent habits that cause them to eat more. One of these habits is that people tend to clean out their plate when food is served to them, even when they are not hungry anymore (Birch et. al.,1987; Wansink, Payne & Werle, 2008). It has also been shown that people use specific benchmarks that serve as norms for how much to eat like the number of items in an assortment, size of packages or serving bowls and the eating behavior of a dinner companion (Wansink, Just & Payne, 2009).

These habits often occur outside of an individual's conscious awareness, which is demonstrated by the evidence that people often don't know how much they want to eat, despite their biological needs. Wasink and Cheny (2005) showed that a difference in the size of bowls or tumblers can influence the amount of food that is consumed by an individual. However, when these individuals were confronted by the fact that the size of a serving bowl had influenced their intake, they simply denied it. People neither know how much they want to eat or know when they are full. This is mostly caused by an over-reliance of external cues and it is shown that, regardless of culture, people who are more overweight have an increased tendency to rely on external rather than internal cues (Wansink, Payne & Chandon, 2007). People eat more with their eyes than with their stomachs. This issue is especially complicated when consumption norms become large, which is a situation created by the societal change in the food system (Drapeau et. al, 2007). These norms negatively influences our ability to accurately estimate how many calories we are actually consuming. Therefore, the environmental and technological changes in the food system as described before only fuel our heuristics, biases and habits in food consumption.

Research has pointed out that we make around 200 different food decisions every day (Wansink, & Sobal, 2007). This makes the case of understanding how the decision environment changes people's choices and how to best arrange this environment in a way that people's fallacies will be accommodated an important and valuable subject to study. People sometimes need a little bit of help in overcoming their inherent shortcomings in order to be able to choose what is best for themselves. To this extent, policymakers have tried to close the gap between our preferences and our decisions, either by giving additional information on what certain choices contain, or by 'nudging' them into healthier decisions. This effort mostly came in the form of nutritional labels. These neatly display all of the nutritional values that a product contains. However, even though a step in the right direction, the actual impact of the publication of nutritional labels is often questioned. In the next chapter we will dive deeper into the case of nutritional labels and why it may not be a helpful tool for

people to make healthier choices. We will then explain how this problem could be accommodated with the help of behavioural economics.

2.2 The case of nutritional labels

The simplest and most frequently used tool for providing information to consumers when making food choices is the publication of nutritional values through nutritional labels. The use of these labels is already widespread throughout the world and a popular instrument among both policy makers, food companies and non-governmental organizations (European Commission, 2018). Every single product now has a standardized label printed on its packaging detailing its energy-, fat-, salt-, carbohydrate- and protein values.

Nutritional labels are an easy way to bridge the gap caused by information asymmetry between food companies and its consumers. This asymmetry exists because information of a food's nutritional content and its potential health effects remain in a domain of expertise within the nutritional sciences, which cannot be directly perceived, understood or verified by an individual consumer (van Trijp, 2009). It is therefore important that the nutrition and health information of individual nutritional products are translated and communicated in a way that it can be used as an accessible tool in the search and selection process of food products. There has been increased attention towards the use of nutritional labels and their consumer and policy implications (Drichoutis, Lazaridis & Nayga Jr, 2006; Grunert et. al., 2010; Cowburn & Stockley, 2005). Overall, consumers express great support and positive attitudes toward the publication of nutritional values on products (Grunert & Wills, 2007; Wills et. al., 2009) Furthermore, nutritional labels are appealing because they do not pose restrictions for consumers on their freedom to choose (Brehm, 1989).

However, simply providing information through labels is of questionable effectiveness and has been shown to be only a minor factor in food decisions. When choosing what we eat, how the food is presented to us seems to be of greater importance than what it actually contains (Schulte-Mecklenbeck et al., 2013). Visual stimuli from food external aspects like packaging, size and shape seem to triumph food internal aspects like nutrient content when it comes to the choice of food (Scheibehenne, Miesler & Todd, 2008). Actively processed information from food labels is in constant interaction with passively provided external information from the aesthetics of a products. This may "enrich" perceptions of the healthfulness of a product as associations in the brain caused by these external aspects may fill in information that is missing or unnoticed (van Trijp, 2009). Because of this, internal and external aspects of nutritional products often go hand in hand as the external factors will have a great impact on how the internal factors are perceived by the consumer (Aikman & Stephen, 2005; Shepherd, 1989). In the end, it ultimately matters how the consumer will perceive the food-internal aspects, and not what is actually in them.

This poses a potential problem in making food decisions as it is often unclear what certain food choices actually contain. Misleading packaging, unclear criteria of "healthy" food labels and

product images created by marketers are a few examples of the hindrances that distort food choices. How the product is packaged and what is on the front of that packaging is therefore the most important for the decision a consumer makes, even though the backside, where the nutritional values are printed, contain the more important and relevant information.

It could therefore be argued that it would be a solution to bring the nutritional labels to prominence and move them from the back of the packaging to the front. This process is formally known as front-of-pack (FOP) nutritional labeling and is already internationally in use on some products (Bonsmann et. al., 2010). FOP nutrition labels should be more effective because the information is presented with maximum exposure on the position where most food choice decisions are made (Nordfalt, 2009). Furthermore, people seem to support and prefer the practice of displaying nutritional values on the front of the packaging (Kleef, Trijp, Paeps, & Fernández-Celemín, 2008).

However, even though support is widespread, this does not mean that when the nutritional values are presented to consumers clearly, they will make better decisions. When using nutritional labels, several problems arise that, once again, can be directly linked to the limited capabilities of human beings. First of all, even though the gap caused by information asymmetry has been closed by these labels, consumers often lack the nutritional specific knowledge needed to effectively decode and understand its distinct effects and meanings (Wansink & Cheney, 2005). This is especially true for consumers who eat the poorest quality of diets, who have the lowest level of nutritional literacy and for whom this information would be most beneficial. The concept of calories is generally better understood than other nutrients (Grunert & Wills, 2007), which can create a rather superficial understanding of nutritional contents of different kinds of foods. To this extent, to accommodate the limited knowledge, a more straightforward and simpler delivery of information is required to increase the effectiveness of product labels. Even though more detailed information might be more scientifically correct, it will likely be less meaningful to the average consumer and further increase the chances of misinterpretation.

A second problem is that people simply do not have the time to interpret, process, compare and evaluate every single decision they are presented with. Even if people have the knowledge and ability to sufficiently interpret every individual nutritional value and compare all of the products available, they often lack the motivation to do so. Time constraints cause them to make quick decisions, often based on heuristics or gut feelings. This is especially true when they are faced with choices that pose a low risk or personal relevance to make the bad or wrong decision (Petty & Cacioppo, 1986), which is the case when choosing food where pleasures are immediate and consequences are only felt in the long term. Again, the implication is that people avoid detailed information and favor superficial and simple cues to base their decision on.

A third problem is that even if people would have both the knowledge and time to comprehend and compare every single product and every single nutritional value they would be faced with information overload (Verbeke, 2005). The overabundance of information will make it too

difficult to distract the relevant information and the vast majority and variance of nutritional values to take into account will make it complicated to make any fair comparisons.

Overall, it can be said that the publication of nutritional values will have little effect on improving the healthfulness of consumer's choices. Simply providing more information will not give consumers a better opportunity to align their preferences with their choices and might actually have the opposite effect. Therefore, new ways need to be found to provide information in a way that is not over cumbersome. Simplicity is key in providing consumers an instrument make quick and easy decisions. However, this simplicity might form a threat to the truthfulness and relevance of the information on display. It is therefore a challenge to find the balance between simplicity and detail. To this extend, it would be useful to study different formats and placements of food labels and the effects they have on the consumer behavior of individuals.

Behavioral economics has long studied how cognitive, aesthetic and environmental differences influence the economic decisions of individuals. It tries to alter the choice environment decisions are made in to 'steer' economic behavior into a direction that will ultimately lead to better outcomes. This is formally known as 'nudging' and has frequently been applied in the field of food decisions. Insights from nudging theories might be helpful in creating and finding a nutritional label that will have better effects than the back printed labels that are present now. The next chapter will explore the philosophy behind nudging practices, how its insights can help in constructing better food labels and why it is a viable option to get people to eat healthier that should not be neglected. We will then go into the different formats of FOP labels, their effectiveness and how they nudge people into healthier decisions.

