The impact of nutritional labeling on adult snack choices : a controlled field experiment in a non-commercial professional setting

Reference:
Godden Elke, Cutello Clara, Dens Nathalie.- The impact of nutritional labeling on adult snack choices : a controlled field experiment in a non-commercial professional setting
Appetite: the journal for research on intake, its control and its consequence- ISSN 1095-8304 - 193(2024), 107167
Full text (Publisher's DOI): https://doi.org/10.1016/J.APPET.2023.107167
To cite this reference: https://hdl.handle.net/10067/2017300151162165141

The impact of nutritional labeling on adult snack choices: a controlled field experiment in a non-commercial professional setting

Abstract

Each year, 2.8 million people die because of comorbidities associated with being overweight. Snacking substantially contributes to people's calorie intake. One way to nudge consumers towards healthier alternatives is the implementation of nutritional labeling. This study reports on a controlled field experiment that evaluates the effect of two nutritional labels on free snack choices (n = 739). Participants at a conference could choose between nuts, cookies, and candy bars as a snack, presented at the bar at six different locations across two bar counters. The labels were set up in front of each snack in three conditions: no labeling (control), a calorie label, or a traffic light label (i.e., the Nutri-Score). The location of the snacks on the counter (Either side of the counter; Center, Right, Left) and the time-of-day (Morning (= reference) vs Afternoon) were statistically controlled for. The results show that calorie labels could not successfully nudge consumers toward healthier snack choices (nuts instead of candy bars or cookies). In contrast, the Nutri-Score label significantly increased the probability of choosing nuts over candy bars. The Nutri-Score also increased the chance of choosing nuts over cookies, but the difference was not significant.

No prior studies to our knowledge have directly compared calorie labels to the Nutri-Score. This study suggests that the Nutri-Score label can be a more successful intervention than calorie labels to nudge consumers towards healthier choices in situations were free snacks are offered, like many modern workplaces. Changing snacking behavior is challenging and naturalistic field experiments like this one are needed to translate the theory from previous laboratory studies to real-life settings.

Keywords: Nutri-Score; Calories; Snack choice; Field Study; Front-Of-Pack label

1. Background and objective

Overweight and obesity are prevalent problems and are associated with different kinds of cancer, diabetes, and other non-communicable diseases, leading to a lower quality of life (Afshin et al., 2017; González-Muniesa et al., 2017; Katzmarzyk & Janssen, 2004). Each year, 2.8 million people die because of comorbidities associated with being overweight (Sciensano, 2021). While obesity is often associated with unhealthy diets and lifestyles, unhealthy diets have been linked with an increased risk of several non-communicable diseases like coronary heart disease and various cancers, even when they do not co-occur with obesity (Campbell & Duhaney, 2016; Harvard T.H. Chan School of Public Health, n.d.; Jannasch et al., 2017; Lassale et al., 2016; Menotti et al., 2014; Sotos-Prieto et al., 2017; Yu et al., 2018).Therefore, there is an increasing emphasis on promoting healthier lifestyles to decrease the number of overweight people and overcome the negative repercussions of unhealthy diets (World Health Organization, 2022).

Besides the impact of unhealthy diets on the chances to develop a variety of diseases, the type of calories eaten also differently contributes to weight gain (Harvard T.H. Chan School of Public Health, n.d.). For example, consuming foods with higher protein contents and lower glycemic loads can help prevent weight gain (Brand-Miller & Buyken, 2012). Moreover, increasing the proportion of vegetables helps protect against several illnesses, independent of the consumers' weight status (Boeing et al., 2012; Mytton et al., 2014). The contemporary environment is frequently described as "obesogenic" (Coelho et al., 2011; Townshend & Lake, 2009), meaning that people's surroundings at present facilitate and even motivate unhealthy choices. This would suggest that changes have to be made not only on an individual level but also at the level of the environment people live in (Swinburn et al., 2011). Small changes to the environment, frequently referred to as "nudges" (Thaler & Sunstein, 2009), might help consumers in adopting healthier lifestyles. Various types of nudges are recognized, often categorized as "Cognitive nudges," "Affective nudges," or "Behavioral nudges" (Cadario & Chandon, 2019). While behavioural nudges have the reputation of being more effective than cognitive nudges (Cadario & Chandon, 2020), it is important to consider the extent to which consumers accept these interventions when applying nudges (Cadario & Chandon, 2019). The current study therefore tests a cognitive nudges (nutritional labelling) that is well-accepted by consumers (Cadario & Chandon, 2019).

A strong contributing factor to obesity is unhealthy snacking (Bertéus Forslund et al., 2005). Research has shown that the number of snacks and their contribution to our daily energy intake has increased exponentially over the years, to the point where snacking is considered a "fourth meal" (Baskin et al., 2016; Kant & Graubard, 2015). About 15-35% of people's daily energy intake comes from snacks (Australian Bureau of Statistics, 2014; Cowan et al., 2020; Myhre et al., 2015; Si Hassen et al., 2018). Due to the substantial role that snacks can have on individuals' weight gain, Public Health England (PHE) advises only to consume snacks containing less than 200 kcal and with more beneficial nutrients (Marty, Evans, et al., 2021). Unfortunately, many popular snacks are not only high in calories, but also poor in nutritional composition (Byrd-Bredbenner et al., 2012; Marty, Evans, et al., 2021). If healthier snacks are offered alongside unhealthier alternatives, they compete for the consumer's choice. Steering consumers towards healthier snack alternatives is of vital importance. Hence, the current study focuses on free snacks at a work-related conference and investigates whether nutritional labels could direct consumers towards healthier alternatives.

Snacking is quite common during breaks, e.g., in the workplace (Hansen et al., 2016). An increasing number of employers offer free snacks to their employees and one study suggests that this increases their happiness (Hadley, 2015; Society for Human Resource Management, 2018). The combination of free snacks, snack proximity, and the presence of other people (e.g., colleagues) suggests that unhealthy snacking can be a problematic vice to control in such environments (Baskin et al., 2016; Herman, 2015). In fact, employees report difficulty maintaining their weight when their workplace offers free snacks (Taber, 2014). This is a considerable problem, as full-time employees spend about 60% of their waking hours in the workplace (Allan et al., 2017). Besides the frequently visited worksite, environments with similar characteristics include for instance conferences, parties, and some school and after-school programs (Coleman et al., 2008). These situations are in contrast to most studied environments, where snacks need to be paid for and price is a confounding choice factor (Petimar et al., 2019, 2022; Rusmevichientong et al., 2021; Sowers et al., 2019). Willingness-to-pay and purchase intentions are not useful measures in these situations, as the price is taken out of the equation. Therefore, this study focusses on actual food choice and the chosen setting is a work-related conference. Work-related conferences represent a viable environment to fulfill the need for more field experiments. Many professions and fields organize several conferences a year to share knowledge and make connections. For instance, in the academic field alone, there are already over 8.4 million researchers around the world, each participating in conferences several times a year to promote their work (Sarabipour et al., 2021). This offers unexploited possibilities for unique field experiments. In fact, conferences present a homogenous pool of participants while still being more controlled than an on-the-street experiment due to the closed admittance. Moreover, they offer an environment with social interactions similar to many food environments and previous research already documented the importance of these social influences in food choice (Cruwys et al., 2015; de Castro & Brewer, 1992; Herman, 2015; Schüz et al., 2018). Furthermore, the naturalistic setting reduces the risk of observation bias like the Hawthorne effect (Elston, 2022; Kälvemark Sporrong et al., 2022; McCambridge et al., 2014; Robson, 2016). Therefore, the chosen conference poses an ideal environment for a naturalistic field experiment with externally valid results. We thereby answer the call made by other scholars to explore a variety of contexts for testing healthier eating interventions (Chandon et al., 2022).

The current study tests and compares the effectiveness of two nutritional labels as a means to reduce unhealthy snacking at a work-related conference. A nutritional label is a communicative element summarizing the nutritional quality of the product (often found on the front of a package for packaged foods). A US survey demonstrated that, unlike other healthy eating interventions - such as portion or packet size reductions (Do Vale et al., 2008)- interventions involving nutritional labels are generally well-accepted by the public (Cadario & Chandon, 2019). Moreover, both online and laboratory experiments have indicated that nutritional labels can increase the purchase (intentions) and willingness-to-pay for healthier food options (Asioli et al., 2016; Marette et al., 2019; Nohlen et al., 2022). Importantly, a recent review has highlighted the diversity in study designs and lack of consistency across contexts in the evidence concerning the effect of nutritional labels on food purchases (Braesco & Drewnowski, 2023), demonstrating the need for further research.

Additionally, different nutritional labels exist and the World Health Organization (WHO) calls for more research on the impact of different front-of-pack labeling schemes in different contexts to recommend a specific scheme (World Health Organization, 2021). Some labels are purely descriptive, whereas others use colours to help interprete the information (evaluative labels) (Cadario & Chandon, 2020). Prior research suggests that descriptive labels can not successfully steer consumers to healthier choices, but evaluative labels can (Cadario & Chandon, 2020). This research explicitly compares a calorie label (descriptive) versus the Nutri-Score (an evaluative summary traffic light label that shows the relative healthiness of a product) on consumer choice. Based on a 2018 Cochrane review, calorie labels emerged as the most frequently researched nutritional label (Crockett et al., 2018). This study contrasts this label with the Nutri-Score, as the International Agency for Research on Cancer (IARC), part of the WHO, called on the EU commission in 2021 to introduce the Nutri-Score on a mandatory basis in Europe (International Agency for Research on Cancer, 2021; Julia & Hercberg, 2017a; Ter Borg et al., 2021).

2. Calorie labels and the Nutri-Score label

This study is one of the few studies attempting to compare the effect of calorie labels and the Nutri-Score label on consumer choice in a real-life setting. In isolation, calorie labels are well-studied. Besides laboratory and online experiments (Bleich et al., 2017; Marty, Franzon, et al., 2021), various field experiments have investigated the extent to which informing consumers about the caloric content of a product would reduce consumers' acquisition, perception, and consumption of energy-dense foods (for reviews, see Kiszko et al., 2014; Swartz et al., 2011). Several experiments exist in stores (Petimar et al., 2022), restaurants (Bleich et al., 2017; Cawley et al., 2020; Petimar et al., 2019), university dining facilities (Cioffi et al., 2015), hospital cafeterias (Mazza et al., 2017; Webb et al., 2011) or worksites cafeterias (Vasiljevic et al., 2018, 2019). Some have found small but significant effects (Cioffi et al., 2015; Mazza et al., 2017; Webb et al., 2011). For instance, in hospital cafeterias, calorie labels led to an increase in the purchase of lower-calorie side dishes and snacks, but not to a different choice of entrées (Webb et al., 2011). Importantly, quite some studies report no effect of calorie labels (Kiszko et al., 2014; Mantzari et al., 2020; Petimar et al., 2019; Swartz et al., 2011; Vasiljevic et al., 2018, 2019). For example, although consumers appreciated the implementation of calorie labels in the study of Vasiljevic et al. (2019) and self-reported using them, the results showed no significant effect of calorie labels on choice. Hence, the evidence reports mixed and inconclusive findings regarding the effectiveness of caloric labels in steering food choices. Moreover, it appears that consumers willfully choose to strategically ignore calorie information for different reasons. One reason for people to avoid calorie information is to allow themselves to act upon their intuitive preference, like consuming a tempting dessert (Kaitlin Woolley & Risen, 2018). It can also be a strategy motivated by guilt aversion (Thunström et al., 2016) or to avoid emotional discomfort by forming optimistic but false beliefs (Nordström et al., 2020). Besides willfully avoiding or ignoring caloric information, an additional explanation to why caloric information might be ineffective could reside in the fact that consumers might under- or overestimate energy content per portion size (Besharat et al., 2021; Carels et al., 2007; Li et al., 2022; Shen et al., 2022; Tal, 2021; K Woolley & Liu, 2021), as well as misinterpret or misunderstand the information provided in the caloric label (Robinson et al., 2021). Moreover, even though most consumers are familiar with the concept of calories, they often do not know how to calculate their own energy needs, let alone use the calorie labels for their health or weight goals (Van Kleef et al., 2008). Finally, consumers might perceive the difference in energy content between two alternatives as rather small, which may make them reluctant to trade taste for calories, annihilating the effectiveness of a calorie label (Breathnach et al., 2021; Tangari et al., 2019).

