

Behavioural Economics: *the application of a Nudge to improve food habits in a school canteen*

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Abstract— In order to find a solution to reduce the growth of overweight and obesity rates among young people, the study aims to analyze the effect of the application of a Nudge to increase the consumption of healthy foods by students in a canteen of a private school in Brasilia, Brazil. For this, a bibliographic research was done on concepts of Behavioral Economics and Nudge, one Nudge was designed and applied and, finally, the effect of the application was evaluated. As a main result, it was observed the success of the Nudge as a tool to increase fruit intake among young people, demonstrating Nudge's ability to be a public policy tool of efficiency and low investment.

Keywords—*nudge; school; food; healthy.*

I. INTRODUCTION

Overweight and obesity are health challenges in the world, and equally in Brazil. In the Brazilian reality, more than half of the adults - 56.5% - are overweight, while the percentage of young people reaches 28%. Considering obesity, this problem reaches 22.1% of adults and 10.8% of young people (WHO, 2017).

The states of overweight and obesity designate situations of being overweight in a human, that is, in that an individual has more weight than is considered normal for his size and his age. The difference between the two is the severity of overweight: in the case of obesity, a more worrying situation is observed when compared to the overweight state.

Weight excess, whether overweight or obesity, contributes to several chronic diseases and is associated with an increase in the incidence of cardiovascular diseases, type 2 diabetes mellitus, hypertension, stroke, dyslipidemia, osteoarthritis and some types of cancer. (MUST et al., 1999).

In addition, the causes of abnormal fat accumulation are varied. However, they are generally related to the adoption by younger generations of less healthy habits, linked to poorer nutrition and less frequent exercise.

Therefore, it is a public health challenge that deserves attention from policymakers, physicians, educators and other relevant stakeholders in changing

the landscape of overweight and obesity. How can one contribute to the improvement of people's habits in such a way as to reduce the incidence of overweight and obesity and related diseases is an important question to be taken into account by these actors.

In the case of children and adolescents, the search for healthy habits becomes even more important because at this stage behaviors are established that will persist throughout life. Based on this, the creation of public policies for healthier habits focused on young people produces changes in behavior and positive results that persist throughout life, even when they are extinct. (LOWENSTEIN, PRICE, VOLPP, 2016)

The school plays an important role in creating habits for young people. In the case of food, school canteens are present in the students' lives by offering food that will be the basis of their daily school feeding and, on account of Moreover, it has a relevant influence on the establishment of their food choices.

Like home, educational institutions are true schools of food. A child accustomed to eating industrialized foods at home and on a daily basis as students is more likely to replicate the choice for food in other situations. As a consequence, the likelihood of developing overweight and obesity is also higher.

With this in mind, in order to offer healthier options in local school canteens, Law No. 5,146 came into force in 2016 in Brasília, prohibiting the commercialization of foods such as soft drinks, snack foods, fritters, and candy. Looking at the results of the law, supply-side action, through the constraints brought about by legislation, is important. However, without the students' awareness and encouragement to buy healthier alternatives, the effectiveness of public policies will be low.

One possibility of public policy is the use of consumption stimuli in school canteens and, among the possibilities of stimulus tools, the use of Nudge, an application developed within the Behavioral Economy and highlighted by Richard Thaler, Nobel of Economics in 2017, in his studies.

A Nudge consists of any modification in the architecture of choice in order to change people's behavior in a predictable way, but without forbidding options or changing their economic incentives. In

addition, it is easy, cheap (THALER; SUSTEIN, 2008) and is a tool that stimulates better choices, but without restricting or prohibiting certain choices.

Therefore, in view of the challenge of overweight and obesity and the importance of school canteens in the creation of eating habits, the objective of this research is the application of this tool to influence students to consume healthier foods in the school canteen, specifically in this work, fruit salads, healthy food that is easily found in school canteens and that will serve as an example of application.

A. General Objective

To analyze the effect of the application of Nudge to increase the consumption of healthy foods by students in a school canteen.

B. Specific Objectives

- Explore concepts of Behavioral Economics and Nudge;
- Elaborate one Nudge for application in the study;
- Apply the Nudge elaborated in a school canteen of Brasília in Brazil to increase the consumption of fruit salads;
- Evaluate the effectiveness of the Nudge and suggest proposals for improvement in the tools;

II. BEHAVIOURAL ECONOMICS

Faced with the dissatisfaction of economists with the explanations offered by the Economy itself for the economic behaviors observed in practice, Behavioral Economics arises. It also has an interdisciplinary character, uniting knowledge of Anthropology, Sociology, Psychology, History, and Biology initially finds difficulty within the academy but begins to gain notoriety from the creation of the Society for the Advancement of Behavioral Economics (SABE). (FERREIRA, 2008)

A fundamental theory that emerges from the questions brought by Economic Psychology and Behavioral Economics is that the human being has limited rationality (SIMON, 1978), which is a counterpoint to the economic theory of rationality.