2.3 On the use and philosophy of nudging practices

Beside the simple provision of information for people to base their decision on, recent scientific developments suggest that it is more effective to alter the environment that decisions are made in order to steer people automatically toward healthier alternatives. The decisions of people are always influenced by how the options they can choose from are presented to them. Because of this, choice environments can be designed in such a way that their biases and heuristics will be accounted for and they will be channeled to better decisions. This practice is formally known as 'nudging' and has been brought to prominence by recent Nobel Prize winner Richard Thaler and Cass R. Sunstein (2008).

Nudging practices have increasingly been embraced by both scholars and policy makers as strategies to promote more optimal behavior (Halpern & David, 2015). One of the most important benefits of nudges is its lack of coercion. Freedom of choice is preserved as individuals are not restrained from making other choices than the one intended from the nudge while still channeling people to a certain decision. Thereby, it embraces two seemingly opposing political philosophies, mainly liberalism and paternalistic, or, as it is called in the study of behavioral economics, liberal

paternalism. Nudges are liberal because it retains the broadest possible freedom of choice for the individual and paternalistic because it still tries to influence people in their choices in a way that they will be better off.

The behavior of consumers can be altered through nudges in many ways. Experiments showing promising results by changing the food environment are numerous. These interventions range from making changes in the physical environment (Keller, Market & Bucher (2015), to changing the default choice (Libotte, Siegrist & Bucher, 2014) to using social norms and salience (Pliner and Mann, 2003).

It would be interesting to see how behavioural insights can help make food labeling practices more viable and effective. As noted before, due to many problems, labels do not necessarily cause individuals to make healthier decisions. However, when there is an effect, this is mostly due to the different setting or format in which the nutritional label is used. Nutritional labels are often too difficult to understand and compare which calls for a simpler and more understandable method than is currently used while still maintaining sufficient information and drawing the attention of consumers. Insights from nudging practices could offer suggestions and solutions for making these nutritional labels more effective.

However, it cannot be the remedy to the societal problem of obesity on its own. Of course, nudging cannot reshape the agri-food business and other alternatives like regulations, penalties or restrictions on producers should not be neglected (Marteau et. al., 2011). In a way, nudges have to be implemented within the constraints of the socioeconomic and power relations of the food system and cannot directly challenge them (Leggett, 2014). In the end, the food industry effectively has the means and the expertise when it comes to nudging consumer behavior and it is worth questioning whether public health driven nudges can compete. Countervailing forces like marketing and advertising will reduce the effects of interpretive information by labels to consumers as it may cloud their understanding and perception of certain food (choices). The danger of this is also found in findings on FOP labels. When displayed on the package on a product, people are quick to use it as a shortcut and neglect the full comprehensive information found on the back (Bix, 2015). Therefore, manufacturers often selectively report nutritional information in order to trick people into thinking it is representative of the whole product.

Even though these problems reside, a public nudge is still a cheap and often effective complementary policy to regulations, restrictions and economic incentives that should not be overlooked. Neglecting this opportunity would be a missed chance in giving the public a tool to accommodate their inherent discrepancies. To this extent, in the next chapter, we will look at the effectiveness of different FOP labels as described by scientific literature and how they can be best implemented. From this information, we will construct a labeling system that we will implement and test on vending machines at the university.

2.4 Effects and differences of FOP labels

There has been extensive research on the effectiveness of different kinds of FOP labels. In certain countries, there are a multitude of labels already in use all varying in form; from symbols to summative assessments to written out claims. Overall, FOP labels can be categorized into three categories: Tick symbols, Guideline daily amount labels (GDA) and traffic light formats (Figure 1).

The first category, the tick symbol, is a combined evaluation of the food´s nutritional content. When certain criteria are met, the package will be printed with a simple logo signifying its qualification. These logos are usually given out by certain health organizations and are already implemented in some countries like the "Ik kies bewust"-logos in The Netherlands (Gray, 2013), the Smart Choices label in the US and the Keyhole system in Scandinavian countries. The second category are the Guideline daily amount labels (GDA). These labels show the amount of sugar, salt, fat and calories per portion with a percentage attached to each of these contents in accordance to the "Guideline Daily Amount". This system is both widely in use and understood by consumers is many countries. The last variations of FOP labels are the traffic light formats. An example of this is the Multiple Traffic Light (MTL) labeling system introduced in the United Kingdom. This is a variety of the FOP label in which the nutritional information of salt, sugar and fat are coded in accordance to its relative healthfulness with the colors red, green and orange. Thus, a priming intervention is used to make the nutritional information easier to interpret. Priming is a technique in which recognizable but often unnoticed stimuli are used to influence the performance or behavior of individuals. Examples of primes are words, colours or sounds that activate certain associations in the brain. Priming can be a useful intervention in the case of food labeling as it can make them more accessible to the average consumer.

Overall, all FOP labels succeed at both garnishing attention toward nutritional information (Bix et. al., 2015) and helping people to make the healthier choice (Borg & westenhoefer, 2009). However, these labels can vary in the degree and the way in which they transfer information. For example, every different variation of FOP label can be classified according to its directiveness, which is the degree in which the label provides guidance about the overall healthfulness of a food (Hodgkins et. al., 2012).

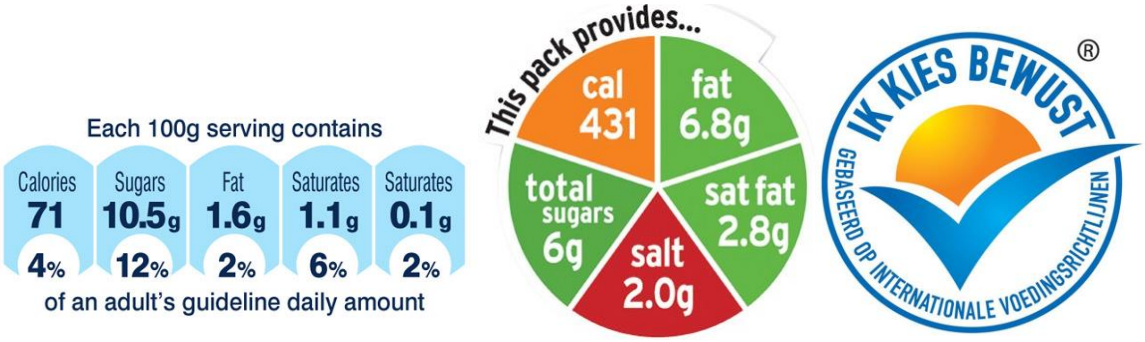

Figure 1. Different FOP labels: Guideline Daily Amount (GDA) (Non-Directive), Traffic light label (Semi-Directive) and Tick symbol (Directive)

Non-directive labels are labels that provide information but leave the assessment and interpretation of these nutrients to the consumer. The GDA-format is an example of a non-directive label as it only provides information and does not by itself imply any relative meaning to any of its values by color or symbols. When a symbol or a qualitative assessment is applied onto the non-directive label to highlight or point out certain variables or values it becomes 'semi-directive'. The traffic light format is an example of a semi-directive label as a priming intervention is attached to the information on display to convey a relative meaning to it. Finally, if the healthfulness of a product is directly summarized by a logo and no interpretation is required, it is directive. Because of the verdictive design of the tick symbols, this is an example a directive label. Again, the problem arises that the more directive a label is, the less encompassing it is, which might form a threat to its comprehensiveness and scientific truthfulness.