The Nutri-Score is a more recent nutritional label developed by scientists (Julia & Hercberg, 2017a; Ter Borg et al., 2021). The label is currently endorsed by the French Santé Publique and is further used in Germany, Luxembourg, Switzerland, and Belgium. The Nutri-Score is a traffic light label with five colored boxes to grade the nutritional quality of foods and beverages (see Figure 1). All foods and beverages are scored using a multi-nutrient algorithm based on the UK Food Standard Agency nutrient profiling system (FSA-NPS), assigning 'bad points' for energy content, salt, saturated fat and sugar and 'good points' for fruit and vegetable content, fiber and protein (Julia & Hercberg, 2017a). Depending on the end score of the algorithm (varying between -15 and 40), healthier foods get an “A” or green score, and the unhealthiest foods get an “E” or red score. The Nutri-Score is based on an across-the-board algorithm, meaning that one set of criteria is applied to all pre-packaged foods, with some minor adaptations to the cut-offs for cheeses, added fats, and beverages [(Peters & Verhagen, 2022; Santé publique France, 2023)].
As it is a fairly recent label (first implemented in France in 2016), research on its effectiveness is still emerging (Nohlen et al., 2022). One of the main advantages of the Nutri-Score compared to calorie labels, is that it distinguishes between 'good' (essential fatty acids and proteins) and 'bad' calories (sugar and saturated fat). It also takes into account non-caloric or low-caloric nutrients like salt and fiber. This results in a more complete picture of a product's healthiness (Vlassopoulos et al., 2022).

Although the Nutri-Score has been found to be the most understandable and recognizable nutritional label compared to various alternative labels (Dubois et al., 2021; Hagmann & Siegrist, 2020; Julia et al., 2016; Julia & Hercberg, 2017b; Muller & Prevost, 2016), support for its effectiveness on actual choice in externally valid contexts (outside a laboratory) is scarce (De Bauw et al., 2021; Egnell et al., 2019; Folkvord et al., 2021; Hagmann & Siegrist, 2020; Marette et al., 2019; Poquet et al., 2019). As a recent review by Braesco and Drewnowski (2023) concludes, several questions with regard to its effect on food purchases and diet quality remain, and the evidence is inconsistent. In response to the call for more external validity, some researchers have begun to conduct field experiments (Crosetto et al., 2016, 2019; Dubois et al., 2021; Julia & Hercberg, 2017a; Van Den Akker et al., 2022). For instance, Dubois et al. (2021) found the Nutri-Score to be the most effective label in improving the nutritional quality of supermarket purchases by especially increasing the purchase of the most nutritious alternatives. In contrast, van den Akker et al. (2022) performed a lab-in-field experiment regarding the choice for Nutri-Score labeled cereals and found that adding the label did not promote healthier alternatives or discouraged unhealthier alternatives in a choice experiment with six products. However, the one product for which they found a significant effect was also the most nutritious alternative. Nevertheless, there is a paucity of naturalistic field experiments on whether the Nutri-Score is effective in promoting healthier choices.

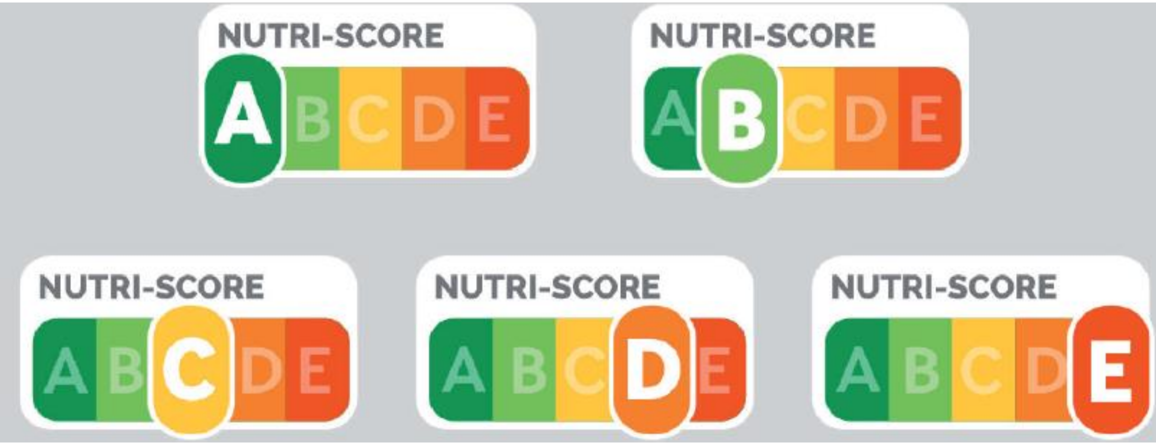

Figure 1: The five grades of the Nutri-Score label. Figure adapted from (Julia & Hercberg, 2017c)

In sum, the goal of this study was to find proof for and compare the effectiveness of two different labels (calorie labels and the Nutri-Score) on changing free snack choices.
Specifically, the study assesses the following research question:

> *What is the relative effectiveness of Nutri-Score and calorie labels in nudging participants' free snack choices, compared to a no-label condition?*

To answer this, the number of healthier snacks chosen under each labeling scheme is modeled and compared to a control condition without any labels.

3. Methods

The current research applies a controlled between-subject design evaluating the effect of nutrition labeling on the free snack choices made by adults (ca. 600) in a non-commercial professional setting. The study protocol was approved by the Ethics Committee for the Social Sciences and Humanities of the University of Antwerp (SHW_20_89). One treatment (nutritional labeling) was studied with three conditions: no labeling (control), calorie labeling and Nutri-Score labeling. Treatments were not randomly assigned to participants because of the constraints imposed by the setting of the study (further details below). Effects are estimated as the odds of each type of snack being chosen in each of the three conditions, over assumed independent snack choices across conditions pooled over two periods of time in the same day (n = 739). In view of this, a number of potentially relevant confounders are included in the analysis of results.

3.1 Population and Participant Sample

As the study was designed as a field study in a natural environment, individual characteristics of the participants were not measured. The organizing professional association reported that 44.6% of their members is of female gender (Callens, 2021). The average age of lawyers in the Netherlands, Belgium's neighbouring country, is 43 years old ("Aantal Advocaten Blijft (Licht) Groeien, Percentage Vrouwen Neemt Ook Toe," 2022). In terms of lifestyle, the Dictionary of Occupational Titles (4th ed.) ("DOT") published by the U.S. Department of Labor under code 110.107.010 defined a "sedentary occupation" as one that requires 6 hours of sitting and 2 hours of walking/standing throughout the day (United States Department of Labor & Library, 1991). As the legal practice indeed demands prolonged periods of sitting, sometimes exceeding 40 hours a week (Bush, 2022; *Lawyers Should Embrace Physical Activities*, n.d.), the occupation of a lawyer is considered sedentary.

3.2 Setting

The data collection took place in Antwerp during a Flemish lawyer conference with about 600 participants. Participants gathered in the atrium before and after sessions for registration, lunch, and coffee breaks. There was a two-sided bar (in the form of a rectangle) towards the rear of the atrium at which participants could order drinks (included in the conference fee). The bar could be accessed from all sides, with bartending staff in the center. Snacks were presented on both bar counters for participants to take freely. Three different snacks (cookies, miniature candy bars (Celebrations), and nuts (Mani Berry & Nuts) were jointly offered. In line with current dietary advice, the nuts are considered the healthier option, due to their high protein content and the presence of essential fatty acids (Harvard T.H. Chan School of Public Health, n.d.; Sabaté, 2010). This makes them an excellent component of a balanced diet, offering high nutritional quality and promoting positive effects on weight loss and maintenance (Bullo et al., 2011; Harvard T.H. Chan School of Public Health, n.d.). The cookies (6.5 g each) and Celebrations candy bars (10.5 g each) were individually wrapped, and the nuts were pre-portioned in packets of 50 grams. The weight differed between the three snacks, but the weight difference was identical in all three conditions (control, Nutri-Score label and calorie label). The labeling conditions were uniformly distributed along the bar, and the distance between the conditions was kept constant throughout the entire day. The choice of snacks did not vary throughout the day.

3.3 Design and Study Administration

The experiment consisted of two observational periods: A morning period from 08:30 until 09:45 (arrival and registration) and an afternoon period from 15:00 until 16:00 (afternoon coffee break). Participants either registered for a full day without dinner (8:30-18:00) or with dinner (which started at 18:00). As participants received lunch between 12:00 and 13:30, this was ruled out as an observational period. The snacks were replenished before each period to avoid scarcity or popularity effects. As part of the labelling intervention, three treatments were installed: a condition without labels (control), one with Nutri-Score and one with calorie labels (see Figure 2 and Figure 3). Nutritional information needed to calculate the labels was obtained from the packaging. Since the nuts, cookies and candy bars were all offered as snacks during the coffee breaks, they can be regarded as viable alternatives to one another. Therefore, it is appropriate to compare the Nutri-Score values to make valid comparisons among these options. The labels were printed and added (when present) in front of the snacks, facing the participants. Participants were unable to approach the snack plates from behind, because this area was restricted to the bartending staff. Calories were both expressed per portion and per 100 grams. Portion sizes were based on commonly defined portion sizes in Belgium. E.g., the daily recommended amount of nuts is 25 g according to the Belgian dietary guidelines.

Three bowls with different snacks and the accompanying labels (for the labeled conditions) were placed together at six different locations across both bar counters (see Appendix A). The conditions were sufficiently spaced (*see figure 2)* to not interfere with one another. The atrium was a standing-room only. Participants could move freely throughout the room and alongside the bar. Although the field experiment did not allow for formal randomization, participants were not restricted as to which bowl they could access. Each treatment (no label/calorie label/Nutri-Score label) was presented at two locations, one at each side of the bar, and the position of the two treatments was alternated between the two sides. The control condition was always in the center of the bar, the two treatment conditions were mirrored on the two sides of the bar.