According to Simon's conception of limited rationality, not all decisions are optimal. There are restrictions on the processing of information by humans because there are limits of knowledge (or information) and computational capabilities.

Human decisions are strongly influenced by context. Unlike Homo Economicus, the rational and selfish individual with stable preferences, according to the logic of limited rationality, human behavior varies in time and space and is subject to cognitive biases, emotions, and social influences. (ÁVILA; BIANCHI, 2015)

The rationality of an individual in his economic decision depends on structures found in the environment. According to Gingerenzer (1996), people

are ecologically rational when they make the best use of their limited capabilities by applying simple, intelligent algorithms that can lead to near-optimal inferences.

Amos Tversky and Daniel Kahneman made important contributions to the field of study through their behavioral studies. Among these contributions is the analysis of Heuristics and Vieses.

Their theory is that decision-makers are based on a set of heuristics, that is, on mental shortcuts that reduce the complexity of assessing probability and predicting values, facilitating decision-making, and making information processing and judgment simpler. Heuristics are important when making complex decisions quickly, thus simplifying information processing.

However, there may be systematic errors and distortions in the reasoning arising from heuristics, in terms of bias of perception and evaluation.

In the initial studies of the area, three main types of heuristics were identified: representativeness, availability and anchorage adjustment. (KAHNEMAN, TVERSKY, 1974)

The representativity heuristic evaluates the probability that an event B occurs at the level that an event A resembles B. This heuristic uses stereotypes to make judgments. Kahneman and Tversky provide the example of an individual who is very shy and withdrawn, is always ready to help but has little interest in the people and the world around him; is quiet and organized; has need of order and structure and a passion for details. Thus, based on the characteristics of the individual, people tend to imagine his possible profession using the stereotype of several professions, such as physicist, mathematician, librarian, salesman, doctor or farmer.

The heuristic of availability stems from the evaluation of the probability of events based on the frequency and ease with which certain ideas, memories or situations come to mind of the decision maker. This frequency demonstrates the ease of such information being present in mental operations. For example, two children born in different families, the first raised by married parents and the second by divorced children. The heuristic of availability in this situation, due to the experience of each of the children in their respective families, can lead to bias when they are adults and asked about the chances of marriage success. Probably the child in the first situation is more likely to believe that a marriage can work.

Finally, the anchorage adjustment heuristic happens when individuals focus on the use during the mental operation of a recently received information, that is, this new information is used as an anchor in the decision-making process.

An important concept brought by Daniel Kahneman in his book *Thinking, Fast and Slow* (2011), is the existence of two different systems in the human brain.

System 1 is fast, unconscious, instinctive, and emotional. This is important in human survival for your survival in dangerous situations. System 1 consists of thought processes that are intuitive, automatic, experience-based, and relatively unconscious. To obtain the speed of processing, System 1 makes use of heuristics and is responsible for systematic errors, that is, biases in the decision process.

On the other hand, System 2 is slow, conscious, logical, and rational. Thus, it is more closely associated with the concept of human rationality considered by mainstream economics.

A. *Nudge*

Nudge is a concept spread by Thaler, Nobel de Economia, and Sustein (2008) in his book *Nudge: Improving Decisions about Health, Wealth, and Happiness* and is aligned with the philosophy of Libertarian Paternalism. Although Paternalism and Libertarianism are concepts that are commonly used in mutually exclusive situations, in this case, Nudge seeks to influence people to make better decisions - hence Paternalism, while retaining their freedom of choice - thus aligned with liberal ideas.

A Nudge [...] is any aspect of the architecture of choice that alters people's behavior in a predictable way without forbidding any options or significantly altering their economic incentives. For an intervention to be considered a mere Nudge, it must be easy and cheap. Nudges are not impositions. Laying the fruit at eye level is considered Nudge. Prohibit junk food, no. (THALER; SUSTEIN, 2008, p.6)

Another example of Nudge, this time aligned with the objectives of this project to provide an improvement in food choices by young students, was the application of this tool in American school canteens. Hanks, Just, and Wansink (2012), scholars of Cornell University, separated their interventions in canteens into three categories:

- Convenience: improving the convenience of fruits and vegetables;
- Attractiveness: increase the attractiveness of fruits and vegetables compared to other options;
- Normativity: make the choice of fruits and vegetables the standard.

The following table 1 presents some specific examples of each category:

TABLE 1. EXAMPLES OF INTERVENTION IN SCHOOL CANTEENS

Category	Example
Attractiveness	Vegetables labeled with creative names
Convenience	Fresh fruits, located near the box, at eye level
Normativity	Question from the employee: "Would you like to try ... How about a vegetable?"