However, every label still carries the rationale of conveying information on the nutritional aspects of the product in a way that is both understandable and helpful for people to make healthier choices. Furthermore, even though it was found that the more directive an FOP label is, the more it might serve as a shortcut to the full comprehensive information on the back (Bix et. al., 2015) this might only be the case when people were not explicitly interested in the nutritional information in the first place (Turner et. al., 2014). Overall, when FOP labels are present, more healthy choices are made over a sustained period of time and given the amount of evidence that points out that people hardly pay attention to nutritional information at all, raising awareness, even if it is only to a fraction of the nutritional information, is a step forward and a societal gain.

Still, differences in efficacy of these variations in labels reside. In a lab experiment, Borgmeier and Westenhoefer (2009) studied the effectiveness of variations of FOP labels on the ability of participants to identify the healthier products and whether they have an impact on consumers' food choices. They showed that all labels were effective instruments for individuals to determine the healthfulness of their food choices. However, a deviation in effectiveness was also noticed. From the labels, the traffic light system was clearly the best performing one (Figure 2).

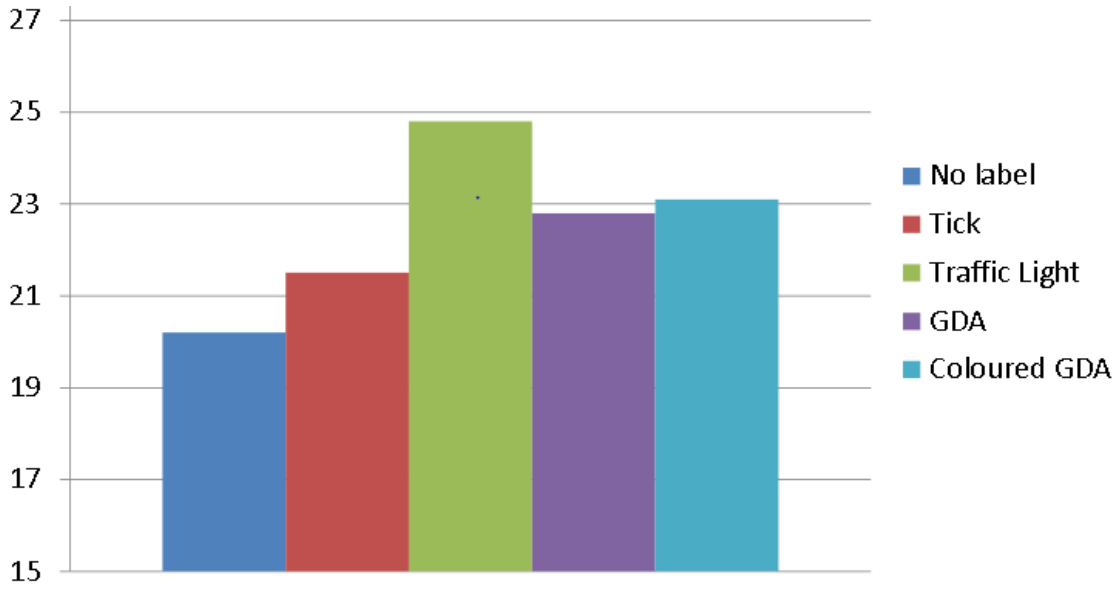

Figure 2. Mean number of correct healthier choices. Source: Borgmeier and Westenhoefer, 2009

The same results were found in a multitude of studies (Aschemann-Witzel et. al., 2013; Kelly et. al, 2009) showing that when nutritional values are coupled with a traffic light system, its potential is increased. Clearly, the priming and behavioral aspects increase the effectiveness of this approach. The aspect of this label that makes it especially strong is that people are more prone to reacting to red shades than to green ones (Genschow, Reutner, Wänke, 2012). When the labeling system is in place, they tend to mostly avoid the red color than specifically choose the green ones. Besides this displacement effects in consumer decisions, a traffic light system has also been shown to increase consumer awareness of health and healthy choices at the point-of purchase (Sonnenberg et. al., 2013). Furthermore, people are more likely to identify healthier items and tend to have healthier food consumption (Borgmeier & Westenhoefer, 2009; Hawley et. al., 2013; Kelly et. al., 2009). Because of this, people who were normally not that conscious about the healthfulness of products are prompted into making better considerations and therefore increasing the reach of the intervention (Brownell & Koplan, 2011). There is even evidence suggesting that consumers are willing to pay more for certain products when the TL label indicates that it is a healthy product as opposed to other label formats (Drichoutis, Lazaridis & Nayga, 2009).

Other research pointed out that consumers find TL colors appealing as it is a simple and quick tool to discover the healthfulness of a food while other more advanced labels are considered too difficult to interpret (Hawley et. al., 2013). Again, the simplicity of the label seems to be the driving factor behind its effectiveness. However, the practice of labeling every single nutrient with a color might still be too difficult. A study conducted in New Zealand found that a Simple Traffic light (STL) format was slightly more effective than a Multi traffic light format. In a STL system, a single color code is given to the whole product instead of a single color to every single nutrient of the product (Gorton et. al., 2009). In a way, this system slightly resembles a tick format but it applies the priming

aspect of colors from the traffic lights to it. Clearly, the priming intervention applied to FOP labels is a strong appliance in helping people to identify the healthiness of a product.

An interesting factor of the traffic light system and other FOP labels to take into consideration is that it not only nudges consumers towards healthier decisions but it might stimulate the food industry to improve the quality of new and existing products as well. Manufacturers and producers of food might shift the contents of their products toward healthier alternatives as to avoid the negative stigma of a red label on the items they sell. In a way, certain behavior of these businesses is rewarded or punished by a green or red label.

There have been experiments that have tested a TL scheme in a lab setting (Aschemann-Witzel et. al., 2013). However, to test whether labelling system's abilities influence consumer behavior in the real world, studies that quantify the magnitude of the effect and measure the actual outcome on food intake in real life are needed (Bucher et al., 2016). Lab studies on TL systems often state that their insights could be applied to school cafeterias or vending machines. Therefore, this paper will conduct a field experiment using the traffic light color system on the vending machines on the campus of the Radboud University in Nijmegen.

In the next chapter, we will explain why vending machines are an appropriate and beneficial environment for intervention. We will then present the design and procedure of our field experiment and show the results of our study.

2.4 The case of vending machines

Vending machines are often scrutinized for the nutrient-poor and energy dense products they have on display and studies have shown that the mere presence of these machines is associated with increased intake of foods of minimal nutritional value (sweet, chips, soft drinks) (Park et. al., 2010; Rovner et. al., 2011). Even though it could be argued that these machines fulfill a service by providing food on demand, it is also a prime example of the societal change toward food consumption that has been happening for the last century. Vending machines have no preparation time and its snacks are always readily accessible and available. Therefore, they have contributed to an unhealthy food environment in a multitude of settings like schools (Pasch et. al., 2011), universities (Byrd-Bredbenner et. al., 2012) and workplaces (Lawrence, Boyle, Craypo & samuels, 2009). Research has shown that interventions can improve the quality of snacks and beverages purchased from vending machines and thus enhance the dietary intake of individuals (French et. al., 2001; French et. al., 2010; Gorton et. al., 2010)

Following the insights of academic literature on FOP labels, we will apply a color coding intervention to the vending machines. Most evidence for the effectiveness of a TL scheme have been from lab settings and studies of these labels on actual sales of food products are needed (Hawley et. al., 2013). Given the closed off nature of the choice environment of a vending machine this gives a

unique opportunity to both get real life data on the effectiveness of the TL scheme and the use of it as a nudge.

Research question:
Does a traffic light color system on vending machines influence the healthfulness of consumers in food choices?

Hypotheses:

H0: A TL scheme on vending machines does not influence the choices of consumers.

H1: A TL scheme on vending machines does influence the choices of consumers.

3. Design and procedure

To answer the research question and test the given hypothesis, the study will be conducted using the 23 vending machines present at the Radboud University in Nijmegen. These vending machines are spread over a wide array of faculties and buildings which are generally open from 8:00 to 18:00, with some exceptions like the library and sport facilities. Customers are primarily Radboud University students and employees. In total, the vending machines sell between 1600 and 4300 items per week with the most popular being the "Kinder Bueno" (246 Cal), the "De Lekkerste Gevulde Koek" (400 Cal), the "Snicker" (241 Cal) and the "Kanjer Stroopwafels" (393 Cal). Coincidentally, these are also some of the most unhealthy products on display. Total amount of products sold per machine varies wildly depending on the location that the vending machine is in, varying between 15 and 500 products sold per week.