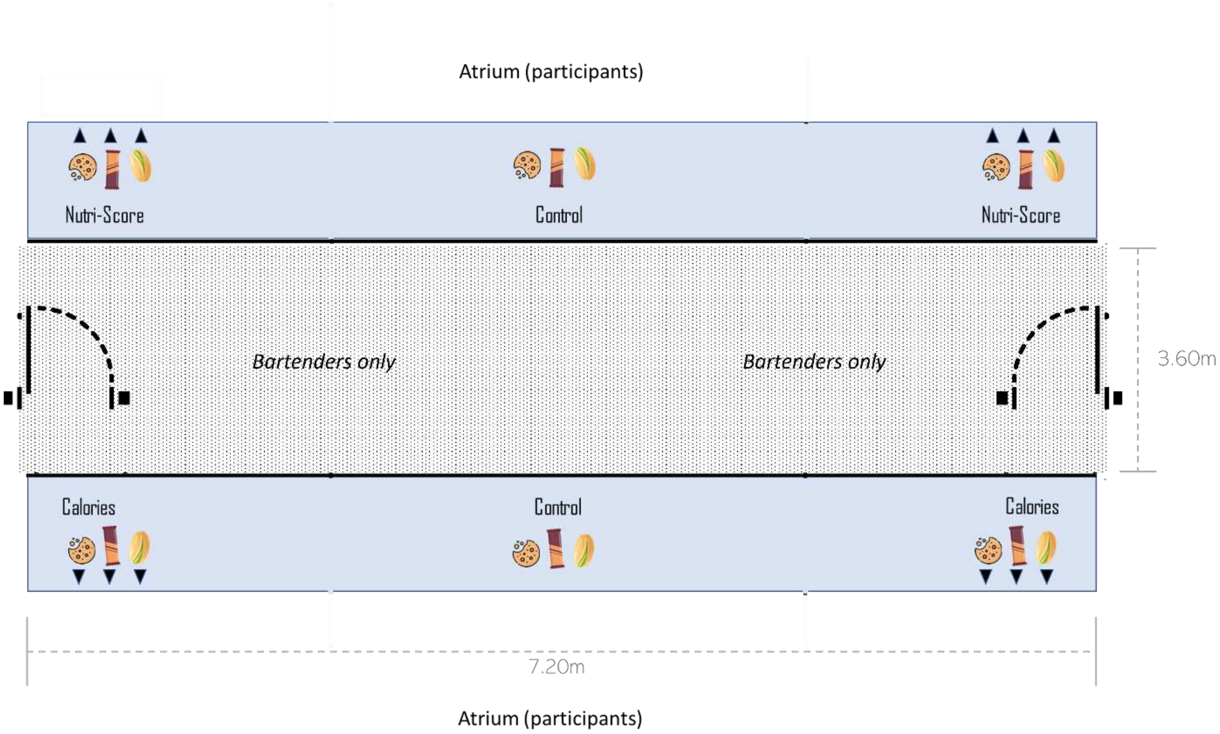

Figure 2: Sketch of the experimental set-up. The location of the Nutri-Score and calorie labeling conditions were interchanged throughout the day. The conditions were evenly spaced and the distance between conditions was kept constant throughout the day. The shaded area was restricted to bartenders only. The black triangles show the direction of the labels.

Figure 3: Set-up of the bowls as seen by participants under the calorie treatment (top) and the Nutri-Score treatment (bottom). The pictures show mirrored versions.

3.4 Outcome Measure

The weight of the bowls was measured before and after each observational period to obtain an objective outcome measure, as recommended by Bucher et al. (2016). This resulted in measures of total weight taken (grams) from each bowl within each location (two locations for each condition), each condition (three conditions) and each observational period (two time periods). The total weight was converted into the total number of snacks taken by dividing the total weight by the average weight per individual portion (6.5 g for the cookies, 10.5 g for the candy bars, and 50 g for the nuts). The number of snacks was then converted to individual choices. When a participant took a snack, we treated this as one choice between the three bowls: they could either take a cookie, a candy bar, or a pack of nuts. This was coded as a choice experiment, with "1" representing the chosen snack and "0" the two other options, for a total of 739 snacks. No observations were discarded within the two predetermined measurement periods. By this, two implicit assumptions were made. The first assumption is the independence of samples. This assumes that every sample (snack) is chosen independently of every other sample, both for snacks chosen by the same person as well as by different participants. This thus means that if the same person goes back three times or picks three snacks at the same time, they are treated as three independent choices. Second, as in many discrete choice experiments, the Independence of Irrelevant Alternatives assumption is made. This assumes that adding or removing alternatives does not affect the odds of the remaining outcomes. It is also referred to as the Red Bus/Blue Bus problem (for more information, see Horowitz, 1991).

Throughout the day, hunger levels were also measured (single item, 7-point Likert scale 0 = not hungry at all – 7 = very hungry) for a sample of participants who completed an unrelated survey at the researchers' conference stand in the same room. The survey was part of another, unrelated experiment and participants to this survey were not linked to their snack choices at the bar. In total, 51 participants (26 male, 25 female) reported on their hunger levels. On a 7-point scale, 6% of participants indicated to be very hungry (7), 21% of participants indicated not be hungry at all (0). The average age of these participants was 41.6 (± 13.5). Participants self-selected into this separate study.

3.5 Analysis

The data were analyzed by a multinomial logistic regression. The outcome variable is choice (cookie/candy bar/nuts). The independent variable is Treatment (no label/calorie label/Nutri-Score label). Location (right/center/left of the bar) and Time are controlled for by adding them as covariates to the regression model (*equation below*). The counter on which the snacks were offered did not significantly influence consumers' choices and was therefore left out of the model. The baseline Treatment is the control condition (i.e., the condition without a label). The references for choice are nuts, for Location center, and for Time the morning session (8:30-9:45). The following models were tested, with $P_{candybar}$ the chance (0-1) that a person picks a candy bar, P_{cookie} the chance they chose a cookie and P_{nuts} the chance they chose nuts.

$$\ln\left(\frac{P_{candybar}}{P_{nuts}}\right)_{center,morning,control} = b_{10} + b_{11}\,Location_{right} + b_{12}\,Location_{left} + b_{13}\,Time_{afternoon} + b_{14}\,Treatment_{Nutri-Score} + b_{15}\,Treatment_{calories}$$

$$\ln\left(\frac{P_{cookie}}{P_{nuts}}\right)_{center,morning,control} = b_{20} + b_{21}\,Location_{right} + b_{22}\,Location_{left} + b_{23}\,Time_{afternoon} + b_{24}\,Treatment_{Nutri-Score} + b_{25}\,Treatment_{calories}$$

The natural logarithm *ln* is

> 0 if $P_1/P_2 > 1$ or if the chance of choosing snack 1 is higher than the chance of choosing snack 2. Snack 1 is more popular.

= 0 if $P_1/P_2 = 1$ or if the chance of choosing snack 1 is equal to the chance of choosing snack 2. The snacks are equally popular.

< 0 if $P_1/P_2 < 1$ or if the chance of choosing snack 1 is lower than the chance of choosing snack 2. Snack 2 is more popular.

4. Results

4.1 Descriptive Statistics

In total, 739 snacks were taken during the experiment: 410 Celebrations candy bars (average weight 10.5 g), 175 Jules Destrooper cookies (average weight 6.5 g), and 154 packs of nut trail mix (50 g each). 224 snacks came from bowls without a label, 321 from bowls with a calorie label, and 194 with a Nutri-Score label. *Tables 1 and 2* show the number of times each snack was chosen for each treatment (*Table 1*) and within each observational period (*Table 2*). 427 snacks were taken off the front of the bar, 213 off the back side.

Table 1: Snack counts within each treatment

	Treatment		
	Control	Calorie label	Nutri-Score label

Choice	Candy Bar	133 (1398g)	195 (2049g)	82 (867g)
	Cookie	48 (312g)	71 (464g)	56 (361g)
	Nuts	43	55	56

Table 2: Snack counts within each observational period. Morning is from 8:30 – 9:45, and afternoon is from 15:00 – 16:00.

		Observational Period	
		8:30-9:45	15:00-16:00
Choice	Candy Bar	63	347
	Cookie	46	129
	Nuts	59	95

4.2 Model outcomes: possibility to predict choice by treatment

The coefficients of the model are given in *Table 3*. The calorie treatment did not significantly affect participants' snack choices compared to the control condition ($p_{candy\ bar} = 0.08$ and $p_{cookie} = 0.39$). In contrast, adding a Nutri-Score label makes people relatively more likely to choose nuts over the two other snacks than in the control condition (log $odds_{candy\ bar} = -0.612$, log $odds_{cookie} = -0.132$). However, the relative difference is only significant for the choice of nuts over candy bars ($p_{candy\ bar} <.001$ and $p_{cookie} = 0.48$).

Table 3: Coefficients and p-values for the logistic model. The reference outcome is choosing nuts, the reference location is the center, the reference time is the morning session, and the reference treatment is the control condition without labels. * shows statistical significance or p < 0.05.

	Candy bar			Cookie		
Variable	Log Odds	Standard Error	P-Value	Log Odds	Standard Error	P-Value
Intercept	0.3258748	0.2316432	0.159	-0.1865311	0.2612795	0.475
Location Left	0.3218185	0.1704880	0.059	0.5065882	0.1898771	0.007*
Location Right	-0.6568764	0.1558195	<0.001*	-0.4829533	0.1801819	<0.001*
Time Afternoon	1.1390778	0.2208532	<0.001*	0.4666677	0.2429877	<0.001*
Treatment Nutri-Score	-0.6118523	0.1676977	<0.001*	-0.1323587	0.1851827	0.475
Treatment Calories	0.2767944	0.1572272	0.078	0.1559936	0.1812994	0.390

Figure 4 shows the predicted probabilities for choosing one of the three snacks under each treatment and during each session. The first panel shows the morning session, and the right panel the afternoon session. It is clear that the Nutri-Score encourages the choice of the healthier alternative (nuts) and discourages the choice of candy bars, compared to the other treatments. Furthermore, the graphs suggest that nuts were more popular during the morning than in the afternoon. For candy bars, it is the other way around. This effect of Time is unlikely to be caused by feelings of hunger. In *Appendix A* (*figure A1*), the measures of hunger of participants in an unrelated survey at the same conference, are plotted against the time of taking the survey. Although these participants are not matched to their snack choices, it is clear that there is no apparent trend in hunger for the sampled participants throughout the day. This suggests that hunger is not a confound for snack choice during the different observational periods and therefore not the reason for the different snack preferences between the morning and afternoon.