Source: Hanks, Just e Wansink (2012)

The study observed that after the changes were implemented, fruit consumption increased by 18% and vegetable consumption by 23%. Thus, this research demonstrates the potential impact of a Nudge through simple and inexpensive interventions.

III. METHODOLOGY

In relation to the essential elements of classification of this work, that is, in the aspects nature, objectives, approach, method and procedures, the research is classified as follows, according to the table 2, respectively:

TABLE 2. CLASSIFICATION OF THE ESSENTIAL ELEMENTS OF THE RESEARCH

Nature	Applied research
Objectives	Exploratory research
Approach	Qualitative and quantitative approach
Method	Inductive method
Procedures	Bibliographic and experimental research

Source: Authors' elaboration

A. *Population and sample*

The population and sample of this research are represented in the table 3 below:

TABLE 3. Population and sample of the research.

Population	Sample
Youth between 6 and 18 years old students from the first year of elementary school to the third year of high school	756 young students with these characteristics of a private school in Brasília

Source: Authors' elaboration

B. Nudge created

The idea is to make the consumption of fruit salads more fun and attractive. Instead of the fruit salad traditionally sold in pots, Pizza Fruit was created, a fruit salad, but with a pizza-like appearance, the base of which is watermelon. For this, interviews were conducted through informal conversations with the school's research youth in order to identify their favorite thefts. In general, banana, grape, strawberry, watermelon and mango fruit stand out.

It seeks to use heuristics in which pizza is associated with a delicious food. Thus, it was hoped that this mental shortcut would bring the fruit salad a more appealing look, a better taste perception and a more fun drinking experience.

The strategy is to get young people to think, "If I love pizza, a Pizza Fruit should be tastier than an ordinary fruit salad."

For its implementation, from the understanding of the favorite fruits of the students, it is tested and elaborated the recipe Pizza Fruit. Then canteen employees are trained to replicate the product and how to run the product on a day-to-day basis.

Figure 1 is a picture, taken by the author, of the Pizza Fruit sold during the experiment. It is composed of a watermelon base and completed in its cover by strawberry, mango, grape and granola.



Fig. 1. Pizza Fruit sold during the experiment.
Source: Authors' elaboration.

In addition to the change in product, posters of the new product were also applied in strategic places in the cafeteria, a total of three, such as the one in Figure 2:



Fig. 2. Poster of the Pizza Fruit.
Source: Authors' elaboration.

IV. RESULT ANALYSIS

For the purpose of comparison and analysis of the effectiveness of Nudge, the average daily sale of fruit salads before the application of the experiments, provided by the manager of the cafeteria, was considered to be 6 units in a day.

Based on the experiment, graphs are shown in figures 3 and 4, respectively: the Fruit Pizzas sold each day and the common fruit salads in pots sold daily. Thus, the common fruit salad is still being sold simultaneously to the new product created.

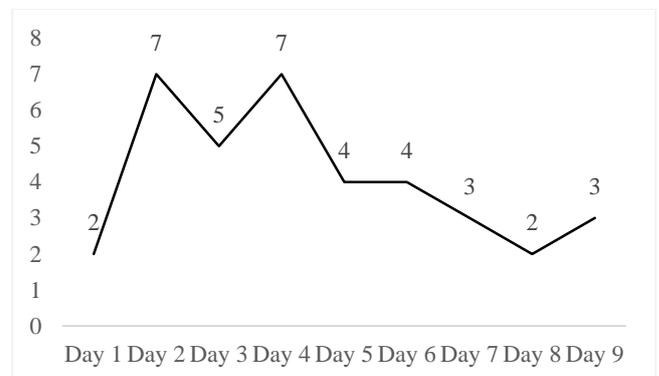


Fig. 3. Graph of the amount of Pizzas Fruit sold daily.
Source: Authors' elaboration.

It is observed on the first day a timidity in the consumption of the Pizza Fruit, but that increases later and more downward decays. This downward trend in sales is possibly due to the loss of novelty effect. At first, as a change in the context of information and something other than what students were accustomed to observe in the canteen environment, the poster attracts more attention from consumers and helps to increase sales. However, in the second moment, the young become accustomed and the tool loses effectiveness.