There are three distinct vending machines present: One that dispenses snacks only, one that dispenses snacks and drinks and one that dispenses drinks only. The treatment will only be applied to the first two as the latter machine is too distinct in its design to assign a similar treatment to. The vending machines contain a wide selection of products with varying degrees of healthfulness. To maintain simplicity, we will use the amount of calories in a product per portion. Calories, even though considered by some to be irrelevant and outdated, is generally well known and understood by the general populous (Grunert & Wills, 2007).

In the treatment period, a traffic light color system will be applied to the products according to their calorie value per portion. Products that contain less than 120 calories per portion will be assigned a green color and all other products will be assigned a white color. Literature points out that people show a stronger reaction to a red shaded colors than to a green ones (Genschow, Reutner, Wänke, 2012). However, because of limitation given by the company we are working with, we were unable to apply the red shaded colors as well. Therefore, the treatment resembles more a simple traffic light system than a multiple one.

As of now, with the criteria for the treatment that we use, on average about 6% of the products sold fall under the green treatment. However, this percentage shows a large variance between different vending machines. For this reason, we will look at before and after differences for every individual machine.

Every vending machine contains the same products displayed in the exact same order. The products present in the vending machines, their calorie count, price and the assigned color coding for the treatment for every product are as follows:

	Cal (pcs)	TL Treatment	Price of Product
Popchips Barbecue (23g)	97	Green	€1,00
Popchips Sea Salt (23g)	94	Green	€1,00
Croky Chips paprika (40g)	214	White	€0,85
M&M's Peanut (100g)	512	White	€1,55
Red Band Peaches (150g)	507	White	€1,20
Autodrop Bosvruchtrode Cadillacs	623	White	€1,80
Red Band DropFruit Duo's (166g)	545	White	€1,50
Tony's Chocolonely Milk (50g)	273	White	€1,25
Snickers (50g)	241	White	€0,90
Bueno (43g)	246	White	€0,95
Balistro (37g)	186	White	€0,90
KitKat (41,5g)	217	White	€0,90
Bio Today Cranberry (25g)	117	Green	€1,50
Nakd Banana Crunch (30g)	103	Green	€1,25
Mars (51g)	229	White	€0,90
Bounty (57g)	278	White	€0,90
Twix (50g)	247	White	€0,90
Kitkat Chunky White (40g)	217	White	€0,90
Leev Bio Maïswafel melkchocolade	158	White	€1,10
Leev Bio Oerkoek choco (35g)	170	White	€1,00
Leev Bio Oerkoek cranberry (35g)	161	White	€1,00
Wasa Sandwich (37g)	196	White	€1,05
Eat Natural almond (50g)	226	White	€1,50
Eat Natural cranberry (45g)	215	White	€1,50
Choco Prince vanille (57g)	277	White	€0,90
Leev Bio spelt stroopwafel (60g)	283	White	€1,00
Kanjers stroopwafel (80g)	393	White	€1,10
De Lekkerste gevulde koek (100g)	400	White	€1,10

The assigned colors will be displayed directly under the product, where the selection number is present. Therefore, the color and calorie value is present and immediately noticeable. To be able to receive the product out of the machine, the consumer has to type in the given number of a product into a display. Because of this, he or she will always see what color has been assigned to it (unless they memorized the number due to frequent purchase). Figure 3 shows the colour strips of the treatment.

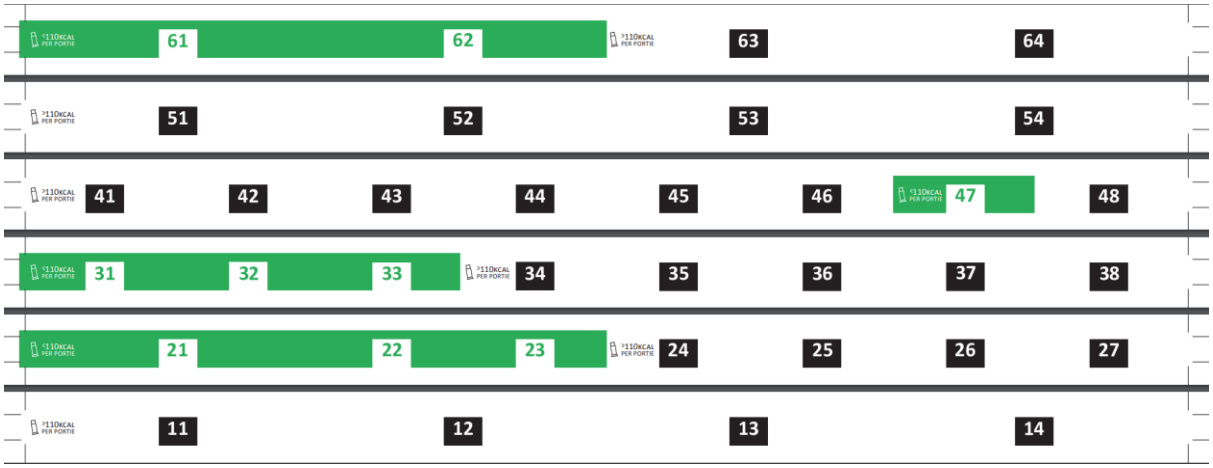

Figure 3. Color strips treatment, Snack machine

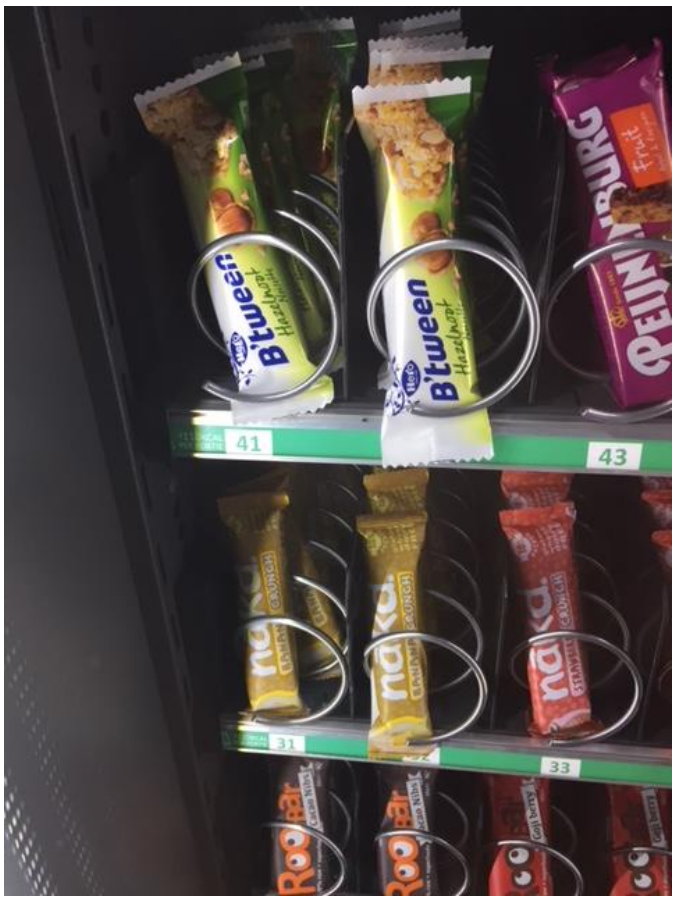

Figure 4 shows how the strips look when applied to the vending machine. There are two interpretive elements to this system: (1) A colour coding system and (2) Text describing whether the contents of the food are above, between or below a certain calorie level.

With all treatments, the products on display are not changed and the ability to buy any of the products is not hampered either. Therefore, the freedom to make any choice at any of the vending machines is retained, which is an important criterion for a nudge.