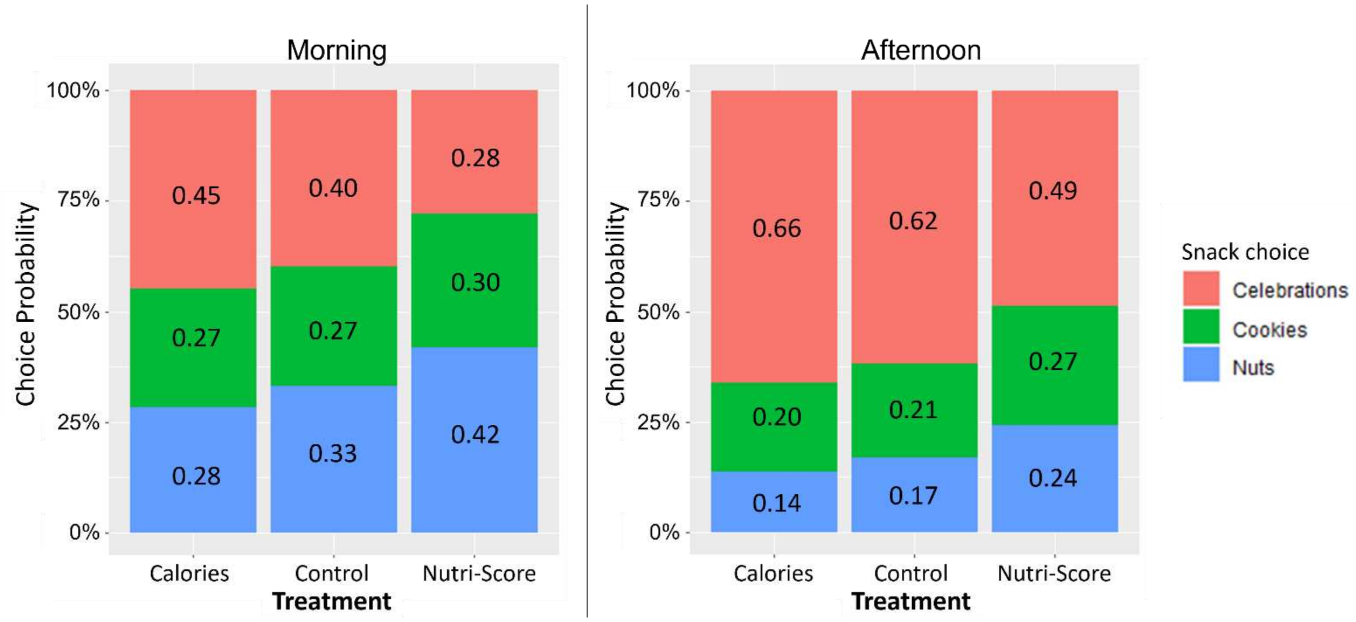

Figure 4: Probabilities of choosing nuts (blue), a candy bar (red), or a cookie (green) under the three treatment conditions. Left panel: Morning session; Right panel: Afternoon session.

5. Discussion

In an attempt to curb obesity and prevent non-communicable diseases such as heart disease, stroke, diabetes, and other chronic conditions, getting consumers to make healthier food choices is crucial (World Health Organization, 2022). Moreover, unhealthy diets have been linked to several non-communicable diseases, not solely driven by an individual's weight (Campbell & Duhaney, 2016; Harvard T.H. Chan School of Public Health, n.d.; Jannasch et al., 2017; Lassale et al., 2016; Menotti et al., 2014; Sotos-Prieto et al., 2017; Yu et al., 2018). Snacks, often consisting of refined carbohydrates with high glycemic loads, and low protein- and fiber contents, are a hard-to-control contribution to the energy intake of consumers (Baskin et al., 2016; Kant & Graubard, 2015). They are particularly tempting when offered in proximity to drinks or in a social context, like at work or a conference (Baskin et al., 2016; Cruwys et al., 2015; Herman, 2015; Schüz et al., 2018). Interventions that aim at reducing the daily energy intake with only 50-100 kcal a day could be sufficient to overcome weight gain (Hill et al., 2003). Similarly, interventions improving participants diet quality, e.g., in terms of trans fat, sugar and salt intake or increasing fiber and protein intake, can help prevent the onset of several illnesses (Boeing et al., 2012; Harvard T.H. Chan School of Public Health, n.d.; He et al., 2014; Mytton et al., 2014; Ruxton et al., 2009). Finding effective means to implement such an intervention is thus of paramount importance. The current field study aimed to investigate whether calorie labels and Nutri-Score labels could lead people to choose a healthier snack at a conference where snacks were offered freely at the bar. Specifically, the snacks offered were nuts (healthy choice), candy bars, and cookies.

The results of this field study showed that calorie labels were unsuccessful in steering consumers toward healthier snack choices. On the contrary, the chance of choosing nuts decreased when a calorie label was added. However, the most intuitive reason for this could be the caloric density of the nuts: both the calories per 100 grams and the calories per portion size were highest for this option (*see figure 3*). This immediately shows one of the drawbacks of using a calorie label: the label does not discriminate between energy content from desired sources (protein and unsaturated fat) versus calories that should be avoided (saturated fats and sugar) (Niewold, 2019). It also does not consider the amount of fiber or salt, as other summary labels do -including the Nutri-Score (Julia & Hercberg, 2017a). Thus, while the label was seemingly successful in steering participants towards the lower caloric options (away from the nuts), this created an unwanted adverse effect. Unfortunately, the lower caloric options are not always the healthiest ones, as was the case in our study. For chronic disease prevention as well as weight control, both the quantity as well as the quality and food sources of calories and nutrients matter. Several studies indeed confirm that eating nuts might help with weight control instead of contributing to weight gain (Harvard T.H. Chan School of Public Health, n.d.). This is in stark contrast with the other two snack options that contain high amounts of refined carbohydrates (Harvard T.H. Chan School of Public Health, n.d.). The calorie label thus seems to promote the least healthy alternative in this case, but it should be noted that the differences between the calorie label and the control condition were never significant. This lack of effect of calorie labels is consistent with prior field experiments that also document insignificant or minor effects of descriptive nutritional labeling on choice (Cadario & Chandon, 2020). Hence, our results coupled with those from others (Kiszko et al., 2014; Mantzari et al., 2020; Swartz et al., 2011; Vasiljevic et al., 2018, 2019) cast doubts on the effectiveness of caloric labels.

Conversely, the Nutri-Score label significantly decreased the odds of choosing a candy bar over the nuts. It also lowered the chances of choosing cookies over nuts, but this was not significant. The same intuition holds as with the calorie labels, but this time the label clearly showed participants the healthier option. The nuts were assigned a green Nutri-Score B, while the other two options were graded with the least healthy red E (see Figure 3). Interestingly, participants also took fewer snacks in total from the Nutri-Score labeled bowls. Whether reducing snacking overall is another positive effect of the label, remains a question for future research. In contrast to the conclusion of a recent review on nutritional labels (Ikonen et al., 2019), the Nutri-Score label does appear to be effective in nudging consumers away from unhealthier choices toward the healthier alternative. This might be because the review of Ikonen et al. (2019) does not specifically focus on the Nutri-Score, but pools together the results of so-called "Interpretative summary indicator labels", such as the Nutri-Score, Health Star Rating, and health logos. It is likely that the Nutri-Score performs better than other nutritional labels, in line with the supermarket study of Dubois et al. (2021). The higher absolute effectiveness of the Nutri-Score in changing the choice for candy bars compared to the calorie labels can be explained by the label type: a meta-analysis by Cadario and Chandon (2020) found a slightly higher effect for evaluative labels than descriptive labels. In fact, previous research has already identified the Nutri-Score as the most understandable and effective nutritional label (Egnell et al., 2018; Finkelstein et al., 2019; Van Den Akker et al., 2022) compared to other labels on the front of food packages. This is another explanation as to why the changes in choice caused by the Nutri-Score are in a more favorable direction than the changes caused by the calorie label: it is easier to understand and more effective in directing consumers to the healthier choice. A second explanation for the different results is the fact that the reviewed studies by Ikonen et al. (2019) were set in a purchase situation. The current study explores the effects of nutritional labels on free snacks, meaning there is no confounding effect of price.

The significant effect of Time was not the result of differences in hunger. First, hunger levels of conference participants did not show a trend throughout the day. Furthermore, the research of Cheung et al. (2017) shows that hungry participants make as many (un)healthy choices as satiated participants when put in a social proof condition. It is reasonable to assume that a conference applies as a social proof condition. Nevertheless, Time significantly influenced choice in this study. Participants were more likely to choose nuts in the morning and candy bars in the afternoon. A possible reason for this could be self-control (Honkanen et al., 2012; Salmon et al., 2014; Vohs &

Heatherton, 2000). Given that the day was filled with lectures, it is likely that the consumers' self-control resources got depleted and it became increasingly difficult to resist temptation (Vohs & Heatherton, 2000). This reasoning finds its grounds in the research by Muraven and Baumeister (2000), who describe self-control as a limited, consumable resource. It finds further support in experimental evidence, like the study of Baskin et al. (2016). In fact, Baskin et al. (2016) showed that time of day was a significant predictor of snacking incidence, with consumers taking more snacks as the day progressed. Other plausible explanations are summarized in the review of Spence (2021). Even though the lighting and ambient temperature were kept constant and participants' chronotypes were previously found irrelevant for the choice of sweets (Schubert & Randler, 2008), several cultural and psychological factors may lead people to choose different foods at different times of the day (Spence, 2021).

Our results, thus, provide important insight into the role of Nutri-Score labels on snack choices. They extend previous work regarding the effectiveness of labels on snack choices by showing that the Nutri-Score is effective in steering consumers towards healthier choices in a real-life social environment, but calorie labels aren't (Folkvord et al., 2021; Hagmann & Siegrist, 2020; Poquet et al., 2019). They hereby clearly show that it is possible to use small interventions in the food environment to help people make healthier choices (Nicolaidis, 2019; Skov et al., 2013; Swinburn et al., 2011). It has been shown that consumers want to be informed about their food's characteristics like allergens or provenance (Roberto et al., 2009), about the calories in their food (Vasiljevic et al., 2019) and about its relative healthiness (Aguenaou et al., 2021; Loureiro & Gracia, 2006). It is thus of no surprise that nutritional labels are generally well-accepted by the population (Cadario & Chandon, 2019). Additionally, previous studies have shown that nutritional labels and especially the Nutri-Score can aid people in identifying (Hagmann & Siegrist, 2020) healthier options and improve their purchase intention in online and laboratory studies and artificial field experiments (De Temmerman et al., 2021; Van Den Akker et al., 2022). At present, the final yet essential questions to answer are whether the success of these labels can be extended to naturalistic settings and whether they are also effective when snacks are free. This study shows that it is indeed possible to steer consumers towards a healthier alternative with a Nutri-Score label. Moreover, it shows that the Nutri-Score clearly outperforms calorie labels. This paper thereby contributes to the body of evidence that has been on the rise since the Nutri-Score's development, but lacks consistency over a variety of contexts and designs so far (Braesco & Drewnowski, 2023). Finally, it demonstrates that the probability of choosing the healthier option declines throughout an intellectually intensive day and that this is unlikely to be caused by feelings of hunger.

6. Study limitations and future research

As Chandon et al. (2022) communicate in their recent review on healthy eating interventions, there are significant differences between "lab eating" and "free-living eating" and a paucity of experiments bridging this gap. Therefore, the naturalistic setting of this research is one of the main strengths and results in outcomes that are high in external validity. Whilst this certainly offers relevant insights to practitioners and politicians, it is important to acknowledge that it also has its limitations.