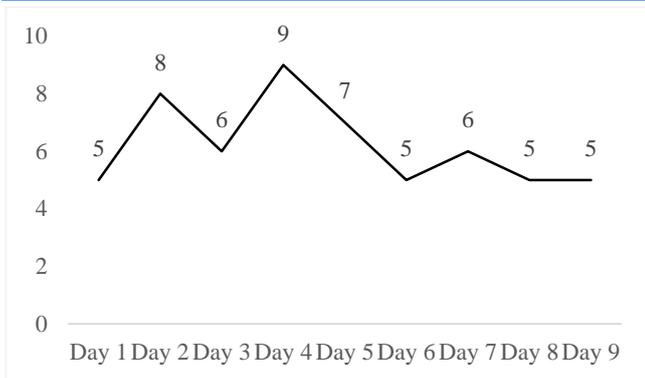


Fig. 4. Graph of the amount of common fruit salads sold during the experiment.
 Source: Authors' elaboration.

The Average PF is defined as average daily sales of Pizza Fruit, and the Average CFS as the average daily sale of common fruit salad. Because they are two products competing with each other and both were sold at the same time, average daily sales of Pizza Fruit (average PF) is lower than the average before the experiment of 6 units. In the case of the common fruit salad, the average (SFC average) is slightly higher than the previous one to the research. Average PF = 4.11 and Average SFC = 6.22.

Possibly, as Pizza Fruit is a new product and there is still mistrust involved in its consumption, its sales result is below the already known common fruit salad.

Although the results appear to be less substantial when the products are analyzed separately, when the two types are sold on the same day, the values show a large increase of fruit salad in relation to the situation prior to the experiment. The canteen even sells 16 units of fruit salad in just one day, which is a substantial increase over the average.

The daily data adding the sale of Pizza Fruit and common fruit salad are shown graphically:

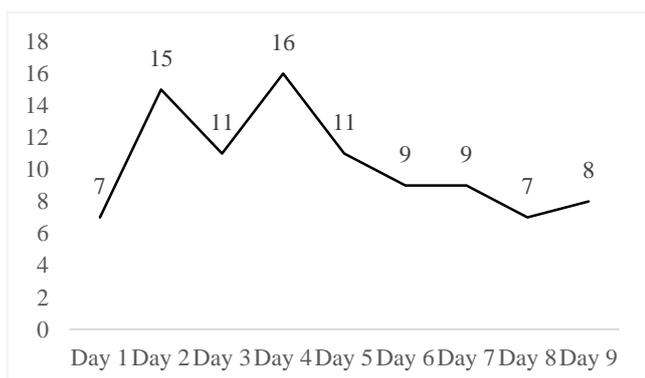


Fig. 5. Sum of Pizzas Fruit and common fruit salads sold daily.
 Source: Authors' elaboration.

Comparing the average sale before the experiment with the sum of the average sales of Pizza Fruit (Average PF) and common fruit salad (Average CFS), we obtain the average daily sales of fruit salad, regardless of type (Average FS).

The average found Average FS is 10.33 fruit salads per day, a substantial increase of 72.16% in

relation to the level of consumption before the experiment, as represented in table 4.

TABLE 4. AVERAGE FS BEFORE AND AFTER THE EXPERIMENT

Before	Average FS=6
During	Average FS=10.33
Variation	+72.16%

Source: Authors' elaboration.

Therefore, it is observed in the research that the application of Nudge is able to generate a new demand of fruit salads. The common fruit salad, in parallel sold, supplies the demand that on average already consumed 6 units daily.

However, the products sold by Pizza Fruta correspond to a new demand that did not exist before, which contributes to the fact that the experiment results in a sales increase of 72.16% in the number of fruit salads.

V. FINAL CONSIDERATIONS

This paper aims to test the Nudge, concept of Behavioral Economics, as a tool to deal with the increasing rates of overweight and obesity, especially among young people.

First, a bibliographical survey of fundamental concepts and theories related to Behavioral Economics was done, in addition to exploring the concept of Nudge and application examples in more detail.

As the school plays an important role in the creation of habits for young people, in this research, we sought to develop, apply and evaluate in a canteen of a private school in Brasilia the Nudge as a tool in order to stimulate and increase the consumption of fruit salads and thus improve the eating habits of young people.

As a result, the increase was substantial: an increase of 72.16% over the pre-survey average. From the point of view of the canteen business, the application of Nudge provided, in the same proportion, an increase in revenue.

However, both also presented a tendency to decrease the impact of Nudge over the analyzed period. It is concluded that this negative trend is due to the loss of the novelty factor, that is, in the first moment each one of the tools caught the attention of the youngsters, but with the passage of the days, the students became accustomed to them. This is perceived as a limitation of Nudge's theory. For situations such as the one in this experiment in which students return to the canteen for several days in a row, constant changes are needed, changing the details of Nudge or replacing them with new ones, in order to maintain effectiveness.

Finally, it can be concluded that Nudge can achieve great effectiveness, even with its low cost of intervention, which serves as inspiration for

formulators of public policies, not only related to health issues, but facing other challenges.

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