Figure 4. Color strip first treatment

As the main dependent variable, the relative number of healthy products (green colour) compared to less healthy products (white colour) sold during the test weeks is used. Additionally, the changes in sales of some individual products will also be assessed. For example, the two varieties of chips that are sold within the vending machine. One of these varieties is of significantly more healthy than the other (94 cal vs 204 cal). It has been shown that when there is a similar healthier alternative placed right next to the unhealthy alternative this will have an increased effect on the healthfulness of consumer decisions. Furthermore, contrasting effects will make the healthier food stand out more as well (Graham, Orquin & Visschers, 2012). Coincidentally, the two varieties of chips with varying healthfulness, and therefore a contrasting assigned colour, are placed right next to each other. For this reason, it should be interesting to see whether this placement has an increased effect on the sales of the healthier alternative when the treatment is applied.

4. Data

4.1 Data gathering

To keep the gathered data as valid as possible and without influences from external changes by, for example, changes in the times and amounts that students are present at the university due to changing schedules, we will only use data from the exact same semester. For our study, the last semester of the year will be used. This semester contains 9 weeks with a May holiday of a week between the second and the fourth week. As the baseline period, the first four weeks after the May holiday will be used. After the baseline, the treatment is applied and changes in product sales will be observed. Sales data will be gathered from all vending machines for every single product on a weekly basis. By grouping the combined sales from every product by every color we will be able to observe whether there is a change in the cumulative sales of a group occurred after the application of the treatment.

4.2 Survey

Additionally to gathering data on products sales, surveys will be taken both before and after the treatment from customers who just made a purchase from the vending machine. Literature has pointed out that people are supportive towards more prominent publication of nutritional values on products (Grunert & Wills, 2007; Wills et. al., 2009; Kleef, Trijp, Paeps, & Fernández-Celemín, 2008). However, it has not been studied to which extent a similar nudge is actually accepted by its target audience in the field. The acceptability, responsibility and ethical aspects of nudges have been debated among policymakers and academics quite extensively (Hansen & Jespersen, 2013; Hausman & Welch, 2010). However, how those who are being nudged view the use of nudges has only been a minor part of the debate. Therefore, additionally to the change in consumer behavior by the implementation of the nudge, their perception, acceptance and opinion of being nudged will also be

assessed. By doing this, it will bring empirical insights into an ethical debate. An excerpt of the survey can be found in the appendix.

Consumers will be asked what their opinions are on eating healthy in general and to what extent they approve of the use of nudges to encourage healthy behavior. To this end, we will ask whether consumer noticed any changes to the vending machine. If they did not, we will point the treatment out to them. We will then ask whether the placement of the traffic light system influenced the decision of the product that they bought. Then, we will try to uncover the acceptance of the consumer towards the use of nudges by first asking whether the consumer found the applied traffic light system useful and then ask a follow up question asking whether consumers approve of the treatment as it is used.

It should be interesting to see whether there are differences in the answers to these surveys depending on the placement of the vending machines or the faculty of which the respondents are from. Vending machines are placed on different faculties, which house students from different students, which might carry different opinions on these subjects. Differences in answers to this survey might therefore also explain possible differences in the effectiveness of the treatment relative to the placement of the machine. Lastly, we will ask some control questions about the consumer's gender and year of birth ad we will ask them to leave additional comments if they have any.

4.3 Statistical analysis strategy

To see whether there is a statistical significant difference in the relative amount of nudged products sold between the control period and the treatment period a T-test Paired Two Sample for Means will be used. By doing this, it can be seen whether there is a significant difference between the number of green labelled items sold in the control period and the treatment period.

Furthermore, we want to see whether the placement of the vending machine makes a difference on the effectiveness of the treatment. The vending machines are placed on different faculties and therefore serve different kinds of students. It would be interesting to see whether certain students of certain faculties are more influenced by the placement of the traffic light system than other students from other faculties.

5. Results

5.1 Application of treatment

During the application of the treatment, some problems arose that caused a deviation from the original research design. First, there were delays in the placement of the color strips. Originally, this was planned to take place right after the May holiday but was pushed back almost 5 weeks to the week right in front of the exams. Because of this, the treatment data incorporates one week of lectures, two weeks of exams and one week after the exams.

Second, when the treatment was applied, it turned out that there was an error in how the strips were printed. There were less green labels printed than was intended. Originally, there would have been 9 products with a green label and 26 products with a white label. However, on the printed versions there were only 4 products with a green label and 31 products with a white label with little variation in the products that were still labelled green (two types of chips and two types of muesli bars). Because of the delays, it was already too late to exchange the labels, as ordering new ones would take additional time and the University would be closed by the time they arrived.

5.2 Vending machine data

Figure 5 shows the total amount of sales of both the four baseline weeks and the four intervention weeks. The sales for all of the vending machines generally fluctuates between 3200 and 2000 units sold per week. In total, there are more than 20.000 observations. Because the second, third and fourth intervention weeks encompass both the exam weeks and one week of vacation, they have significantly less total sales than in other weeks. This might potentially bias the results of the statistical analysis as it might create both a different pattern of sales in these weeks due to its different setting, and uneven sample sizes between the baseline and the treatment period. To fix this problem, we wanted to take the same weeks of last year as a baseline period to get a more reliable point of comparison. However, because of a major shift in assortment that happened over the course of this year, the data from the weeks from last year is different from the ones of the current year. For example, one of the products that got a green label this year was not in the vending machine yet a year prior, which rendered the possibility of using it as baseline data obsolete. Therefore, we will keep using the baseline weeks that are both taken in a different setting and of a different sample size. Because of this, we will focus on relative instead of absolute differences of sales of the treatment products to accommodate some of these problems.

5.3 Analysis of data

All vending machines	Baseline 1	Baseline 2	Baseline 3	Baseline 4	Intervention 1	Intervention 2	Intervention 3	Intervention 4
Green products	191(6.01%)	114 (5.55%)	156 (6.45%)	154 (6.09%)	217 (7%)	186 (7.33%)	127 (6.15%)	88 (6.33%)
White products	2988 (93.99%)	1941 (94.45%)	2263 (93.55%)	2373 (93.91%)	2883 (93%)	2353 (92.67%)	1939 (93.85%)	1303 (93.67%)
Total	3179 (100%)	2055 (100%)	2419 (100%)	2527 (100%)	3100 (100%)	2539 (100%)	2066 (100%)	1391 (100%)
Crocky chips	105 (45.26%)	76 (48.41%)	98 (45.58%)	84 (44.21%)	109 (42.91%)	94 (43.12%)	81 (48.80%	48 (44.86%)
Popchips	127 (54.74%)	81 (51.59%)	117 (54.42%)	106 (55.79%)	145 (57.09%)	124 (56.88%	85 (51.20%)	59 (55.14%)
	232 (100%)	157 (100%)	215 (100%)	190 (100%)	254 (100%)	218 (100%)	166 (100%)	107 (100%)

Figure 5. Sales of all the machines and their relative numbers

When all of the sales from all of the vending machines are added up for each week, the relative number of green labeled products sold fluctuates between 5.5 and 6.45 percent in the baseline period and between 6.15 and 7.33 percent in the intervention period (Figure 5). However, differences can be noted between different vending machines on the campus. Figure 6 shows the change in relative amount of green labelled products sold before and after the treatment for every machine. Because in the later weeks of the treatment the amount of sales were low, large variances in percentage points of green labeled products sold in these weeks appeared. Therefore, instead of looking at changes over time, we decided to add up the sales for the complete control period and the complete treatment period to get a more consistent result. Therefore, we will be looking at a before and after implementation. Furthermore, we decided to drop some of the machines out of the analysis that hardly had any sales in the treatment period.