First of all, there was no data collection on any socio-demographical or other personal characteristics of the participants (e.g., dieting goals, BMI, and pre-existing medical conditions like metabolic disorders, brand familiarity, and nutritional knowledge). While this was a logical choice for the naturalistic setting of the experiment, it resulted in our inability to correct for certain baseline differences among participants. Additionally, as the conference offered a sample of participants with similar backgrounds and comparable socioeconomic classes, it is reasonable to assume that the sample does not represent a country's general population. Therefore, future research should repeat this set-up with a mix of different participants to ensure generalization, while also trying to measure baseline differences between participants. Furthermore, the impact these factors may have on an individual's predisposition to develop obesity, irrespective of their response to health-promoting interventions, should not be disregarded. Second, the two assumptions underlying the model construction might not hold. It was not possible to account for the number of snacks each participant took. This limitation is not necessarily problematic, as previous literature on calorie labels (Vermeer et al., 2011) and the Nutri-Score (Van Den Akker et al., 2022) found that a primarily positive effect of nutritional labels on choice of alternative was not followed by a compensatory effect on subsequent portion size choice. Also, considering the substantial quantity of snacks consumed (amounting to over 13 kg), it is reasonable to infer that individual participants did not exert a significant impact on the overall outcomes. If desired, future research could solve the abovementioned limitations by using a personal identifier (e.g., a personalized RFID tag) to link participants to their choices. In this case, participants may be linked to their individual (repeated) choices and a more robust model (e.g., an RC MNL or Hierarchical Bayesian estimation) can be used to account for the diversion of the IIA assumption and individual heterogeneities (see, for example, Godden et al., 2023). One remark has to be made concerning the portion sizes used in the caloric labels. Since there isn't a universally agreed-upon standard for indicating portion sizes, this study used national dietary guidelines and commonly accepted portion sizes as a reference. In the future, it may be worth investigating how altering these relative portion sizes could also serve as an effective nudge, as suggested by previous research (e.g., Do Vale et al., 2008). It remains unexplored whether changing this portion size would indeed be an effective nudge, considering that it is still obligatory to also express the calories per 100 grams.

Third, as with any study, there is a trade-off between external and internal validity. Increases to external validity (such as by setting up a field experiment) come at the cost of sacrifices to the internal validity of a study. While the field study offers many benefits in terms of ecological validity, concessions had to be made that potentially challenged the internal validity of the study. First, participants had the freedom to select the location where they took their snacks. However, this approach does not eliminate the possibility of self-selection bias as participants may have self-selected into a specific condition, making it less preferable than a completely random allocation method. Additionally, we acknowledge that the control condition in our study was not subject to the same rotation across different locations as the two labeling conditions. Future research should consider implementing rotation across all conditions, effectively controlling for the potential influence of snack location. Moreover, it is possible that participants' exposure to a certain label on one occasion (e.g., in the morning) further influenced their subsequent snack choices, even when there was no or a different label present at that time. If individuals were indeed exposed to different label types (either at a specific moment or throughout the day), we would expect their snack choices in the three conditions to converge. As a final potential threat to the internal validity of the findings, participants who may have noticed the difference in labeling may have deduced that they were being monitored as part of an experiment and adjusted their behavior accordingly. To mitigate potential observer bias, we followed the guidelines proposed by Kälvemark et al. (2022) as outlined in the methodology section, thus minimizing the potential impact of this bias as much as possible. Nevertheless, while participants' awareness of being observed may have exerted an effect on the overall choice of nuts (the healthier snack), it does not explain the observed differences in snack choices between the conditions. The fact that we still found a significant effect of the Nutri-Score label suggests the robustness of our findings. On the other hand, even though previous research has found that up to 91% of participants pay attention to a nutritional label and that the time to first fixation is similar for different labels (Nohlen et al., 2022), it is possible that participants did not notice the labels and were not affected by them. However, this again confirms the robustness of our findings, as this would only have decreased the effect size found for the Nutri-Score. The difference in effectiveness between the calorie labels and Nutri-Score might be explained by a difference in visual attention to the label. Previous research found that a color-coded label was more attended to than the same monochrome label (Bialkova et al., 2014) and that the Nutri-Score required less time to process than a monochrome label (Gabor et al., 2020). It is thus possible that the effects of calorie labels might become significant if consumers are forced to pay attention to them, but it can be argued that this is against the nature of the experiment.

Finally, the portion size of the nuts (50 g) was larger than the portion sizes of the candy bars (10.5 g) and cookies (6.5 g). It could have reduced the positive effect of the Nutri-Score label if participants considered the portion of nuts too big for a snack, similar to the effect of large versus small packages of potato chips in the study of do Vale et al. (2008). However, as this was the same for all conditions, the effect would have been similar for both labels. Moreover, models assuming that participants take more than one cookie at a time, only mildly differ in coefficients and show identical results in terms of magnitude (log odds), direction (sign of the log odds) and significance (based on the p-value). Future research could repeat the current experiment with other types of snacks, weights and nutritional contents (e.g., calories) to generalize the findings. It is noteworthy, however, that while reducing portion sizes may effectively reduce consumers' (unhealthy) calorie intake, this approach does not receive approval from the majority of the public (Cadario & Chandon, 2019). In contrast, most consumers have no problem accepting a nutritional label and even prefer it (Nohlen et al., 2022). Nevertheless, it has been generally accepted that combining healthy eating nudges, and especially different types of nudges (e.g., combining a behavioural nudge and a cognitive nudge), can yield the most impactful and sustainable results in promoting healthier dietary choices (Broers et al., 2017; Cadario & Chandon, 2020). Future research should, therefore, aim to identify the most effective combination of nudges, with the Nutri-Score being one potentially successful component, as indicated by this study.

As the first of its kind, this study extends our insights into the usefulness of nutritional labels for free snack choice in a social context. Future research may dig deeper into the underlying mechanism of the current findings. Moreover, to fully inform the European government in deciding on a mandatory food label, the effectiveness of the Nutri-Score label in guiding snack choice should be tested more frequently in naturalistic settings, allowing the participants to be themselves.

7. Conclusion

Calorie labels did not significantly change free snack choices at a conference. Nutri-Score labels significantly increased the probability of choosing nuts over candy bars. Participants were more likely to choose the healthier option (nuts) in the morning than in the afternoon, during an intensive intellectual day. This study shows how nutritional labels can be used to nudge consumers towards healthier free snack choices and extends current insights with results from a naturalistic field experiment. Limitations with respect to the naturalistic setting have been formulated. Future research should aim to combine several healthy eating nudges to assess their cumulative impact, with, for instance, relative portion sizes integrated alongside nutritional labeling.

Acknowledgments

The authors thank de Orde van Vlaamse Balies for letting us conduct this experiment at their “Jungle van het Recht” conference. Additionally, a warm and grateful thank you to Lisa Martinez Sanchez and Johanna Kainz for helping out during the conference.

Competing interests

No conflict of interest.

Funding

This work was supported by the Research Foundation – Flanders (FWO) and the University of Antwerp.

Appendix A: Measures of Hunger

Prior studies have demonstrated that hunger alters individuals' food selection behavior. For example, in comparison to selecting food items in a satiated state, individuals experiencing hunger tend to exhibit lower consistency between their food choices and their stated preference for utilitarian foods (Otterbring et al., 2023) and a greater inclination to select high-caloric foods with greater speed (Garlasco et al., 2019).

In an effort to rule out hunger as a covariate, even though this was a naturalistic field experiment, participants to the same conference who participated in an unrelated survey at the conference booth of the University of Antwerp were asked how hungry they were (single item, 7 point Likert scale: 0 = not hungry at all – 7 = very hungry). In *Figure A1* these measures of hunger are plotted against the time of taking the survey. The absence of a discernible pattern indicates that the hunger levels among conference participants did not vary significantly at specific intervals throughout the experiment. This finding implies that hunger does not serve as a confounding factor in the selection of snacks during the various observation periods.

Figure A1: Hunger measures plotted against the time of taking the survey.

References

Aantal advocaten blijft (licht) groeien, percentage vrouwen neemt ook toe. (2022). *Mr. Online Juridisch Nieuws*. https://www.mr-online.nl/aantal-advocaten-blijft-licht-groeien-percentage-vrouwen-neemt-ook-toe/

Afshin, A., Forouzanfar, M. H., Reitsma, M. B., Sur, P., Estep, K., Lee, A., Marczak, L., Mokdad, A. H., Moradi-Lakeh, M., Naghavi, M., Salama, J. S., Vos, T., Abate, K. H., Abbafati, C., Ahmed, M. B., Al-Aly, Z., Alkerwi, A., Al-Raddadi, R., Amare, A. T., … Murray, C. J. L. (2017). Health effects of overweight and obesity in 195 countries over 25 years. *New England Journal of Medicine*, *377*(1), 13–27. https://doi.org/10.1056/NEJMoa1614362

Aguenaou, H., El Ammari, L., Bigdeli, M., El Hajjab, A., Lahmam, H., Labzizi, S., Gamih, H., Talouizte, A., Serbouti, C., El Kari, K., Benkirane, H., El Berri, H., AL-Jawaldeh, A., & Yahyane, A. (2021). Comparison of appropriateness of Nutri-Score and other front-of-pack nutrition labels across a group of Moroccan consumers: awareness, understanding and food choices. *Archives of Public Health*, *79*(1), 1–13. https://doi.org/10.1186/s13690-021-00595-3

Allan, J., Querstret, D., Banas, K., & Bruin, M. De. (2017). Environmental interventions for altering eating behaviours of employees in the workplace : a systematic review. *Obesity Reviews*. https://doi.org/10.1111/obr.12470

Asioli, D., N, T., Øvrum, A., & Almli, V. L. (2016). Comparison of rating-based and choice-based conjoint analysis models . A case study based on preferences for iced coffee in Norway. *Food Quality and Preference*, *48*, 174–184. https://doi.org/10.1016/j.foodqual.2015.09.007

Australian Bureau of Statistics. (2014). *Australian Health Survey: Nutrition First Results – Food and Nutrients*.

Baskin, E., Gorlin, M., Novemsky, N., Dhar, R., Huskey, K., & Hatzis, M. (2016). Proximity of snacks to beverages increases food consumption in the workplace : A fi eld study. *Appetite*, *103*, 244–248. https://doi.org/10.1016/j.appet.2016.04.025

Bertéus Forslund, H., Torgerson, J. S., Sjöström, L., & Lindroos, A. K. (2005). Snacking frequency in relation to energy intake and food choices in obese men and women compared to a reference population. *International Journal of Obesity*, *29*(6), 711–719. https://doi.org/10.1038/sj.ijo.0802950

Besharat, A., Romero, M., Haws, K., Is, H., Walker, T. B., Chaired, J., & Graduate, O. (2021). Customizing calories : How rejecting (vs . selecting) ingredients leads to lower calorie estimation and unhealthier food choices. *Journal of Retailing*, *97*(3), 424–438. https://doi.org/10.1016/j.jretai.2020.11.003

Bialkova, S., Grunert, K. G., Juhl, H. J., Wasowicz-Kirylo, G., Stysko-Kunkowska, M., & van Trijp, H. C. M. (2014). Attention mediates the effect of nutrition label information on consumers' choice: Evidence from a choice experiment involving eye-tracking. *Appetite*, *76*, 66–75. https://doi.org/10.1016/j.appet.2013.11.021

Bleich, S. N., Economos, C. D., Spiker, M. L., Vercammen, K. A., VanEpps, E. M., Block, J. P., Elbel, B., Story, M., & Roberto, C. A. (2017). A Systematic Review of Calorie Labeling and Modified Calorie Labeling Interventions: Impact on Consumer and Restaurant Behavior. *Obesity*, *25*(12), 2018–2044. https://doi.org/10.1002/oby.21940

Boeing, H., Bechthold, A., Bub, A., Ellinger, S., Haller, D., Kroke, A., Leschik-Bonnet, E., Müller, M. J., Oberritter, H., Schulze, M., Stehle, P., & Watzl, B. (2012). Critical review: Vegetables and fruit in the prevention of chronic diseases. *European Journal of Nutrition*, *51*(6), 637–663. https://doi.org/10.1007/s00394-012-0380-y

Braesco, V., & Drewnowski, A. (2023). Are Front-of-Pack Nutrition Labels Influencing Food Choices and Purchases, Diet Quality, and Modeled Health Outcomes? A Narrative Review of Four Systems. *Nutrients*, *15*(1). https://doi.org/10.3390/nu15010205

Brand-Miller, J., & Buyken, A. E. (2012). The glycemic index issue. *Current Opinion in Lipidology*, *23*(1), 62–67. https://doi.org/10.1097/MOL.0b013e32834ec705

Breathnach, S., Koutoukidis, D. A., Lally, P., Boniface, D., Sutherland, A., & Llewellyn, C. H. (2021). The effect of messaging on the acceptance of swaps to reduce the energy content of snacks and non-alcoholic drinks ordered in an experimental online workplace canteen : A randomised controlled trial. *Appetite*, *162*(January), 105171. https://doi.org/10.1016/j.appet.2021.105171

Broers, V. J. V., De Breucker, C., Van Den Broucke, S., & Luminet, O. (2017). A systematic review and meta-analysis of the effectiveness of nudging to increase fruit and vegetable choice. *European Journal of Public Health*, *27*(5), 912–920. https://doi.org/10.1093/eurpub/ckx085

Bucher, T., Collins, C., Rollo, M. E., Mccaffrey, T. A., Vlieger, N. De, Bend, D. Van Der, Truby, H., & Perez-cueto, F. J. A. (2016). Nudging consumers towards healthier choices : a systematic review of positional in fl uences on food choice. *British Journal of Nutrition*, *9*. https://doi.org/10.1017/S0007114516001653

Bullo, M., Lamuela-Raventos, R., & Salas-Salvado, J. (2011). Mediterranean Diet and Oxidation: Nuts and Olive Oil as Important Sources of Fat and Antioxidants. *Current Topics in Medicinal Chemistry*, *11*(14), 1797–1810. https://doi.org/10.2174/156802611796235062

Bush, S. (2022). What Jobs Have the Most Sedentary Lifestyle? *The Houston Chronicle*. https://work.chron.com/jobs-sedentary-lifestyle-31136.html

Byrd-Bredbenner, C., Johnson, M., Quick, V. M., Walsh, J., Greene, G. W., Hoerr, S., Colby, S. M., Kattelmann, K. K., Phillips, B. W., Kidd, T., & Horacek, T. M. (2012). Sweet and salty. An assessment of the snacks and beverages sold in vending machines on US post-secondary institution campuses. *Appetite*, *58*(3), 1143–1151. https://doi.org/10.1016/j.appet.2012.02.055

Cadario, R., & Chandon, P. (2019). Viewpoint: Effectiveness or consumer acceptance? Tradeoffs in selecting healthy eating nudges. *Food Policy*, *85*(March), 1–6. https://doi.org/10.1016/j.foodpol.2019.04.002

Cadario, R., & Chandon, P. (2020). Which healthy eating nudges work best? A meta-analysis of field experiments. *Marketing Science*, *39*(3), 465–486. https://doi.org/10.1287/mksc.2018.1128

Callens, P. (2021). *Geïntegreerd jaarverslag 2021*. https://www.advocaat.be/nl/fetch-asset?path=ovb/Documenten/Beleidsplan/Jaarverslagen/Jaarverslag-2021-def.pdf

Campbell, N., & Duhaney, T. (2016). Restricting Marketing of Unhealthy Foods: Should General Internists Engage? *Canadian Journal of General Internal Medicine*, *8*(3), 2013. https://doi.org/10.22374/cjgim.v8i3.67

Carels, R., Konrad, K., & Harper, J. (2007). Individual differences in food perceptions and calorie estimation : An examination of dieting status , weight , and gender. *Appetite*, *49*, 450–458. https://doi.org/10.1016/j.appet.2007.02.009

Cawley, J., Susskind, A., & Willage, B. (2020). The Impact of Information Disclosure on Consumer Behavior: Evidence from a Randomized Field Experiment of Calorie Labels on Restaurant Menus. *Journal of Policy Analysis and Management*, *39*(4), 1020–1042. https://doi.org/10.1002/pam.22219

Chandon, P., Haws, K. L., & Liu, P. J. (2022). Paths to Healthier Eating: Perceptions and Interventiosn for Success. *Journal of the Association for Consumer Research*, *7*(4).

Cheung, T. T. L., Kroese, F. M., Fennis, B. M., & Ridder, D. T. D. De. (2017). The Hunger Games : Using hunger to promote healthy choices in self- control con fl icts. *Appetite*, *116*, 401–409. https://doi.org/10.1016/j.appet.2017.05.020

Cioffi, C. E., Levitsky, D. A., Pacanowski, C. R., & Bertz, F. (2015). A nudge in a healthy direction . The effect of nutrition labels on food purchasing behaviors in university dining facilities. *Appetite*, *92*, 7–14. https://doi.org/10.1016/j.appet.2015.04.053

Coelho, J. S., Idler, A., Werle, C. O. C., & Jansen, A. (2011). Sweet temptation: Effects of exposure to chocolate-scented lotion on food intake. *Food Quality and Preference*, *22*(8), 780–784. https://doi.org/10.1016/j.foodqual.2011.06.008

Coleman, K. J., Geller, K. S., Rosenkranz, R. R., & Dzewaltowski, D. A. (2008). Physical activity and healthy eating in the after-school environment. *Journal of School Health*, *78*(12), 633–640. https://doi.org/10.1111/j.1746-1561.2008.00359.x

Cowan, A. E., Higgins, K. A., Fisher, J. O., Tripicchio, G. L., Mattes, R. D., Zou, P., & Bailey, R. L. (2020). Examination of different definitions of snacking frequency and associations with weight status among U.S. adults. *PLoS ONE*, *15*(6), 1–19. https://doi.org/10.1371/journal.pone.0234355

Crockett, R., King, S., Marteau, T., Prevost, A., Bigardi, G., Roberts, N., Stubbs, B., Hollands, G., & Jebb, S. (2018). Nutritional labelling for healthier food or non-alcoholic drink purchasing and consumption (Review). *Cochrane Database of Systematic Reviews*. https://doi.org/10.1002/14651858.CD009315.pub2.www.cochranelibrary.com

Crosetto, P., Lacroix, A., Muller, L., & Ruffieux, B. (2019). Nutritional and economic impact of five alternative front-of-pack nutritional labels: experimental evidence. *European Review of Agricultural Economics*, 1–34. https://doi.org/10.1093/erae/jbz037

Crosetto, P., Muller, L., & Ruffieux, B. (2016). Consumer responses to three nutrition “Front-of-Pack” labeling systems. *Cahiers de Nutrition et de Dietetique*, *51*(3), 124–131. https://doi.org/10.1016/j.cnd.2016.04.002

Cruwys, T., Bevelander, K. E., & Hermans, R. C. J. (2015). Social modeling of eating: A review of when and why social influence affects food intake and choice. *Appetite*, *86*, 3–18. https://doi.org/10.1016/j.appet.2014.08.035

De Bauw, M., Matthys, C., Poppe, V., Franssens, S., & Vranken, L. (2021). A combined Nutri-Score and ‘Eco-Score’ approach for more nutritious and more environmentally friendly food choices? Evidence from a consumer experiment in Belgium. *Food Quality and Preference*, *93*(December 2020), 104276. https://doi.org/10.1016/j.foodqual.2021.104276

de Castro, J. M., & Brewer, E. M. (1992). The amount eaten in meals by humans is a power function of the number of people present. *Physiology and Behavior*, *51*(1), 121–125. https://doi.org/10.1016/0031-9384(92)90212-K

De Temmerman, J., Heeremans, E., Slabbinck, H., & Vermeir, I. (2021). The impact of the Nutri-Score nutrition label on perceived healthiness and purchase intentions. *Appetite*, *157*, 104995. https://doi.org/10.1016/j.appet.2020.104995

Do Vale, R. C., Peters, R., & Zeelenberg, M. (2008). Flying under the radar: Perverse package size effects on consumption self-regulation. *Journal of Consumer Research*, *35*(3), 380–390. https://doi.org/10.1086/589564

Dubois, P., Albuquerque, P., Allais, O., Bonnet, C., Bertail, P., Combris, P., Lahlou, S., Rigal, N., Ruffieux, B., & Chandon, P. (2021). Effects of front-of-pack labels on the nutritional quality of supermarket food purchases: evidence from a large-scale randomized controlled trial. *Journal of the Academy of Marketing Science*, *49*(1), 119–138. https://doi.org/10.1007/s11747-020-00723-5

Egnell, M., Talati, Z., Gombaud, M., Galan, P., Hercberg, S., Pettigrew, S., & Julia, C. (2019). Consumers' responses to front-of-pack nutrition labelling: Results from a sample from the Netherlands. *Nutrients*, *11*(8). https://doi.org/10.3390/nu11081817

Egnell, M., Talati, Z., Hercberg, S., Pettigrew, S., & Julia, C. (2018). Objective understanding of front-of-package nutrition labels: An international comparative experimental study across 12 countries. *Nutrients*, *10*(10). https://doi.org/10.3390/nu10101542

Elston, D. M. (2022). The Hawthorne effect. *Journal of the American Academy of Dermatology*. https://doi.org/10.1016/j.jaad.2021.01.085

Finkelstein, E. A., Ang, F. J. L., Doble, B., Wong, W. H. M., & Van Dam, R. M. (2019). A randomized controlled trial evaluating the relative effectiveness of the multiple trafic light and nutri-score front of package nutrition labels. *Nutrients*, *11*(9). https://doi.org/10.3390/nu11092236

Folkvord, F., Bergmans, N., & Pabian, S. (2021). The effect of the nutri-score label on consumer's attitudes, taste perception and purchase intention: An experimental pilot study. *Food Quality and Preference*, *94*(December 2020), 104303. https://doi.org/10.1016/j.foodqual.2021.104303

Gabor, A. M., Stojnić, B., & Ban Ostić, D. (2020). Effects of different nutrition labels on visual attention and accuracy of nutritional quality perception – Results of an experimental eye-tracking study. *Food Quality and Preference*, *84*(December 2019), 103948. https://doi.org/10.1016/j.foodqual.2020.103948

Garlasco, P., Osimo, S. A., Rumiati, R. I., & Parma, V. (2019). A hierarchical-drift diffusion model of the roles of hunger, caloric density and valence in food selection. *Appetite*, *138*(March), 52–59. https://doi.org/10.1016/j.appet.2019.03.009

Godden, E., Thornton, L., Avramova, Y., & Dens, N. (2023). High hopes for front-of-pack (FOP) nutrition labels ? A conjoint analysis on the trade-offs between a FOP label , nutrition claims , brand and price for different consumer segments. *Appetite*, *180*(August 2022), 106356. https://doi.org/10.1016/j.appet.2022.106356

González-Muniesa, P., Mártinez-González, M. A., Hu, F. B., Després, J. P., Matsuzawa, Y., Loos, R. J. F., Moreno, L. A., Bray, G. A., & Martinez, J. A. (2017). Obesity. *Nature Reviews Disease Primers*, *3*. https://doi.org/10.1038/nrdp.2017.34

Hadley, M. (2015). Study: The key to happiness at work is free snacks. *USA Today*. https://eu.usatoday.com/story/money/2015/09/16/study-says-snacks-affect-happiness-at-work/72259746/

Hagmann, D., & Siegrist, M. (2020). Nutri-Score , multiple traffic light and incomplete nutrition labelling on food packages : Effects on consumers ' accuracy in identifying healthier snack options. *Food Quality and Preference*, *83*(December 2019), 103894. https://doi.org/10.1016/j.foodqual.2020.103894

Hansen, P. G., Skov, L. R., Jespersen, A. M., Skov, K. L., & Schmidt, K. (2016). Apples versus brownies : A field experiment in rearranging conference snacking buffets to reduce short-term energy intake Apples versus brownies : A field experiment in rearranging. *Journal of Foodservice Business Research*, *8020*(February). https://doi.org/10.1080/15378020.2016.1129227

Harvard T.H. Chan School of Public Health. (n.d.). *Food and Diet Beyond Willpower: Diet Quality and*

Quantity Matter. Obesity Prevention Source. Retrieved September 21, 2023, from https://www.hsph.harvard.edu/obesity-prevention-source/obesity-causes/diet-and-weight/

He, F. J., Brinsden, H. C., & Macgregor, G. A. (2014). Salt reduction in the United Kingdom: A successful experiment in public health. *Journal of Human Hypertension*, *28*(6), 345–352. https://doi.org/10.1038/jhh.2013.105

Herman, C. P. (2015). The social facilitation of eating. A review. *Appetite*, *86*, 61–73. https://doi.org/10.1016/j.appet.2014.09.016

Hill, J., Wyatt, H., Reed, G., & Peters, J. (2003). Obesity and the Environment: Where Do We Go from Here? *Science*, *299*(5608), 853–855.