Overall, the total relative amount of green labelled product sold rose from 6.041% in the baseline period to 6.794% in the treatment period, a change of 0.753%. This means that there were 12.5% more green labeled products sold in the treatment period than in the control period. Differences between machines can be noted. For example, not all of the machines showed an increase. Five out of the twenty-one machines showed a decline and one machine showed no change at all. This result can have multiple interpretations. It might be that the green labels simply have no effect. However, it can also be that people at these machines were already aware of the differences in healthiness before the application of the treatment and did not need a tool to guide them. For example, the machine at the dentist restaurant, which showed the biggest decline, already started out with the highest relative amount of green labelled products sold before the application of the treatment. It can be argued that dentists, given their knowledge of the effect of sugar based foods on teeth, were already avoiding the white labelled products in the first place.

	Type machine	Before	After	Difference
All machines		6.041%	6.794%	0.753%
Social Science Faculty				
Spinoza	Snack	6.716%	7.229%	0.512%
Spinoza Cafe	Snack	8.534%	8.645%	0.111%
TVA 6 Soutterain library	Snack	3.311%	7.500%	4.189%
Science Faculty				
Huygens	Snack	4.740%	5.667%	0.927%
Medical Faculty				
Dentistry Restaurant	Combi	11.991%	10.870%	-1.122%
Law Faculty				
Grotius	Combi	3.947%	8.850%	4.902%
Management Faculty / Sport facility				
Gymnasion hall	Combi	8.371%	13.811%	5.440%
Gymnasion hall	Snack	4.571%	6.519%	1.948%
Management Faculty				
Gymnasium Middle	Snack	6.897%	6.224%	-0.672%
Sport Education Faculty				
Gymnasion HAN	Snack	3.812%	5.401%	1.589%
Lecture Halls				
Linaeus C	Snack	4.831%	5.000%	0.169%
Linaeus C 2	Snack	7.143%	13.953%	6.811%
Lecture Halls CC	Snack	3.256%	5.714%	2.458%
Other Student Facilities				
Library	Snack	6.272%	6.434%	0.162%
Erasmus 1st floor	Snack	4.890%	6.173%	1.283%
Erasmus 2nd floor	Snack	5.541%	8.730%	3.189%
Erasmus Ground floor	Snack	3.759%	3.252%	-0.507%
Erasmust 1st floor	Combi	9.091%	9.091%	0.000%
Other Staff Faculties				
Mercator	Combi	6.085%	5.381%	-0.703%
Forum	Combi	3.067%	3.889%	0.821%
Transitorium	Snack	4.673%	4.268%	-0.405%
	Mean	5.786%	7.267%	

Figure 6. Relative changes green labelled products before and after treatment per machine

	Total sales baseline	Total sales intervention	Percentage change
Total products	10180	9096	-10.65%
Green products	615	618	0.49%

Figure 7. Absolute and relative change in total sales and sales of green labelled products

To test whether the mean difference between the before and after treatment results are significantly different from zero, a paired sample t-test will be conducted (Figure 8). We will use the relative numbers of green labelled products sold from every machine before the treatment as the before group and after the treatment as the after group (Figure 6).

t-Test: Paired Two Sample for Means		
	Before treatment	*After treatment*
Mean	5.786%	7.267%
Variance	0.052%	0.084%
Observations	21	21
Pearson Correlation	0.64990	
Hypothesized Mean Difference	0	
df	20	
t Stat	-3.03291	
P(T<=t) one-tail	0.00329	
t Critical one-tail	1.72472	
P(T<=t) two-tail	0.00657	
t Critical two-tail	2.08596	

Figure 8. paired sample t-test

The results show that the mean percentage of green labelled products sold in a vending machine was 5.786% before the treatment and 7.267% after the treatment. Given the p-value of 0.00657, the null hypothesis can be rejected on a 99% confidence level. Therefore, we can accept the alternative hypothesis that the traffic light colour system does influence consumer choices.

Given the t critical level of 2.085, we can calculate a 95% confidence interval of effect of the treatment (Figure 9). The mean difference after the treatment is 1.448% with the confidence bounds between 0.451% and 2.445%. Therefore, it can be said that with a 95% confidence the mean difference is between is between these bounds after the application of the treatment.

Mean Difference	1.448%
Stand. Dev. Of Difference	2.189%
Standard Error of Difference	0.478%
T alpha 95% confidence	2.086
Lower Confidence Level	0.451%
Upper Confidence Level	2.445%

Figure 9. 95% confidence interval

5.4 Surveys

The surveys were taken at different locations on the campus, most of them at the university library. The surveys for both the control and the treatment period were mostly conducted on students, with the average age being 23. From the respondents, 61% was female and 39% of them male. The students originated from different faculties from the university with most of them being from the social sciences faculty. From the respondents, 38% made a purchase at a vending machine less than once a month, 35% made a purchase more than once a month and 27% made a weekly purchase. Furthermore, there are differences in the frequency of which the chosen product is bought.

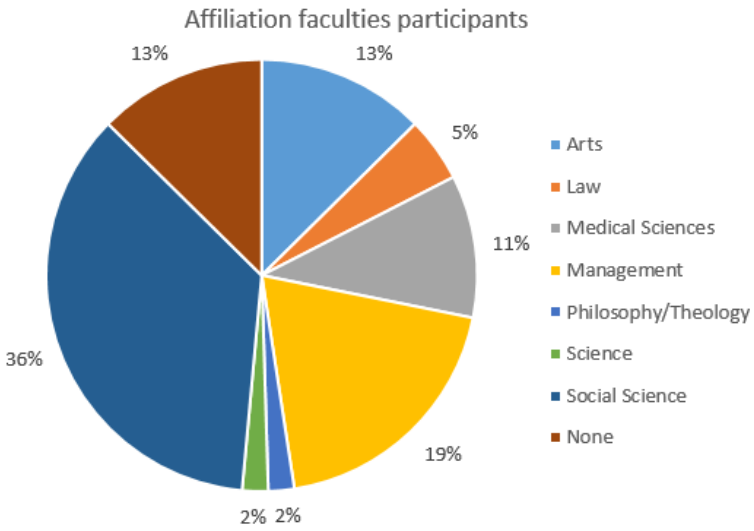

Figure 8. Distribution affiliation faculties of respondents

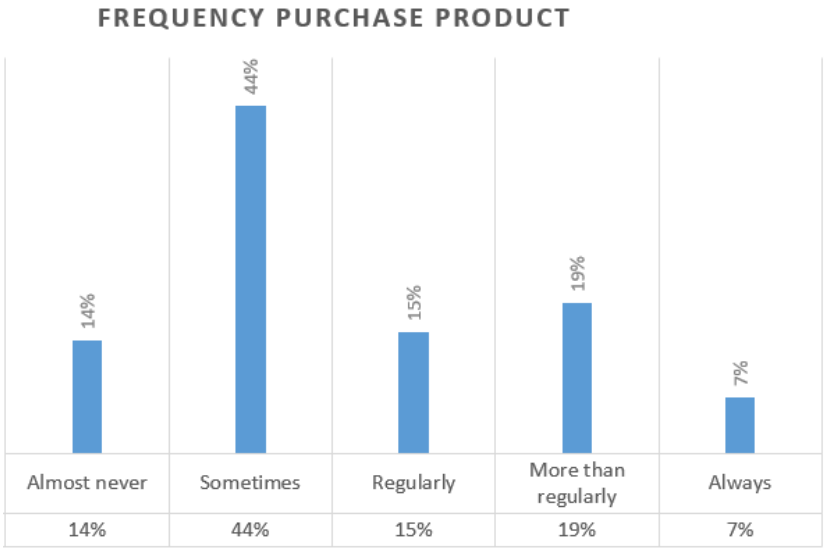

Figure 9. Distribution frequency of purchase

Most people tend to buy more often. From the respondents, 41% answered that they bought the products regularly or more often than that. Therefore, there might be some evidence for habit formation in the purchase of products from vending machines. People settle for a certain product they like and do not put much effort into the decision of the product they'll buy at the vending machine after that. This might also be reflected by the answers given to the important of certain aspects of the decision.