Honkanen, P., Olsen, S. O., Verplanken, B., & Tuu, H. H. (2012). Reflective and impulsive influences on unhealthy snacking. The moderating effects of food related self-control. *Appetite*, *58*(2), 616–622. https://doi.org/10.1016/j.appet.2011.11.019

Horowitz, J. L. (1991). Reconsidering the multinomial probit model. *Transportation Research Part B*, *25*(6), 433–438. https://doi.org/10.1016/0191-2615(91)90036-I

Ikonen, I., Sotgiu, F., Aydinli, A., & Verlegh, P. W. J. (2019). Consumer effects of front-of-package nutrition labeling: an interdisciplinary meta-analysis. *Journal of the Academy of Marketing Science*. https://doi.org/10.1007/s11747-019-00663-9

International Agency for Research on Cancer. (2021). *Nutri-Score: Harmonized and mandatory front-of-pack nutrition label urgently needed at the European Union level and beyond* (Issue 301). https://www.iarc.who.int/wp-content/uploads/2021/09/pr301_E.pdf

Jannasch, F., Kröger, J., & Schulze, M. B. (2017). Dietary patterns and Type 2 diabetes: A systematic literature review and meta- analysis of prospective studies. *Journal of Nutrition*, *147*(6), 1174–1182. https://doi.org/10.3945/jn.116.242552

Julia, C., & Hercberg, S. (2017a). Development of a new front-of-pack nutrition label in France: the five-colour Nutri-Score. *Public Health Panorama*, *3*(4), 537–820.

Julia, C., & Hercberg, S. (2017b). Nutri-Score: evidence of the effectiveness of the French FOP nutrition label. *Ernaehrungs Umschau*, *64*(12), 181–187. https://doi.org/10.4455/eu.2017.048

Julia, C., & Hercberg, S. (2017c). Nutri-Score: evidence of the effectiveness of the French front-of-pack nutrition label. *Ernaehrungs Umschau*, *64*(12), 181–187. https://doi.org/10.4455/eu.2017.048

Julia, C., Méjean, C., Touvier, M., Péneau, S., Lassale, C., Ducrot, P., Hercberg, S., & Kesse-Guyot, E. (2016). Validation of the FSA nutrient profiling system dietary index in French adults—findings from SUVIMAX study. *European Journal of Nutrition*, *55*(5), 1901–1910. https://doi.org/10.1007/s00394-015-1006-y

Kälvemark Sporrong, S., Grøstad Kalleberg, B., Mathiesen, L., Andersson, Y., Eidhammer Rognan, S., & Svensberg, K. (2022). Chapter 18 - Understanding and addressing the observer effect in observation studies. In S. P. Desselle, V. García-Cárdenas, & T. F. Chen (Eds.), *Contemporary Research Methods in Pharmacy and Health Services*. Elsevier Inc. https://doi.org/10.1016/b978-0-323-91888-6.00008-9

Kant, A. K., & Graubard, B. I. (2015). 40-Year Trends in Meal and Snack Eating Behaviors of American Adults. *Journal of the Academy of Nutrition and Dietetics*, *115*(1), 50–63. https://doi.org/10.1016/j.jand.2014.06.354

Katzmarzyk, P. T., & Janssen, I. (2004). The Economic Costs Associated With Physical Inactivity and

Obesity in Canada: An Update. *Canadian Journal of Applied Physiology*, *29*(1), 90–115. https://doi.org/10.1139/h04-008

Kiszko, K. ., Martinez, O. D., Abrams, C., & Elbel, B. (2014). The influence of calorie labeling on food orders and consumption: A review of the literature. *Journal of Community Health*, *39*(6), 1248–1269. https://doi.org/10.1007/s10900-014-9876-0.The

Lassale, C., Gunter, M. J., Romaguera, D., Peelen, L. M., Van Der Schouw, Y. T., Beulens, J. W. J., Freisling, H., Muller, D. C., Ferrari, P., Huybrechts, I., Fagherazzi, G., Boutron-Ruault, M. C., Affret, A., Overvad, K., Dahm, C. C., Olsen, A., Roswall, N., Tsilidis, K. K., Katzke, V. A., … Tzoulaki, I. (2016). Diet quality scores and prediction of all-cause, cardiovascular and cancer mortality in a pan-european cohort study. *PLoS ONE*, *11*(7), 1–18. https://doi.org/10.1371/journal.pone.0159025

Lawyers should embrace physical activities. (n.d.). The Impact Lawyers. Retrieved October 6, 2023, from https://theimpactlawyers.com/articles/lawyers-should-embrace-physical-activities#:~:text=The legal practice is understood,to do any physical activity

Li, S., Zhao, Y., & Liu, S. (2022). How Food Shape Influences Calorie Content Estimation : The Biasing Estimation of Calories. *Journal of Food Quality*, *2022*.

Loureiro, M. L., & Gracia, A. (2006). Do consumers value nutritional labels ? *European Review of Agricultural Economics*, *33*(2), 249–268. https://doi.org/10.1093/erae/jbl005

Mantzari, E., Pechey, R., Codling, S., Sexton, O., Hollands, G. J., & Marteau, T. M. (2020). The impact of ‘ on-pack ’ pictorial health warning labels and calorie information labels on drink choice : A laboratory experiment. *Appetite*, *145*(August 2019), 104484. https://doi.org/10.1016/j.appet.2019.104484

Marette, S., Nabec, L., & Durieux, F. (2019). Improving Nutritional Quality of Consumers ’ Food Purchases With Traffic-Lights Labels : An Experimental Analysis. *Journal of Consumer Policy*, 377–395.

Marty, L., Evans, R., Sheen, F., Humphreys, G., Jones, A., Boyland, E., & Robinson, E. (2021). The energy and nutritional content of snacks sold at supermarkets and coffee shops in the UK. *Food and Dietary Quality*, *February*, 1035–1041. https://doi.org/10.1111/jhn.12880

Marty, L., Franzon, C., Jones, A., & Robinson, E. (2021). Socioeconomic position, energy labelling and portion size selection: An online study comparing calorie and physical activity calorie equivalent (PACE) labelling in UK adults. *Appetite*, *166*(June), 105437. https://doi.org/10.1016/j.appet.2021.105437

Mazza, M. C., Dynan, L., Siegel, R. M., & Tucker, A. L. (2017). Nudging Healthier Choices in a Hospital Cafeteria: Results From a Field Study. *Health Promotion Practice*, *19*(6), 925–934. https://doi.org/10.1177/1524839917740119

McCambridge, J., Witton, J., & Elbourne, D. R. (2014). Systematic review of the Hawthorne effect: New concepts are needed to study research participation effects. *Journal of Clinical Epidemiology*, *67*(3), 267–277. https://doi.org/10.1016/j.jclinepi.2013.08.015

Menotti, A., Puddu, P. E., Lanti, M., Maiani, G., Catasta, G., & Fidanza, A. A. (2014). Lifestyle habits and mortality from all and specific causes of death: 40-year follow-up in the italian rural areas of the seven countries study. *Journal of Nutrition, Health and Aging*, *18*(3), 314–321. https://doi.org/10.1007/s12603-013-0392-1

Muller, L., & Prevost, M. (2016). What cognitive sciences have to say about the impacts of nutritional labelling formats. *Journal of Economic Psychology*, *55*, 17–29.

https://doi.org/10.1016/j.joep.2016.01.005

Muraven, M., & Baumeister, R. F. (2000). Self-Regulation and Depletion of Limited Resources : Does Self-Control Resemble a Muscle ? *Psychology Bulletin*, *126*(2), 247–259. https://doi.org/10.1037//0033-2909.126.2.247

Myhre, J. B., Løken, E. B., Wandel, M., & Andersen, L. F. (2015). The contribution of snacks to dietary intake and their association with eating location among Norwegian adults - Results from a cross-sectional dietary survey. *BMC Public Health*, *15*(1), 1–9. https://doi.org/10.1186/s12889-015-1712-7

Mytton, O. T., Nnoaham, K., Eyles, H., Scarborough, P., & Mhurchu, C. N. (2014). Scutellaria extract and wogonin inhibit tumor-mediated induction of T reg cells via inhibition of TGF-β1 activity. *BMC Public Health*, *14*(886). https://doi.org/10.1186/1471-2458-14-886

Nicolaidis, S. (2019). Environment and obesity. *Metabolism: Clinical and Experimental*, *100*, 1–5. https://doi.org/10.1016/j.metabol.2019.07.006

Niewold, T. (2019). *Nutrition and Metabolism*.

Nohlen, H. U., Grammatikaki, E., Ciriolo, E., Salesse, J., Christofoletti, M., Bruns, J., Marandola, F., & Van Bavel, G. (2022). *Front-of-pack nutrition labelling schemes: an update of the evidence. Addendum to the JRC Science for Policy report "Front-of-pack nutrition labelling schemes: a comprehensive review", published in 2020.* https://doi.org/10.2760/932354

Nordström, J., Thunström, L., Van 't Veld, K., Shogren, J. F., & Ehmke, M. (2020). Strategic ignorance of health risk: its causes and policy consequences. *Behavioural Public Policy*, 1–32. https://doi.org/10.1017/bpp.2019.52

Otterbring, T., Folwarczny, M., & Gidlöf, K. (2023). Hunger effects on option quality for hedonic and utilitarian food products. *Food Quality and Preference*, *103*(December 2021). https://doi.org/10.1016/j.foodqual.2022.104693

Peters, S., & Verhagen, H. (2022). An Evaluation of the Nutri-Score System along the Reasoning for Scientific Substantiation of Health Claims in the EU—A Narrative Review. *Foods*, *11*(16). https://doi.org/10.3390/foods11162426

Petimar, J., Grummon, A. H., Zhang, F., Gortmaker, S. L., Moran, A. J., Polacsek, M., Rimm, E. B., Roberto, C. A., Rao, A., Cleveland, L. P., Simon, D., Franckle, R. L., Till, S., Greene, J., & Block, J. P. (2022). Assessment of Calories Purchased after Calorie Labeling of Prepared Foods in a Large Supermarket Chain. *JAMA Internal Medicine*, *182*(9), 965–973. https://doi.org/10.1001/jamainternmed.2022.3065

Petimar, J., Ramirez, M., Rifas-Shiman, S. L., Linakis, S., Mullen, J., Roberto, C. A., & Block, J. P. (2019). Evaluation of the impact of calorie labeling on McDonald's restaurant menus: A natural experiment. *International Journal of Behavioral Nutrition and Physical Activity*, *16*(1), 1–11. https://doi.org/10.1186/s12966-019-0865-7

Poquet, D., Ginon, E., Goubel, B., Chabanet, C., Marette, S., Issanchou, S., & Monnery-Patris, S. (2019). Impact of a front-of-pack nutritional traffic-light label on the nutritional quality and the hedonic value of mid-afternoon snacks chosen by mother-child dyads. *Appetite*, *143*(March), 104425. https://doi.org/10.1016/j.appet.2019.104425

Roberto, C. A., Schwartz, M. B., & Brownell, K. D. (2009). Rationale and Evidence for Menu-Labeling Legislation. *American Journal of Preventive Medicine*, *37*(6), 546–551. https://doi.org/10.1016/j.amepre.2009.07.015

Robinson, E., Humphreys, G., & Jones, A. (2021). Alcohol, calories, and obesity: A rapid systematic review and meta-analysis of consumer knowledge, support, and behavioral effects of energy labeling on alcoholic drinks. *Obesity Reviews*, *22*(6). https://doi.org/10.1111/obr.13198

Robson, C. (2016). *Real World Research: A Resource for Social Scientists and Practitioner-Researchers* (Fourth edi). Blackwell Publishers.

Rusmevichientong, P., Jaynes, J., & Chandler, L. (2021). Understanding influencing attributes of adolescent snack choices : Evidence from a discrete choice experiment. *Food Quality and Preference*, *92*(July 2020), 104171. https://doi.org/10.1016/j.foodqual.2020.104171

Ruxton, C. H., Gardner, E. J., & McNulty, H. M. (2009). Is sugar consumption detrimental to health? A review of the evidence 1995-2006. *Critical Reviews in Food Science and Nutrition*, *50*(1), 1–19. https://doi.org/10.1080/10408390802248569

Sabaté, J. (2010). Nut Consumption and Blood Lipid Levels. *Archives of Internal Medicine*, *170*(9), 821. https://doi.org/10.1001/archinternmed.2010.79

Salmon, S. J., Fennis, B. M., De Ridder, D. T. D., Adriaanse, M. A., & De Vet, E. (2014). Health on impulse: When low self-control promotes healthy food choices. *Health Psychology*, *33*(2), 103–109. https://doi.org/10.1037/a0031785

Santé publique France. (2023). *Nutri-Score*. https://www.santepubliquefrance.fr/en/nutri-score

Sarabipour, S., Khan, A., Seah, Y. F. S., Mwakilili, A. D., Mumoki, F. N., Sáez, P. J., Schwessinger, B., Debat, H. J., & Mestrovic, T. (2021). Changing scientific meetings for the better. *Nature Human Behaviour*, *5*(3), 296–300. https://doi.org/10.1038/s41562-021-01067-y

Schubert, E., & Randler, C. (2008). Association between chronotype and the constructs of the Three-Factor-Eating-Questionnaire. *Appetite*, *51*(3), 501–505. https://doi.org/10.1016/j.appet.2008.03.018

Schüz, B., Papadakis, T., & Ferguson, S. G. (2018). Situation-specific social norms as mediators of social influence on snacking. *Health Psychology*, *37*(2), 153–159. https://doi.org/10.1037/hea0000568

Sciensano. (2021). *Numbers*. https://www.sciensano.be/en/health-topics/obesity/numbers

Shen, L., Cai, F., & Jr, R. S. W. (2022). How the interplay of variety and processing strategy affects calorie estimates ☆. *Journal of Business Research*, *147*(April), 97–107. https://doi.org/10.1016/j.jbusres.2022.04.010

Si Hassen, W., Castetbon, K., Tichit, C., Péneau, S., Nechba, A., Ducrot, P., Lampuré, A., Bellisle, F., Hercberg, S., & Méjean, C. (2018). Energy, nutrient and food content of snacks in French adults. *Nutrition Journal*, *17*(1), 1–9. https://doi.org/10.1186/s12937-018-0336-z

Skov, L. R., Lourenço, S., Hansen, G. L., Mikkelsen, B. E., & Schofield, C. (2013). Choice architecture as a means to change eating behaviour in self-service settings: A systematic review. *Obesity Reviews*, *14*(3), 187–196. https://doi.org/10.1111/j.1467-789X.2012.01054.x

Society for Human Resource Management. (2018). *2018 Employee Benefits*. https://www.shrm.org/hr-today/trends-and-forecasting/research-and-surveys/Documents/2018 Employee Benefits Report.pdf

Sotos-Prieto, M., Bhupathiraju, S. N., Mattei, J., Fung, T. T., Li, Y., Pan, A., Willett, W. C., Rimm, E. B., & Hu, F. B. (2017). Association of Changes in Diet Quality with Total and Cause-Specific Mortality. *New England Journal of Medicine*, *377*(2), 143–153.

https://doi.org/10.1056/nejmoa1613502

Sowers, M. F., Colby, S., Kavanagh, K., Zhou, W., Sowers, M. F., Colby, S., Kavanagh, K., Zhou, W., & Sowers, M. F. (2019). Testing product , pricing , and promotional strategies for vending machine interventions with a college population vending machine interventions with a college population. *Journal of Foodservice Business Research*, *0*(0), 1–23. https://doi.org/10.1080/15378020.2019.1592653

Spence, C. (2021). Explaining diurnal patterns of food consumption. *Food Quality and Preference*, *91*(February), 104198. https://doi.org/10.1016/j.foodqual.2021.104198

Swartz, J. J., Braxton, D., & Viera, A. J. (2011). Calorie menu labeling on quick-service restaurant menus : an updated systematic review of the literature. *International Journal of Behavioral Nutrition and Physical Activity*, 1–8.

Swinburn, B., Sacks, G., Hall, K., McPherson, K., Finegood, D., & Moodie, M. (2011). The global obesity pandemic: shaped by global drivers and local environments. *Obesity*, *378*(9793), 804–814. https://doi.org/10.1016/S0140-6736(11)60813-1

Taber, L. (2014). Free food at work is on the rise — but not everyone's happy. *NY Post*.

Tal, A. (2021). Wanting More , Seeing Less : Hunger Reduces Calorie Evaluations. *International Journal of Environmental Research and Public Health*.

Tangari, A. H., Bui, M. M., Haws, K. L., & Liu, P. J. (2019). *That ' s Not So Bad , I ' ll Eat More ! Backfire Effects of Calories-per-Serving Information on Snack Consumption*. *83*(1), 133–150. https://doi.org/10.1177/0022242918815895

Ter Borg, S., Steenbergen, E., Milder, I. E. J., & Temme, E. H. M. (2021). Evaluation of nutri-score in relation to dietary guidelines and food reformulation in the Netherlands. *Nutrients*, *13*(12). https://doi.org/10.3390/nu13124536

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge*. Penguin Putnam Inc.

Thunström, L., Nordström, J., Shogren, J. F., Ehmke, M., & van't Veld, K. (2016). Strategic self-ignorance. *Journal of Risk and Uncertainty*, *52*(2), 117–136. https://doi.org/10.1007/s11166-016-9236-9

Townshend, T., & Lake, A. A. (2009). Obesogenic urban form: Theory, policy and practice. *Health and Place*, *15*(4), 909–916. https://doi.org/10.1016/j.healthplace.2008.12.002

United States Department of Labor, & Library, O. of A. L. J. L. (1991). *DICTIONARY OF OCCUPATIONAL TITLES*.

Van Den Akker, K., Bartelet, D., Brouwer, L., Luijpers, S., Nap, T., & Havermans, R. (2022). The impact of the nutri-score on food choice : A choice experiment in a Dutch supermarket. *Appetite*, *168*(January 2021), 105664. https://doi.org/10.1016/j.appet.2021.105664

Van Kleef, E., Van Trijp, H., Paeps, F., & Fernández-Celemín, L. (2008). Consumer preferences for front-of-pack calories labelling. *Public Health Nutrition*, *11*(2), 203–213. https://doi.org/10.1017/S1368980007000304

Vasiljevic, M., Cartwright, E., Pilling, M., Lee, M., Bignardi, G., Pechey, R., Hollands, G. J., Jebb, S. A., & Marteau, T. M. (2018). Impact of calorie labelling in worksite cafeterias : a stepped wedge randomised controlled pilot trial. *International Journal of Behavioral Nutrition and Physical Activity*, 1–12.

Vasiljevic, M., Fuller, G., Pilling, M., Hollands, G. J., Pechey, R., Jebb, S. A., & Marteau, T. M. (2019).

What is the impact of increasing the prominence of calorie labelling ? A stepped wedge randomised controlled pilot trial in worksite cafeterias. *Appetite*, *141*(April), 104304. https://doi.org/10.1016/j.appet.2019.05.035

Vermeer, W. M., Steenhuis, I. H. M., Leeuwis, F. H., Bos, A. E. R., & Boer, M. De. (2011). View the label before you view the movie : A field experiment into the impact of Portion size and Guideline Daily Amounts labelling on soft drinks in cinemas. *BMC Public Health*.

Vlassopoulos, A., Katidi, A., & Kapsokefalou, M. (2022). Performance and discriminatory capacity of Nutri-Score in branded foods in Greece. *Frontiers in Nutrition*, *9*(September), 1–11. https://doi.org/10.3389/fnut.2022.993238

Vohs, K. D., & Heatherton, T. F. (2000). SELF-REGULATORY FAILURE : A Resource-Depletion Approach Kathleen. *Psychological Science*, *21*, 249–254.

Webb, K. L., Solomon, L. S., Sanders, J., Akiyama, C., & Crawford, P. B. (2011). Menu Labeling Responsive to Consumer Concerns and Shows Promise for Changing Patron Purchases. *Journal of Hunger & Environmental Nutrition*, *October 2014*, 37–41. https://doi.org/10.1080/19320248.2011.576210

Woolley, K, & Liu, P. J. (2021). How You Estimate Calories Matters: Calorie Estimation Reversals. *Journal of Consumer Research*, *48*(1), 147–168. https://doi.org/10.1093/jcr/ucaa059

Woolley, Kaitlin, & Risen, J. L. (2018). Closing your eyes to follow your heart: Avoiding information to protect a strong intuitive preference. *Journal of Personality and Social Psychology*, *114*(2), 230–245. https://doi.org/10.1037/pspa0000100

World Health Organization. (2021). *State of play of WHO guidance on Front-of-the-Pack labelling*. https://www.who.int/news/item/27-09-2021-state-of-play-of-who-guidance-on-front-of-the-pack-labelling

World Health Organization. (2022). *WHO EUROPEAN REGIONAL OBESITY REPORT 2022*. https://apps.who.int/iris/bitstream/handle/10665/353747/9789289057738-eng.pdf

Yu, E., Malik, V. S., & Hu, F. B. (2018). Cardiovascular Disease Prevention by Diet Modification: JACC Health Promotion Series. *Journal of the American College of Cardiology*, *72*(8), 914–926. https://doi.org/10.1016/j.jacc.2018.02.085