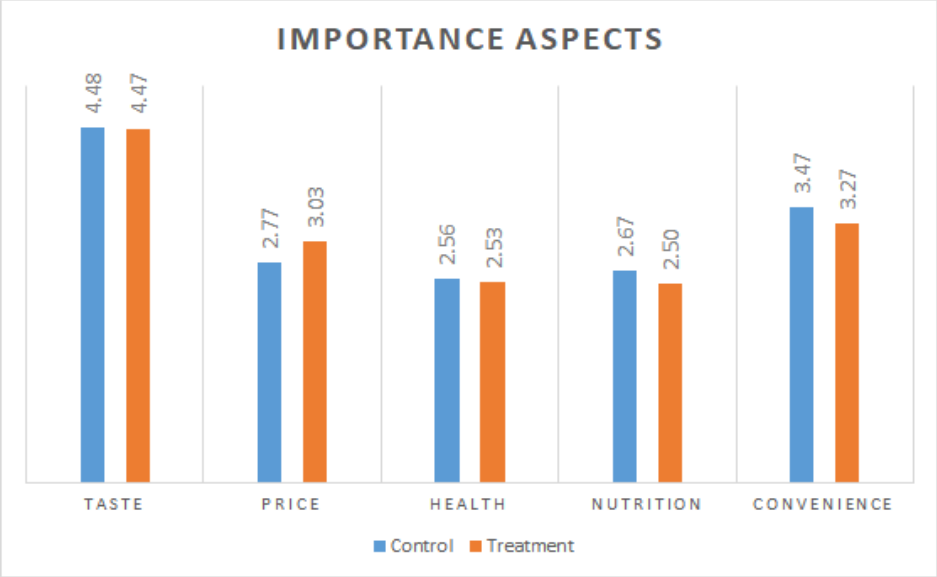

Figure 10. Valuation different aspects in choice (Scale 1-5)

Overall, people find taste the most important when deciding what to eat, followed by convenience and then price (Figure 10). People seem to care the least about health and nutrition. When the treatment was applied, the valuation of these aspects did not seem to change. The difference between the valuation of taste and the other aspects is interesting as there are large discrepancies. It seems that people only seem to care what tastes good to them and care little about anything else. This might be due to the habit formation described earlier. People keep choosing the same product because it tastes good to them and don't put much effort into the evaluation of their decision afterward.

An interesting result emerged that proved the discrepancy between people's preferences and their actions. When asked how important the respondents found eating healthy, almost everyone responded with a high score. However, when asked how healthy they deemed the product that they had just bought moments ago, people admitted that it is not healthy at all (Figure 11). Literally everyone gave the second question a similar or lower score than the first.

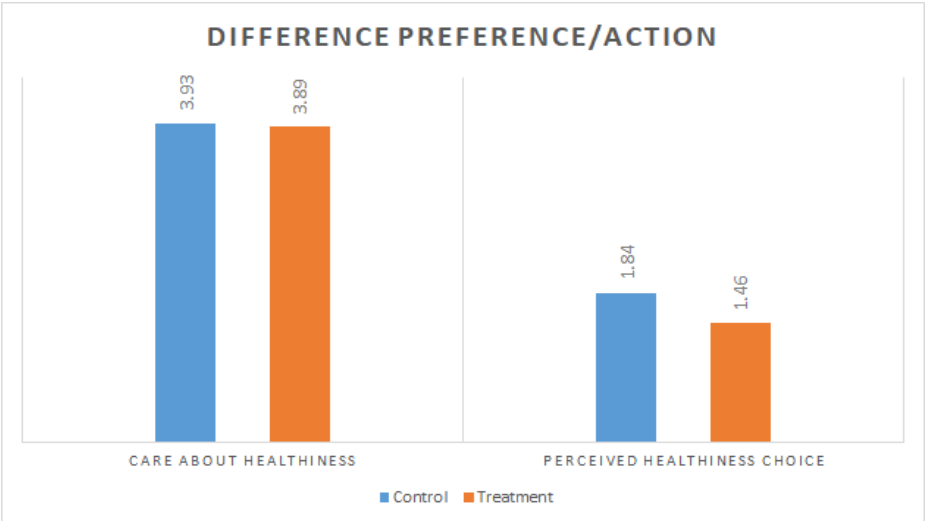

Figure 11. Difference preference and action

This effect was slightly exaggerated by the application of the treatment. This was confirmed with the use of an Anova, testing whether there was a significant difference between the control responses and the treatment responses (p-value = 0.0406). It might be that people perceive their product as less healthy because of the absence of a green label. The result shows that people want to adhere to healthier diets but have a hard time doing so. Some interesting correlations occurred with these questions as well. For example, people who scored high on the goal persistence questions on the executive skill questions also seemed to care more about eating healthy (p-value = 0.012, SD = .037). No differences between age or gender were found.

Besides the evaluation of the underlying reasons or considerations for the purchase of certain products, we also tried to capture the response to the application of the treatment.
From the 30 respondents in the treatment survey, only 2 noticed something different about the vending machine and could point out correctly that colors and calorie information had appeared. However, from the 30 respondents 4 stated that it had influenced their decision. This might also be reflected by the question whether people had planned to buy the product they had chosen when they went to the vending machine (Figure 12).

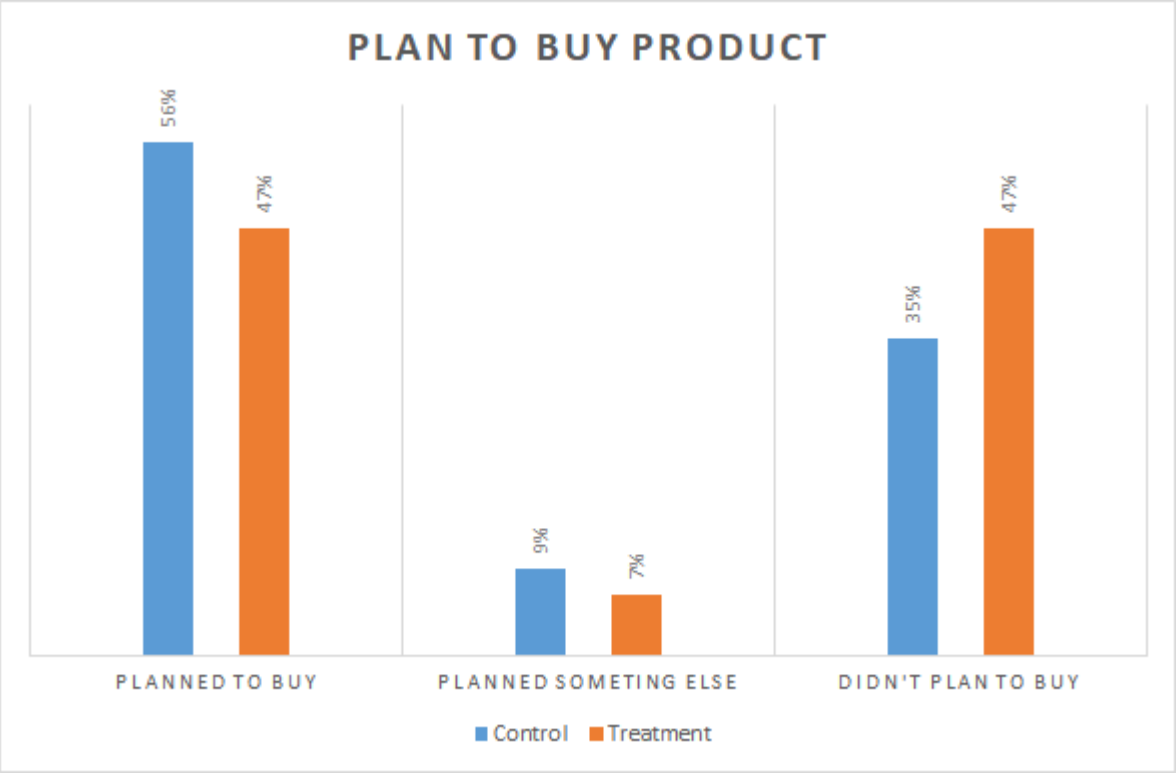

Figure 12. Planned to buy the product

There is a noticeable difference between the treatment surveys and the control surveys to this question. More people did not plan to buy the product in the treatment period than in the control period. It might be, that the application of the color-coding changed their minds when choosing a product.

We also asked about the opinion of respondents about the application of a color coding system in making decisions. Of the respondents, 60% thought color-coding would be helpful and 40% thought it is not a helpful. However, there might have been a misinterpretation of the question. People might have thought that the question was about the color-coding they had just experienced and since barely anyone noticed the treatment, it might have been perceived as not helpful. It might be that people did not see the placement of the green labels as there were less labels printed than were originally intended and they were in the corners and at the side, where visibility is limited. When asked how they felt about being influenced in their decision making by the placement of the color coding, none of the respondents said they were annoyed by it, 60% said they didn't care and 40% thought that it was good.

Respondents were then given the opportunity to leave a comment. Almost all of the remarks given were about the exposure of the treatment. People would like to be informed through a notice and suggested different kinds of solutions to this. Furthermore, suggestions were given to make the treatment more effective, like the use of more colors or using the LCD screen as a notice. All of these suggestions were planned for this research from the beginning but were ultimately scrapped because of limitations.

6. Conclusion/Discussion

The purpose of this study was to determine the effect of the placement of a traffic light labeling system on the purchases of products in vending machines on a university campus. Our results show that the total amount of sales after the application of a color coding system were significantly different between the experimental and the control periods, rising with approximately 12.5%. We also explored empirical insights into the perception, acceptance and opinion of the nudge. People give general positive feedback about being nudged and overall, people respond that they want to be informed about the healthiness of products.

However, as proven by the survey, many people did not notice the labeling system. Therefore, it is questionable that the full extent of the possible effectiveness of the treatment was achieved. To come to a more viable outcome, future research on the application of this treatment on vending machines should be coupled with an educational campaign informing customers of the meaning and the placement of the Traffic light system. Furthermore, this study was limited in its application as only 21 machines were taken into the analysis, a limited amount of products were labelled and red shaded colors were not applied.

Given the societal importance of the matter of obesity, the use of a traffic light labeling system is an important opportunity to explore. Nudges have shown to be an effective tool in helping people to make better choices and evidence of its effectiveness is needed to gain the support of the public and policymakers alike. The traffic light system has already been implemented and in use in the United Kingdom for years and was planned for a European-wide implementation as well (European Parliament, 2008). However, even though widely supported by food agencies across Europe, due to extensive lobbying it did not pass through as official legislation under the assumption that there is no real evidence that a traffic light system would actually improve citizen's healthfulness. With this research, we have tried to provide this evidence and have found significant results. Of course, nudges alone cannot fix the issue of widespread obesity and can in no way substitutes regulations, restrictions or economic incentives. However, an effective and cheap complementary policy tool like this should not be overlooked and would be a waste not to utilize.

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Appendix 1. Survey

Radboud Universiteit

You are about to take part in a questionnaire for a study about consumer behavior related to vending machines. This questionnaire is anonymous and results will be used for research purposes only.

Please fill out the questionnaire as honest as possible, there are no right or wrong answers as we are merely interested in personal observations and results.

By filling out this survey you agree that your answers in the questionnaire will be used and added to a database for future research.

1. What is your gender?

- ○ Male
- ○ Female
- ○ Other

2. What is your age?

3. At which faculty do you work or study?

- ○ Faculty of Arts
- ○ Faculty of Law
- ○ Faculty of Medical Sciences
- ○ Faculty of Management
- ○ Faculty of Philosophy, Theology and Religious studies
- ○ Faculty of Science
- ○ Faculty of Social Science
- ○ None of the above

4. Which product(s) did you purchase from the vending machine?

- ☐ Autodrop Bosvruchtrode Cadillacs
- ☐ Balistro
- ☐ Bio Today Cranberry
- ☐ Bounty
- ☐ Bueno
- ☐ Chaudfontaine
- ☐ Vitamine Water Mango
- ☐ Choco Prince vanille
- ☐ Coca Cola
- ☐ Coca Cola Zero
- ☐ Croky Chips paprika
- ☐ De Lekkerste gevulde koek
- ☐ Eat Natural almond
- ☐ Eat Natural cranberry
- ☐ Fanta
- ☐ Kanjers stroopwafel
- ☐ KitKat
- ☐ Kitkat Chunky White
- ☐ Leev Bio Maïswafel melkchocolade
- ☐ Leev Bio Oerkoek choco
- ☐ Leev Bio Oerkoek cranberry
- ☐ Leev Bio spelt stroopwafel
- ☐ M&M's Peanut
- ☐ Mars
- ☐ Nakd Banana Crunch
- ☐ Popchips Barbecue
- ☐ Popchips Sea Salt
- ☐ Red Band DropFruit Duo's
- ☐ Red Band Peaches
- ☐ Red Bull
- ☐ Snickers
- ☐ Tony's Chocolonely Milk
- ☐ Twix
- ☐ Vitamin Water Framboos
- ☐ Wasa Sandwich

5. Did you plan to buy exactly <u>this</u> product before you went to the vending machine?

- ○ Yes, I planned to buy this product
- ○ No, I planned to buy something else, but then chanced my mind
- ○ No, I planned to buy something, but still had to make a choice

6. How often do you make purchases at this vending machine?

- ◯ Less than once a month
- ◯ More than once a month
- ◯ Every week

7. Is it the first time that you bought the product you have chosen from the vending machine?

◯ Yes ◯ No ◯ I do not know

If no, answer question 8. Else, continue at question 9.

8. How often do you buy the product you have chosen when making a purchase at the vending machine?

◯ Almost never ◯ Sometimes ◯ Regularly ◯ More than regularly ◯ Always

9. On a scale from 1 to 5, with 1 being not important and 5 being very important, identify how important the following aspects were for your decision.

(Not important)	1	2	3	4	5 (Very important)
1) Taste	◯	◯	◯	◯	◯
2) Price	◯	◯	◯	◯	◯
3) Health	◯	◯	◯	◯	◯
4) Nutrition	◯	◯	◯	◯	◯
5) Convenience	◯	◯	◯	◯	◯

6) Other, Mainly

Survey continues on next page

10. Read each item below and then rate that item based on the extent to which you agree or disagree with how well it describes you.

Strongly disagree	1	Tend to agree	5
Disagree	2	Agree	6
Tend to disagree	3	Strongly agree	7
Neutral	4		

	1	2	3	4	5	6	7
1) I don't jump to conclusions	○	○	○	○	○	○	○
2) I think before I speak.	○	○	○	○	○	○	○
3) I don't take action without having all the facts.	○	○	○	○	○	○	○
4) My emotions seldom get in the way when performing on the job	○	○	○	○	○	○	○
5) Little things do not affect me emotionally or distract me from the task at hand	○	○	○	○	○	○	○
6) I can defer my personal feelings until after a task has been completed	○	○	○	○	○	○	○
7) I think of myself as being driven to meet my goals	○	○	○	○	○	○	○
8) I easily give up immediate pleasures to work on long-term goals	○	○	○	○	○	○	○

11. On a scale from 1 to 5, how important do you find eating healthy?

1	2	3	4	5
○	○	○	○	○

(Not at all) (Very much)

12. How healthy do you deem the product that you have just bought?

1	2	3	4	5
○	○	○	○	○

(Not healthy) (Very healthy)

11. During your purchase, did you find anything different or out of the ordinary about the vending machine?

◯ Yes ◯ No

If Yes, in a few words, explain what you noticed:

THE ANSWER IS ON THE NEXT PAGE

On the vending machines, a color coding system (white/green) has been applied to indicate the healthfulness of certain products.

12. Did the placement of the color coding system influence your purchase decision in any way?

◯ Yes ◯ No

13. Do you think the placement of the color coding system is helpful in making decisions?

◯ Yes ◯ No

14. How do you feel about being influenced in your product choice by the placements of a color coding system?

◯ Annoyed ◯ Don't care ◯ Good

15. You are given the opportunity to leave a comment

End of survey. If you would like to be updated about the results of the study, you are given the opportunity to leave your email address: