

**AFFORDANCE NUDGING:  
A NEW APPROACH TO FACILITATE  
HEALTHIER FOOD CHOICES**



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# **AFFORDANCE NUDGING: A NEW APPROACH TO FACILITATE HEALTHIER FOOD CHOICES**

AN ONLINE SUPERMARKET EXPERIMENT

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4141377

Master of Science: Social, Health and Organizational Psychology

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This manuscript can be made publicly accessible after June 24<sup>th</sup>, 2022.

JUNE 22th, 2022

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Date: 22/6/2022

## ABSTRACT

Minor changes in the choice environment, commonly referred to as nudging, can be used to encourage people to make more desirable food choices. This study investigated the effectiveness of a novel nudge that explicitly incorporates the concept of affordances, or possibilities for action, and the potential added effect of positive feedback. Furthermore, this study attempted to investigate potential spillover effects via the mediation of healthy eating attitudes, and provide insight into some potential moderators. In an online grocery shopping experiment, 347 Dutch individuals were randomly assigned to the affordance nudge, affordance nudge with positive feedback, or control condition. The healthiness of food choices was measured in two independent supermarket tasks, the first with the nudge and the second without. The results showed that the nudge had no effect on food choices and this effect was not moderated by healthy eating habits. There was also no additional effect of feedback. Consequently, no spillover effect of the nudge on the products chosen in the second supermarket task was discovered. Positive attitudes toward healthy eating as well as healthy food habits were found to predict the healthiness of the products chosen. Further research is needed to explore the influence of this affordance nudge in a more real-life supermarket setting.

**Keywords:** Food choices, Affordances, Nudging, Choice architecture; Supermarket

## INTRODUCTION

One of the largest contributors to global disease is having a poor diet consisting of relatively cheap, energy dense and nutrient-poor foods (Swinburn et al., 2011). Currently 39% of the global adult population is affected by overweight and 13% by obesity, indicating that obesity numbers have nearly tripled since 1975 (WHO, 2021). This is cause for concern, as obesity and its determinants are risk factors for diet-related diseases, such as type 2 diabetes, cardiovascular disease, and certain cancers (Swinburn et al., 2019). To reduce this burden of disease it is important that we adopt healthier eating habits.

Dietary recommendations are designed to help people adhere to a healthy diet and thus reduce the risk of obesity, chronic disease, and nutrient deficiencies. Although most people have the intention to adhere to dietary recommendations, they often fail to do so (de Ridder et al., 2017). One reason for this failure to eat healthily is that today's obesogenic food makes it difficult to follow through on one's intention to eat healthily (Swinburn et al., 2011). Many of our food choices are rather habitual or based on heuristics and influenced by convenience, availability or affordability (Cohen & Babey, 2012; Dijksterhuis et al., 2005). Consequently, modifying diet-related behaviors can be challenging, especially since our food choices are heavily impacted by our surroundings. Therefore, the focus should be on altering the food environment (Giskes et al., 2011).

## NUDGING

Nudging is a promising strategy to encourage people to make healthier food choices. Nudging refers to the modification of the choice architecture that can change human behavior in a predictable way without restricting freedom of choice or modifying economic incentives such as product prices (Broers et al., 2017; Thaler & Sunstein, 2008). People often rely on rule-of-thumb strategies such as heuristics, biases, and mental shortcuts to make decisions quickly and efficiently (Kahneman, 2011). Making use of these rule-of-thumb strategies, nudging can help people to select a preferred alternative by simply making it the most appealing, visible, or convenient option (Thaler & Sunstein, 2008).

Nudging is a popular way to change health behaviors, including dietary choices (Arno & Thomas, 2016; Bucher et al., 2016). A recent meta-analysis concentrating on healthy eating nudges in field experiments found an overall positive modest effect on healthy food consumption (Cadario & Chandon, 2020). Nudges have also been used in a variety of food-

choice environments, including supermarkets (Bucher et al., 2016). Examples of nudges that attempt to promote a specific dietary choice can be as simple as the placement of products at eye height, or putting healthier products within a closer reach to consumers than unhealthy ones (Cadario & Chandon, 2020)

## AFFORDANCE THEORY

Affordance theory (Gibson, 1977) helps to better understand the link between organisms and their environment that is involved in nudging. Affordances describe the relationship between a person and an object and what the person can do with the object. To identify what actions are possible, humans have to consciously or unconsciously (Kaaronen, 2017) identify the affordances of that object, such as that a button can be pushed or a rope can be pulled (Norman, 1988). If affordances are unclear, an object does not signal correctly what opportunities for action they afford. Therefore, signifiers, such as signals, drawings, signs, or labels, are required to make the action properties visible (Norman, 2013). An example of a signifier is the signal on a screen that indicates where a person should touch. In short, affordances are the actions that are possible whereas signifiers define how people discover these actions by communicating what actions are appropriate and where these should take place (Norman, 2013).

## AFFORDANCE THEORY AND NUDGE THEORY

The principle of human interaction with the affordances of our environment could be more intentionally used within the design of nudges. Existing nudges seem to attract the nudged person's attention to the affording properties of nudged option (Blom et al., 2021), such as placement of products at eye-level to nudge people towards interacting easily with these products (Cadario & Chandon, 2020). A nudge might be considered a signifier. This intentional application of the principle of affordances can be relevant for nudging since, when we perceive affordances correctly, behaviors can flow naturally from that perception. As a result, affordances can enable opportunities for action through the automatic activation of the motor system (Gibson, 1977). Similarly, affordances can also encourage people to engage with the nudged option. This has the potential to increase the effectiveness of nudges, which is especially important given that nudges in grocery stores have been shown to be less

effective than nudges used in other eateries such as restaurants or cafes (Cadario & Chandon, 2020).

This notion of affordances was applied for the first time in the development of a new nudge as part of the supermarket-based “Sustainable Prevention of Cardiometabolic Risk through Nudging Health Behaviors” (Supreme) Nudge project in the Netherlands (Lakerveld et al., 2018). The affordance nudge consists of an animated character that shifts its gaze towards healthier food items, such as fruit and vegetables, in order to encourage customers to choose these options. Additionally, to the gaze cue, when a nudged item was chosen, individuals received positive feedback in the form of a smile and thumbs up.

The gazing technique (i.e., “gaze cueing”) is based on people's quick and automatic ability to detect eyes and redirect their attention accordingly (Ernest-Jones et al., 2011). Gaze cues direct attention to a specific object and lower the threshold for interacting with the nudged item (Tipper, 2010). Consequently, the gaze cue could be labelled as a signifier since it enhances the affording properties of fruit and vegetables. This automatically encourages consumers to interact with the object.

The positive feedback consisting of a smile and a thumbs up are expected to facilitate the activation of injunctive social norms as a means of reinforcing the nudged behavior (Gaube et al., 2018). Injunctive social norms describe the behavior that is commonly socially approved or disapproved (Schultz et al., 2007). Previous research has shown that providing feedback using emoticons was successful in reducing water use (Schultz et al., 2016).

Furthermore, positive feedback has been linked to increased motivation (Mouratidis et al., 2008). According to the theory of planned behavior, one’s attitude predicts one’s behavioral intentions (Ajzen, 1991). The perception that an action is good or enjoyable is the basis of a positive attitude toward it. Nudges are found to be able to affect future decisions via the mediation of attitude (Van Rookhuijzen et al., 2021). This is consistent with Bem's (1972) theory of self-perception, which holds that attitudes can not only impact conduct but can also be an input for new attitudes via perceived behavior. As a result, a shift in attitude may have an impact on future decisions, causing them to conform to the new attitude, as seen in cognitive dissonance study (Festinger, 1962). In this way, attitude may be able to moderate the effect of the affordance nudge on healthy food choices in a second supermarket task, which has not been found in previous studies for food choices.

Blom et al. (2021) found that, when this nudge was placed in the fruit and vegetable section, vegetable purchases increased by 13%. This current study aimed to replicate these findings in a more controlled environment and investigate the effect of both elements of the nudge, the gaze-cue and the positive feedback, in more detail.

## CURRENT STUDY

To further provide insight in the effectiveness of the affordance nudge on the healthiness of food choices, this study investigates the effectiveness of the nudge (gaze cue) with and without the positive feedback on (future) food choices and to explore some potential components of the underlying mechanism, including healthy eating habits and attitude towards healthy foods. Participants were divided over three different research conditions: a control condition, a nudge condition, and a nudge + positive feedback condition where positive feedback was provided when participants select the nudged option.

Participants in either of the nudge conditions were expected to make healthier food choices than those in the control condition. Furthermore, it was expected that participants who received positive feedback after healthier choices, are likely to be more satisfied with their decisions (Hilton et al., 2014). Satisfaction with a food choice might be of impact of future choices, therefore they might be more likely to eventually change their behavior to be in line with the behavior for which they received the positive feedback (Bem, 1972). As a result, it was expected that participants in the nudge condition, either with or without positive feedback, would make healthier food choices in a second supermarket task than participants in the control condition. In addition, we anticipated that participants who received feedback would make the healthiest food choices.

To learn more about the mechanisms behind this nudge, we looked at whether the effect of affordance nudging combined with positive feedback on healthy food choices was mediated by an increase in positive attitudes toward healthier foods. Furthermore, although nudging strategies have been found to increase healthy eating behaviors in the past (Broers et al., 2017), we anticipate that those who already have good eating habits will choose healthier products in general (Diefenbacher et al., 2020). To look beyond main effects and look at a priori preferences, as part of an explorative analysis, we will examine whether the effect of nudging on the healthiness of dietary choices is moderated by healthy food habits.



## METHOD

Ethical approval was obtained from Utrecht University Students Ethics Review & Registration Site, registered under number 22-0861. Furthermore, this study was pre-registered at As Predicted ([https://aspredicted.org/1L7\\_DTL](https://aspredicted.org/1L7_DTL)).

## PARTICIPANTS

Participants were recruited using convenience sampling using social media platforms (Facebook, LinkedIn, WhatsApp). The sample size was calculated a-priori in G\*Power using the effect size from a recent meta-analysis (Broers et al., 2017), yielding an estimated sample size of  $N = 432$  for a one-way ANOVA with three groups and a moderate effect size of  $d = 0.30$  ( $\alpha = 0.05$ ,  $power = 80\%$ ). 438 people started the first questionnaire with participants quitting the study during the first demographic survey ( $N = 20$ ) or during the first supermarket task ( $N_{\text{control}} = 22$ ,  $N_{\text{nudge}} = 14$ ,  $N_{\text{nudge} + \text{feedback}} = 12$ ). Four participants were excluded because they did not provide consent during the experiment's debriefing.

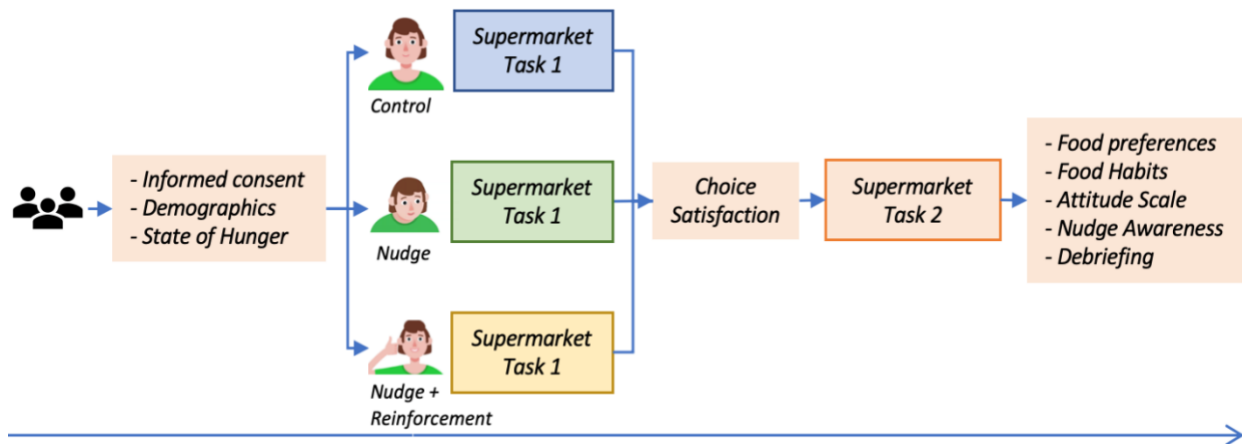
$N = 347$  Dutch people finished the study ( $N_{\text{nudge}} = 116$ ,  $N_{\text{nudge} + \text{feedback}} = 123$ ,  $N_{\text{control}} = 113$ , 262 women, 86 men, 4 gender not specified). Mean age was 29.78 ( $SD = 11.59$ ) and mean BMI was 23.36 ( $SD = 3.61$ ). 288 completed higher-education, 60 middle-education and 4 lower-education. A total of 181 participants were students, 163 were employed, either full-time ( $N = 95$ ) or part-time ( $N = 68$ ), 4 were unemployed, and 4 retired.

## DESIGN AND PROCEDURE

A randomized, three-arm, double-blind, controlled trial was performed, with a between groups design (Figure 1). An online supermarket experiment was designed using the Gorilla Experiment Builder (<https://gorilla.sc/>).

**Figure 1.**

*Procedure of the three-arm study design.*

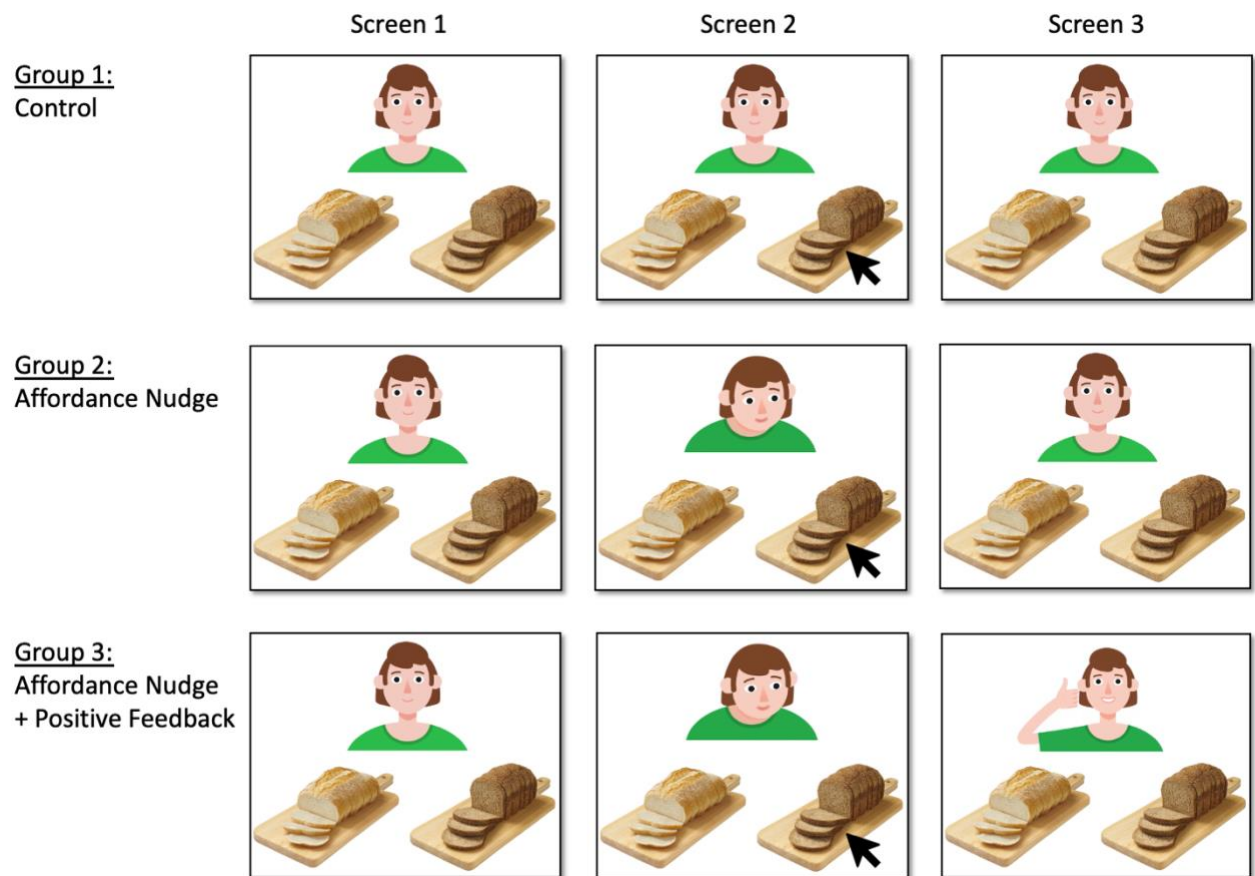


After consent was provided, participants completed a demographic questionnaire assessing gender, age, height, weight, dietary preferences, current employment status, highest completed education level, and state of hunger.

Next, participants were randomly assigned with a balanced randomization tool to one of three research conditions as shown in Figure 2: (1) the control condition with the affordance nudge in default mode (no products are nudged), (2) the affordance nudge alone nudging the healthiest product, or (3) the affordance nudge followed by positive feedback. During this task, participants were shown two products at the same time and asked to choose their preferred item as if they were grocery shopping in a supermarket and had to choose between these two items.

**Figure 2.**

*Visual representation of the three research conditions: one control group and two nudging conditions, with the screens arranged in the same order as shown during the experiment.*



The two products presented in each trial belonged to the same food category, but differed in healthiness, as determined by the Nutri-score (Dréano-Trécant et al., 2020). An example of such a duo can be seen in Figure 3. A total of 10 trials were presented. Before each forced choice trial, a fixation cross was displayed for 500ms, with a short 100ms white screen before and after. Immediately after selecting a product, a 3000ms clip displaying the animation in default mode or with a smile and thumbs up was displayed (screen 3 in Figure 2). This first supermarket task was followed by a choice satisfaction task where participants rated how satisfied they were with their choices.

### Figure 3.

*An example of a product duo displayed during the first supermarket task (see Appendix A). Brown rice (left, Nutri-score: -3), and white rice (right, Nutri-score 0).*



To evaluate potential spillover effects, participants performed a second supermarket task where no nudging was present. It consisted of five trials, each with eight products (four product pairs) from one of five categories (breakfast, lunch, dinner, dessert, and snacks). Participants were asked to select two products of their choice. We also assessed food preferences, eating habits, attitudes toward healthy food, and nudge awareness. Finally, participants were debriefed, and asked to give their permission again or withdraw their participation. There was no monetary compensation for taking part in this study.

## MEASURES AND MATERIALS

### ***OUTCOME MEASURE***

The primary outcome was the healthiness of selected food products in the first supermarket task measured with the Nutri-score, ranging from -15 (highest nutritional quality) to 40, (lowest nutritional quality) (Dréano-Trécant et al., 2020). The average Nutri-score of the product selection in the first supermarket task was the primary outcome measure. As a secondary outcome, the Nutri-scores from the second supermarket task were used to assess potential spill-over effects.

## ***OTHER VARIABLES***

### *Attitudes towards Healthier Foods*

Attitudes towards choosing healthy food items were assessed with six items, all starting with the sentence “*choosing healthier food products is...*” followed by six different seven-point Likert scales (*good - bad; positive – negative; satisfactory – unsatisfactory; pleasant - unpleasant; satisfactory – unsatisfactory; desirable – undesirable; Van Rookhuijzen et al., 2021,  $\alpha = 0.87$* ). Participants were also asked to rate the importance for themselves to eat healthily on a visual analogue scale ranging from 0 (*not important at all*) to 100 (*very important*).

### *Checklist for Eating Habits*

Healthy food habits were measured using *The Adolescent Food Habits Checklist* (AFHC) (Johnson et al., 2002). This scale assesses eating behavior using a true/false response format for a total of 23-items. Although targeted at adolescent, it is also used in the general population (Hill et al., 2016). The scale was translated into Dutch with one question on daily fruit consumed adapted to meet the Dutch National Dietary Guidelines. The final score, which ranges from 0 (very low level of healthy eating habits) to 23 (very high level of healthy eating habits), was calculated using a scoring system provided (Johnson et al., 2002). The validity and internal reliability of the original scale was high (Cronbach's  $\alpha = 0.83$ ). In this study, the Dutch version, Cronbach's alpha ( $\alpha = 0.73$ ) was considered acceptable.

### *Demographics*

The baseline measurements included self-reported demographics (*Female; Male; Not specified*), age (*in years*), height (*in cm*), weight (*in kg*), dietary lifestyles (*No specific diet; Organic; Gluten-free; Vegetarian; Pescatarian; Vegan*), current employment status (*Disabled; Unemployed (looking for work); Unemployed (not looking for work); Student; Full-time employed; Part-time employed; Retired*) and highest completed education level. Body mass index (BMI - kg/m<sup>2</sup>) was calculated using self-reported height and weight (<18.5 underweight, 18,5 – 25 healthy weight, 25 – 30 overweight, 30 severely overweight). Education was categorized using the five categories used by *Sociaal en cultureel Planbureau (SCP)* as a proxy for socioeconomic position (SEP).

### *Other Control Variables*

*Food Choice Satisfaction* was assessed by asking participants how much they agreed on a 7-point scale (1 strongly disagree, 7 totally agree) with the statement “I am satisfied with the products I have chosen”. Food preference were assessed with an open question: “Are there any products you do not like or do not want to eat? If so, please specify...”.

*Evaluation of the nudge* was assessed similarly to previous research (Blom et al., 2021). Following the statement “When deciding which product to choose, I felt...”, we asked to rate the following statements on a 7-point scale: “Encouraged”, “Patronized”, “Invited”, “As if I was being watched”, or “Taken seriously”. The “Patronized” and “As if I were being watched” scores were transformed, and the average score on all evaluation questions was used to indicate how positive the participants perceived the nudge.

Immediately after the first supermarket task, *nudge awareness* was measured with an open question: “Did you notice anything in the supermarket?”. Also, information on grocery shopping was acquired: “Do you do your own grocery shopping?”. State of hunger was assessed using an analogue scale ranging from 0 (not hungry at all) to 100 (very hungry) with the question “How hungry do you currently feel?”. Finally, we inquired about participants' perspectives on the study's goal: “What do you think the study's goal was?”.

## ANALYSES

Data was analyzed per protocol, excluding all non-compliant participants and dropouts. Deviating data was defined as either having an absolute z-score larger than 3.29 or as being visually removed from the rest of the data in the histogram. For group-wise analysis a multivariate outlier per group was defined as having a Cook's distance larger than 1.00. Any missing or deviating data was reported for all variables. Univariate or multivariate outliers were individually judged to be included in the sample and excluded in a sensitivity analysis. All statistical analyses were conducted in R. Two-sided statistical analysis is considered at  $p$  values  $< 0.05$ .

Prior to the statistical analysis a randomization check was performed using a logistic regression analysis with condition as the independent variable and age, gender, BMI, and level of education as the dependent variables. Histograms were visually inspected for violations of univariate distribution assumptions, and homogeneity of variance (ANOVA) was tested using Hartley's  $F_{max}$  (violated if  $F_{max} > 10$ ).

### *Main Analyses*

The first hypothesis was tested using a one-way ANOVA, with research condition as the independent variable and healthiness of food choice (as dependent variable). To test the second hypothesis, a one-way ANOVA was used on the healthiness of food choice from the second supermarket task. The Tukey HSD test was used to perform post-hoc comparisons to investigate differences between groups. The number of times participants chose the healthier option presented was used as a secondary outcome measure to validate the Nutri-scores as an outcome measure for the first two hypotheses. Participants (N = 3) who chose one product rather than two during the second supermarket were excluded from the analyses<sup>1</sup>. Finally, the third hypothesis was tested using the Baron and Kenny (1986) method to investigate potential attitude mediation on the effect of research condition on the healthiness of food choices.

### *Explorative Analysis*

To investigate whether the effect of nudging on the healthiness of food choices is moderated by healthy food habits a hierarchical multiple linear regression with healthiness of food choices as outcome was performed with research condition added as predictor in the first step. In the second step healthy eating habits was added as predictor and in the third step the condition X healthy eating habits interaction was added predictor.

### *Sensitivity Analysis*

Sensitivity analyses were performed excluded all outliers on time, based on the pre-registered outlier identification or when a decision was made within 1 second (N = 4), or participants who made one of their food choices after 20 seconds (N = 47). Furthermore, after concerns regarding readability were raised, a sensitivity analysis was conducted that excluded all mobile phone users (N = 73). Additionally, sensitivity analyses were performed excluding participants who correctly guessed the aim of the study (N = 3), outliers on age (N = 3), outliers on importance of healthy eating (N = 3), being obese (N = 19) overweight (N = 59), underweight (N = 4), unknown (N = 17) and not doing groceries (N = 42).

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<sup>1</sup> Some participants (n=29) selected three, four, five or even six products during one or more of the trials. Since it was clearly stated in the instructions that only the first two selected scores would be used in the analysis, these selections were deleted and only the first two selected products were used.

## RESULTS

### RANDOMIZATION CHECK

A randomization check was performed using a logistic regression for BMI ( $p = .313$ ), and age ( $p = .986$ ). A Chi-square Test was used to investigate randomization for the categorical variables: education ( $p = .636$ ), gender ( $p = .718$ ), and employment status. For employment status randomization was not completely since four participants were retired and all were assigned to the nudge + feedback condition,  $X^2(8, N = 347) = 15.62, p = .048$ .

Assumptions for homogeneity of variance for the average Nutri scores of the first and second supermarket task could be assumed. Normality, checked with a density plot and Shapiro normality test, could only be assumed for the Nutri scores of the second supermarket task ( $W = 1.00, p < .547$ ) and was skewed for the Nutri scores from the first supermarket task ( $W = 0.97, p < .001$ ), healthy eating attitude ( $W = 0.95, p < .001$ ), importance of healthy eating ( $W = 0.94, p < .001$ ) and food habits ( $W = 0.98, p < .001$ ). Given the relatively equal sample sizes within the research conditions, no outliers in the Nutri-scores, and a degree of freedom error greater than 20, we expect an ANOVA to be robust to the assumptions of normality not being met (Tabachnick & Fidell, 2013).

### MAIN STUDY PARAMETERS

#### ***Healthiness of food choices – First Supermarket Task***

An ANOVA was conducted with experimental condition (control vs. nudge vs. nudge + feedback) as between-subject variables and the average Nutri-scores from the first supermarket task as dependent variable, revealing no significant variation among conditions,  $F(2, 344) = 0.37, p = .693, \eta_p^2 = .00$ . These findings contradict our hypothesis, indicating that the nudge had no effect on the healthiness of food choices. The average Nutri scores per condition are displayed in Table 1, with lower scores indicating healthier food choices. A one-way ANOVA using the number of healthier choices as dependent variable, see Table 2, did not reveal any differences between research conditions either,  $F(2, 344) = 0.02, p = .985, \eta_p^2 = .00$ .



**Table 1***Mean Nutri scores of both supermarket tasks per condition*

Research Condition	Supermarket task 1		Supermarket task 2	
	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>
Control	111	-0.13 (1.56) [-2.50, 3.60]	111	2.55 (2.04) [-2.30, 8.50]
Nudge	115	-0.10 (1.50) [-2.50, 3.50]	112	2.54 (2.00) [-1.90, 6.50]
Nudge + Feedback	121	0.03 (1.47) [-2.50, 3.30]	121	2.61 (1.86) [-2.10, 7.60]

***Healthiness of food choices – Second Supermarket Task***

An ANOVA was conducted with experimental condition (control vs. nudge vs. nudge + feedback) as between-subject variables and the average Nutri-score from the first supermarket task as dependent variable, revealing no significant variation among conditions,  $F(2, 341) = 0.04, p = .956, \eta_p^2 = .00$ , see Table 1. Similarly, as to the second outcome measure, the number of times participants selected a healthier option revealed no difference between conditions either,  $F(2, 341) = 1.04, p = .355, \eta_p^2 = .01$ , see Table 2. In contrast to what was hypothesized, these results indicate that there was no spillover effect of nudging combined with positive feedback on the healthiness of the food choices made in the second supermarket task.

**Table 2***Mean Nutri scores of both supermarket tasks per condition*

Research Condition	Supermarket task 1	Supermarket task 2
	Healthier food choice (%)	Healthier food choice (%)
Total	(65.1 %)	(65.4 %)
Control	720 (64.9 %)	749 (67.5 %)
Nudge	750 (65.2 %)	721 (64.4 %)
Nudge + Feedback	790 (65.3 %)	778 (64.3 %)

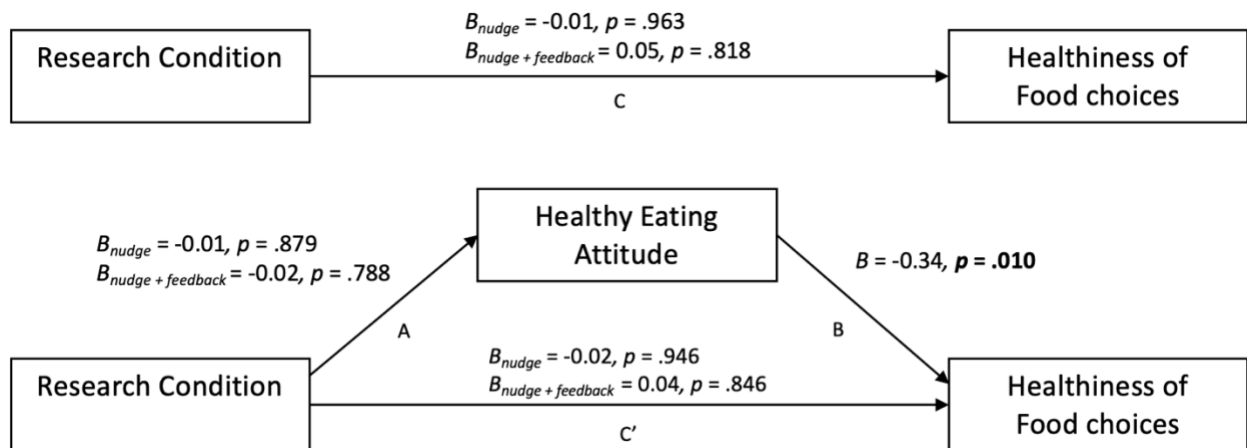
### Mediation of Healthy Eating Attitude

The main effect of the research condition on the healthiness of food products selected in the second supermarket task was not significant,  $F(2,341) = 0.04$ ,  $p = .956$ ,  $\eta^2 = .00$ .

Consequently, we were not able to prove a mediation of healthy eating attitude between research conditions and average Nutri scores in the second supermarket task using the Baron and Kenny (1986) method. The results of the three main paths that were investigated are displayed in Figure 4.

**Figure 4.**

*Results indicating no significant mediation of healthy eating attitude on the effect from research condition on healthiness of food choices made in the second supermarket task.*



### SECONDARY STUDY PARAMETERS

According to the associations shown in Table 3, people with a higher BMI had a less positive attitude toward healthy eating and, on average, a less healthy selection of products in the first supermarket task. Furthermore, for both supermarket tasks, participants acted in accordance with their healthy food habits and positive attitude toward healthy eating. A positive attitude toward healthy eating was also linked to a positive evaluation of the nudge.

**Table 3***Means, standard deviations, and correlations with confidence intervals*

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Age	29.84	11.64	-								
2. BMI	23.38	3.59	<b>.28**</b> [.18, .38]	-							
3. Nutri Score 1	-0.07	1.50	-.01 [-.12, .09]	<b>.11*</b> [.01, .22]	-						
4. Nutri Score 2	2.57	1.96	-.06 [-.16, .05]	.01 [-.10, .12]	<b>.30**</b> [.20, .39]	-					
5. State of hunger	37.06	25.80	<b>-.15**</b> [-.25, -.04]	-.02 [-.13, .09]	.09 [-.01, .20]	.10 [-.01, .20]	-				
6. Healthy Food habits	14.36	3.44	<b>.20**</b> [.10, .30]	-.07 [-.18, .04]	<b>-.45**</b> [-.53, -.37]	<b>-.31**</b> [-.40, -.21]	-.10 [-.20, .01]	-			
7. Healthy eating attitude	5.84	0.81	.08 [-.03, .18]	<b>-.15**</b> [-.25, -.04]	<b>-.39**</b> [-.48, -.30]	<b>-.14*</b> [-.24, -.03]	<b>-.16**</b> [-.26, -.06]	<b>.45**</b> [.37, .53]	-		
8. Importance Healthy Eating	80.09	14.26	.02 [-.08, .13]	<b>-.16**</b> [-.26, -.05]	<b>-.42**</b> [-.50, -.33]	<b>-.23**</b> [-.33, -.12]	<b>-.13*</b> [-.24, -.03]	<b>.50**</b> [.42, .58]	<b>.59**</b> [.51, .65]	-	
9. Evaluation of the Nudge	4.64	0.56	<b>-.16*</b> [-.31, -.01]	-.13 [-.28, .04]	-.06 [-.21, .10]	.03 [-.12, .19]	.03 [-.12, .19]	.02 [-.13, .17]	<b>.21**</b> [.05, .35]	.09 [-.07, .24]	-
10. Choice Satisfaction	5.82	1.06	<b>-.18**</b> [-.28, -.08]	<b>-.15**</b> [-.25, -.04]	<b>-.25**</b> [-.35, -.15]	<b>-.15**</b> [-.25, -.04]	-.01 [-.12, .09]	.02 [-.09, .12]	<b>.16**</b> [.05, .26]	.07 [-.04, .17]	<b>.28**</b> [.13, .42]

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. \* indicates  $p < .05$ . \*\* indicates  $p < .01$ .

### ***Exploratory analysis – Moderation Healthy eating Habits (preregistered)***

To reduce concerns about multicollinearity, data on healthy eating habits was centered prior to computing the interaction variable. Table 3 summarizes the results of the hierarchical linear regression with the three models, indicating that healthy food habits significantly predict healthier Nutri scores,  $b = -.20$ ,  $t(343) = -9.43$ ,  $p < .001$ . Model 2 explained significantly more variance than model 1,  $F(3, 343) = 29.95$ ,  $p < .001$ ,  $R^2 = .208$ . The addition of the interaction in model 3 did not explain significantly more variance compared to model 2,  $F(2, 343) = 0.19$ ,  $p = .827$ ,  $R^2 = .001$ .

**Table 4**

*Summary of Hierarchical Regression Analysis for the interaction between research condition and healthy food habits in predicting the Nutri scores of the first supermarket task.*

Predictor	<i>b</i>	<i>b</i>		<i>sr</i> <sup>2</sup>	Fit	Difference
		95% CI [LL, UL]				
(Intercept)	-0.07	[-0.23, 0.09]				
nudge	0.02	[-0.18, 0.21]		.00		
Nudge and Feedback	0.05	[-0.06, 0.16]		.00		
					<i>R</i> <sup>2</sup> = .002	
					95% CI[.00,.02]	
(Intercept)	-0.07	[-0.21, 0.07]				
nudge	-0.04	[-0.22, 0.14]		.00		
Nudge and Feedback	0.03	[-0.07, 0.12]		.00		
Food Habits	<b>-0.20**</b>	[-0.24, -0.16]		.21		
					<i>R</i> <sup>2</sup> = .208**	$\Delta R^2$ = .205**
					95% CI[.13,.27]	95% CI[.13, .28]
(Intercept)	-0.07	[-0.21, 0.08]				
nudge	-0.04	[-0.22, 0.14]		.00		
Nudge and Feedback	0.03	[-0.07, 0.13]		.00		
Food Habits	<b>-0.20**</b>	[-0.24, -0.16]		.20		
Nudge X Food Habits	-0.00	[-0.05, 0.05]		.00		
Nudge and Feedback X Food Habits	0.01	[-0.02, 0.04]		.00		
					<i>R</i> <sup>2</sup> = .208**	$\Delta R^2$ = .001
					95% CI[.13,.27]	95% CI[-.00, .01]

*Note.* *b* represents unstandardized regression weights. *sr*<sup>2</sup> represents the semi-partial correlation squared. *LL* and *UL* indicate the lower and upper limits of a confidence interval, respectively. \* indicates  $p < .05$ . \*\* indicates  $p < .01$ .

### ***Additional exploratory analysis***

The added effect of positive feedback was further investigated using a multiple linear regression, revealing no effect of research condition on the food choice satisfaction compared to the nudge condition ( $p = .385$ ) or the control condition ( $p = .652$ ). Using a multiple hierarchical regression, the interaction of research condition and the number of healthy products selected in the first supermarket did not explain significantly more variance in choice satisfaction ( $F(2, 341) = 0.131, p = .878, R^2 = .00$ ). Nevertheless, adding the number of healthier products selected did explain significantly more variance in choice satisfaction ( $F(1, 343) = 22.29, p < .001, R^2 = .06$ ), with one extra healthy product selected resulting in an increase in choice satisfaction,  $b = .14, t(343) = 4.72, p < .001$ . Furthermore, there was also

no additional effect of positive feedback on the evaluation of the nudge compared to nudge condition ( $p = .518$ ) or the control condition ( $p = .390$ ). On the other hand, a linear regression found that attitude towards healthy eating was found to significantly predict evaluation of the nudge ( $F(1, 161) = 12.06, p < .001, R^2 = .06$ ), with an increase in attitude resulting in an increase in evaluation,  $b = .17, t(161) = 3.47, p < .001$ . Finally, an ANOVA indicated that people who noticed a healthier and unhealthier product did not select significantly more healthier options ( $M = 6.59, SD = 1.93$ ) compared to people who did not mention to have noticed anything ( $M = 6.27, SD = 1.98$ ),  $F(1, 345) = 1.66, p = .199, \eta_p^2 = 0.01$ .

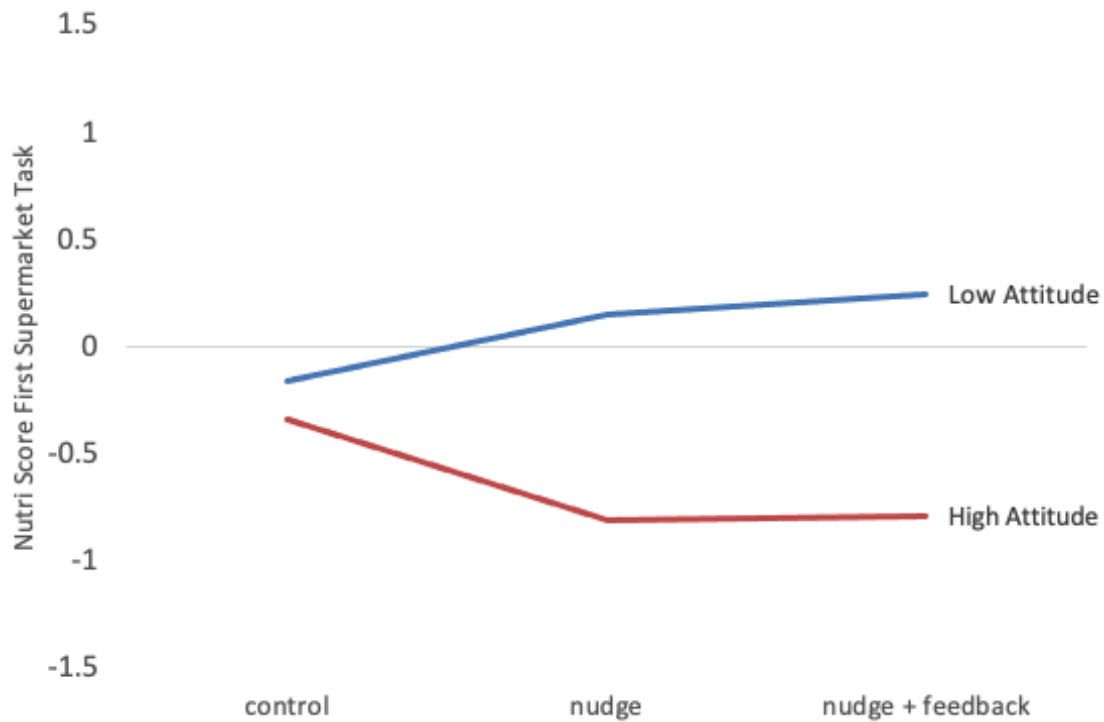
Healthy food habits, a positive attitude toward healthy eating, and the importance of healthy eating were all associated with healthier food choices, as shown in Table 2. As a result, these variables were looked into as potential moderators. However, the distributions revealed that participants scored high on all three scales, resulting in a skewed distribution. Therefore, a median split was performed to generate dichotomous variables. Six separate two-way ANOVAs were performed to investigate potential interactions with data of these three transformed predictors and research conditions on the healthiness of food products selected in both supermarket tasks. These results indicated that there were no interaction effects between research conditions and either of the predictors on both Nutri scores (Appendix B, Tables 1 – 6).

### *Sensitivity Analyses*

The sensitivity analyses did not change the previous conclusions. Additionally, an analysis was performed excluding participants who indicated to not doing their own groceries ( $N = 41$ ). This resulted in a significant interaction effect of healthy eating attitude on the Nutri score in the second supermarket task,  $F(2, 294) = 3.25, p = .040, \eta_p^2 = 0.02$ , and a marginal significant interaction in the first supermarket task,  $F(2, 297) = 2.78, p = .064, \eta_p^2 = 0.02$ . Figure 5 and 6 provide more insight in these results. Even though the difference were not significantly different compared to the control condition, the trend in these figures suggests that people with a higher positive attitude seem to make somewhat healthier choices in both nudge conditions compared to people with a lower positive attitude. However, both the effect and mean differences in Nutri scores remains very small

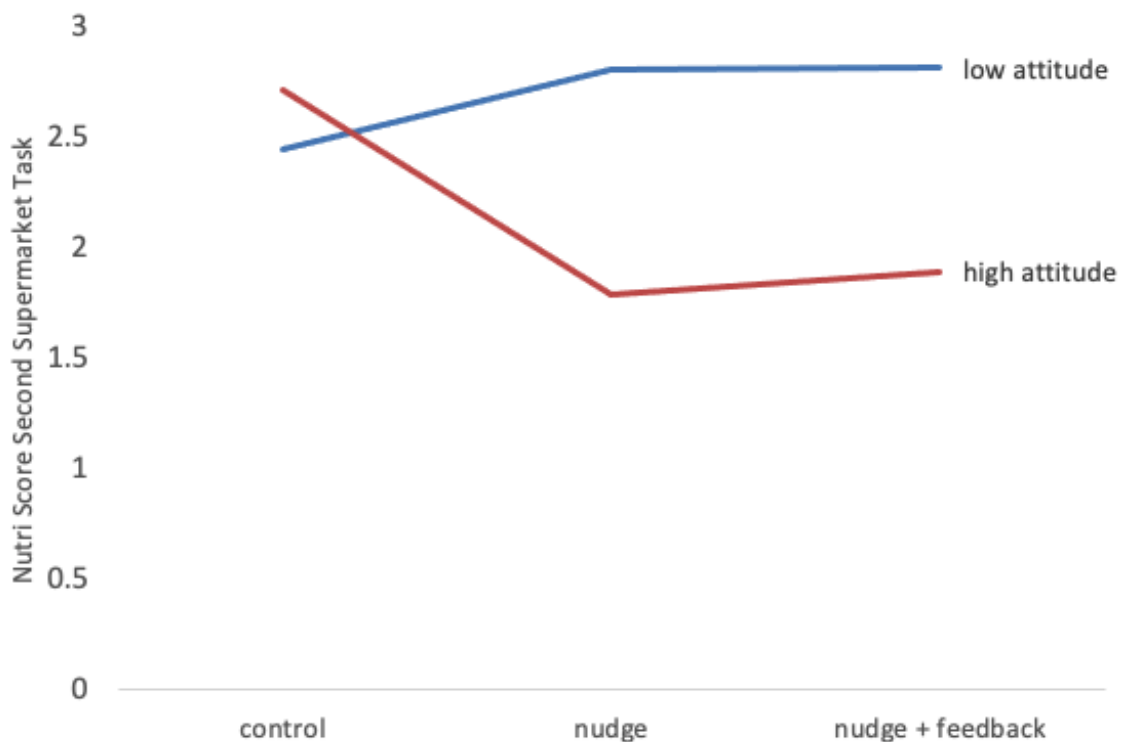
**Figure 5.**

*Marginal significant interaction between attitude and research condition on the Nutri scores measured in Supermarket Task 1 for people who do their groceries (N = 303).*



**Figure 6.**

*Significant interaction between attitude and research condition on the Nutri scores measured in Supermarket Task 2 for people who do their groceries (N = 300).*



## DISCUSSION

### MAIN FINDINGS

This study aimed to investigate the effectiveness of a new affordance nudge, with or without positive feedback, on healthier food choices in an online supermarket study design. The current study was not able to replicate previous findings by Blom et al. (2021), when using a more controlled online supermarket environment. Positive feedback did not result in any effect on food choices in the second supermarket task nor on choice satisfaction.

Additionally, there was also no spillover effect of the nudge form either of the nudge conditions. However, we found that participants with a higher positive attitude toward healthier foods and healthier eating habits chose healthier food items in both supermarket tasks than those with a lower positive attitude toward healthy food options or lower healthy eating habits.

### DISCUSSION OF THE RESULTS

Contrary to expectations, the affordance nudge had no effect on the average healthiness of food choices made in the first supermarket task. These findings fail to support that using affordances could improve the effectiveness of a nudge in an online forced choice food task. The gaze cue used to direct attention to the nudged object's affording properties is intended to lower the threshold for interacting (Tipper, 2010). However, our data imply that in the current research environment, this nudge is unable to overcome other determinants of food choice, such as habits and food preferences (de Ridder et al., 2017).

However, most of our participants indicated to have high healthy eating habits and positive attitudes towards healthy eating. Our study did confirm previous studies that these were both strong predictors of healthy food decisions (Harker et al., 2010; Riet et al., 2011). In line with our results, nudges have limited effect on participants with contradicting attitudes and nudges are redundant for people with strong congruent attitudes or preferences (Venema et al., 2019). Therefore, the high positive attitude towards healthy eating among this study sample might have outweighed the potential effect of the nudge, making it redundant.

We were also did not find a moderating effect of habits on dietary choices. Although previous research found that a priori habits are able to moderate the effect of nudging (Diefenbacher et al., 2020), we did not find these results. We also did not find a moderation

of attitudes on the effect of nudging. These findings might be a result of the lack of heterogeneity in our research sample (Venema et al., 2019). However, since a sensitivity analysis of our data implied that people who have positive attitudes toward healthy eating are more susceptible to the nudge than those who do not, it would be interesting to further investigate these findings.

Furthermore, it could be argued that using this online supermarket design made it relatively easy for participants to make healthy and socially desirable choices. In a more complex supermarket environment, nudges might be more effective as they aid people to remember their goals that they might have forgotten in the heat of the moment (Venema et al., 2019). In our study, people still chose the unhealthier option, indicating that nudges, do not completely override strong desires for alternative options, which has been a major point of concern among critics (Schubert, 2017). If this was the case, it would violate the fundamental principle of nudging that it facilitates autonomous decision making whilst still preserving people's freedom of choice (Thaler & Sunstein, 2008).

Since there was no main effect of the nudge, there was also no spillover effect on the healthiness of the product selected in the second supermarket task. Consequently, it was not possible to determine whether this effect was mediated by attitudes towards healthier foods. These results are in line with the results of Van Rookhuijzen et al. (2021), who found a spillover effect of nudging of prosocial behavior but not on food choices. However, since we did not find any main effect of the nudge on food choices, we are not able to draw any conclusions regarding the spillover effect.

## STRENGTHS

One of the study's strengths is that it investigates the two separate components of the affordance nudge by creating two conditions, one with positive feedback and one without. Although no effect of positive feedback was found, it would be interesting to investigate whether mere exposure to this feedback in a more longitudinal design would have been more effective, which has been the case in previous successful interventions. These studies used happy faces to convey social approval (Nomura et al., 2011; Schultz et al., 2016).

Furthermore, this study used Nutri scores as proxy for healthiness, providing valid representation of nutritional quality across different food groups in European countries in line with dietary patterns according to nutritional recommendations (Dréano-Trécant et al., 2020).



This is likely a more accurate representation of the healthiness of dietary patterns than simply labeling a single food choice as healthy or unhealthy. This is especially relevant for food choices made in the second supermarket task where multiple products were presented with varying Nutri scores and participants have the opportunity to select multiple healthier or unhealthier products.

The controlled research setting provided the opportunity to investigate the underlying mechanisms and some interesting moderators. Little studies have investigated the mediators or moderators of nudge effectiveness (Arno & Thomas, 2016; Marchiori et al., 2017). This understanding of when and how nudges are effective is especially important given the relatively low effect sizes of nudges in supermarkets (Cadario & Chandon, 2020; Seymour et al., 2004) and may lead to opportunities to improve the effectiveness of nudge interventions (de Ridder et al., 2021). This is a very relevant contribution to the research field, especially since a recent study have indicated the importance of a priori preference on the effectivity of nudging a (Venema et al., 2019).

## LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

This study has some limitations that might have been of impact. First, a sample size of 432 participants was initially estimated with ultimately 347 people participating. However, Blom et al. (2011) recently found a larger significant main effect of the affordance nudge on the number of nudged products that were sold ( $p = .034$ ,  $\eta_p^2 = .07$ ). According to this effect size, a power of 95 percent would have been achieved with 215 participants. Although this could suggest power might not have been a limiting factor, given the large difference in research settings, using physical products instead of pictures and a more heterogenous field sample, power might still have been a limiting element in this study.

It can be argued that the affording properties of images of food in an online supermarket task differ from physical food items. Due to the affording properties that graspable items provide, they also have a stronger influence on attention and physical reaction than simple images (Wilford et al., 2021). This raises questions about whether using photographs as a proxy for real food items to examine this new affordance nudge was suitable. It would be interesting for future studies to investigate whether virtual reality could provide affordances in a more representative way to real supermarket settings to investigate consumer's behavior towards food in a controlled but more realistic setting (Xu et al., 2021).

Finally, data was collected from participants via social media using a convenience sampling method, resulting in an overrepresentation of highly educated people, women, and respondents under the age of 30, who agreed to participate on their own volition. Participants in general had a positive attitude toward healthy eating and agreed that it was important, which may have left little room for the affordance nudge to have an impact. Future research should include a group with more diverse attitudes towards healthy eating to provide more insight into the effect of a priori preferences on the effectiveness of this specific affordance nudge. This is particularly relevant because most intervention effects, including nudge effectiveness, are heterogeneous (Bryan et al., 2021). To provide nuances in the effectiveness, research should focus on developing a more thorough understanding of causal mechanisms, studying relevant moderators, and using a heterogeneous and generalizable sample.

Given the increasing rates of obesity (WHO, 2021), exploring new potentials for more effective nudges is relevant. Especially since the majority of supermarket purchases are spontaneous (Inman et al., 2009), and effectivity of nudges can be very context-specific (Wijk et al., 2016). Since many current nudging interventions show small to modest effects on eating behavior (Arno & Thomas, 2016; Broers et al., 2017). With the majority of people intending to eat healthily, the obesogenic food environment makes it difficult to align our behaviors accordingly (Swinburn et al., 2011). In line with our results, it would therefore be interesting to investigate whether this nudge could have a larger impact when positive attitudes towards healthy eating exists, but where conflicting preferences might be into play.

The potential of this affordance nudge in a more complex environment is underlined by the promising results of a study performed in a real supermarket setting (Blom et al., 2021). However, it should be investigated whether this increase in vegetable sales can be assigned to the aspects of the affordance nudge itself. To investigate the nudge's individual components, a full factorial design should be used. In the vegetable and fruit section, this can be accomplished by displaying only the nudge, only the feedback, the nudge combined with the feedback, and the default as a control in four separate trials. Given the minor difference in Nutri scores found in this study within the different research conditions, more research is needed to determine whether the implications of this nudge are fruitful and who are most susceptible. Especially since only a one-point difference in average Nutri scores can be argued to have minor impact on the current obesity pandemic.

## CONCLUSION

In conclusion, the results of the study demonstrate no effect of the nudge on healthiness of food choices and no additional effect of the positive feedback on food choice or on choice satisfaction. However, these results might be attenuated due to already relatively high positive attitude towards healthy eating as well as healthy eating habits and the overall lack of a heterogenous research sample. Although this study was not able to replicate the previous findings with respect to the study of Blom et al. (2021), it did confirm the strong predictive aspects of attitudes and healthy eating habits on food choices.

Our results give the suggestion that attitudes could moderate the effect of nudging, with people that already have positive attitudes towards healthy eating being more likely to act in accordance with the nudge. However, given the large uncertainty of this sensitivity analyses, no such conclusions can be drawn at this moment and further research should investigate the moderation of attitudes, using a more heterogenous sample. A better understanding of what aspects can draw attention to the affording properties of food products could help consumers to interact more easily with healthier food options. Given the difficulty to make healthy choices in our current obesogenic environment, this might help people to act in line with their healthy intentions more easily in the heat of the moment.

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## APPENDICES

### APPENDIX A – PRODUCTS

#### 1.1 Breakfast Food Items – Supermarket Task 1

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Havermout	-5 (A)	Cruesli	8 (C)	13



Griekse Yoghurt Light	-2 (A)	Griekse Yoghurt	5 (C)	7
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#### 1.2 Lunch Food Items – Supermarket Task 1

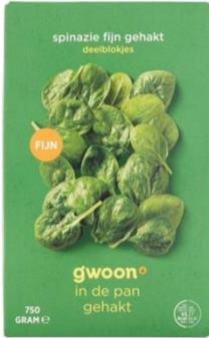



Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Hummus	-3 (A)	Eiersalade	11 (D)	14







Brood Bruine Bollen	-5 (A)	Brood Witte Bollen	0 (B)	5
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### 1.3 Dinner Food Products – Supermarket Task 1

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Diepvries Spinazie	-4 (A)	Spinazie à la crème	0 (B)	14
				
Zilvervlies Rijst	-3 (A)	Witte Rijst	0 (B)	3
				

### 1.4 Dessert Food Products – Supermarket Task 1

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Soja yoghurt zonder suiker	-2 (A)	Soja yoghurt vruchten	0 (B)	2
				
Skyr Aardbei	-4 (A)	Vanillepudding Aardbei	3 (C)	7
				

### 1.5 Snack Food Products – Supermarket Task 1

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Naturel Chips Ovenbaked	2 (B)	Naturel Chips	9 (C)	7



Ongezouten cashewnoten

1 (B)

Gezouten Cashewnoten







4 (B)

3



## 2. SUPERMARKET TASK 2

### 2.1 Breakfast Food Items – Supermarket Task 2

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Bananen	-2 (A)	Gedroogde Bananen	14 (D)	16
				
Volkoren brood	-5 (A)	Wit Brood	0 (B)	5
				
Volkoren crackers	-1 (A)	Kaas pompoen crackers	14 (D)	15
				
Afbak broodjes	12 (D)	Afbak croissantjes	22 (E)	10
				

## 2.2 Lunch Food Items – Supermarket Task 2

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Stokbrood Bruin	-3 (A)	Stokbrood wit	-1 (A)	2



100% Pindakaas

-2 (A) Pindakaas

2 (B)

4



Tijgerbrood Bruin

-4 (A) Tijgerbrood Wit

0 (B)

4



Pastasalade Tonijn

-2 (A) Pastasalade Kip Bacon

2 (B)

4



### 2.3 Dinner Food Items – Supermarket Task 2

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Dressing Naturel	8 (C)	Dressing Tuinkruiden	11 (D)	5
				
Witte kaas light	17 (D)	Witte kaas	23 (E)	6
				
Volkoren Noedels	-4 (A)	Noedels	12 (D)	16
				
Tomaten pureersoep	-2 (A)	Tomaten crème soep	3 (C)	5
				



## 2.4 Dessert Food Products – Supermarket Task 2

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Magere Yoghurt	-2 (A)	Vanille Yoghurt	2 (B)	4
				
Aardbeien	-5 (A)	Aardbeien ijsjes	3 (B)	8
				
Vanille Vla	2 (B)	Vanille Roomtoetje	3 (C)	1
				
Protein Mouse Dark Chocolate	-3 (A)	Chocolade mousse	6 (C)	9
				

## 2.5 Snack Food Products – Supermarket Task 2

Healthier option	NUTRI-score	Less Healthy option	NUTRI-score	Difference
Volkoren koekjes	10 (C)	Chocolade koekjes	20 (E)	10



Paprika chips Ovenbaked

2 (B) Paprika chips

9 (C)

7

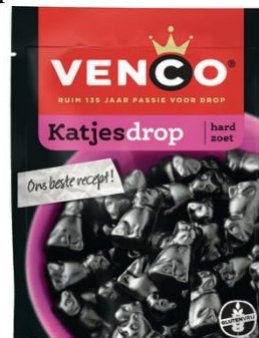


Katjes drop Suikervrij

-2 (A) Katjesdrop

16 (D)

18



Mueslireep zero sugar

1 (B) Mueslireep chocolade

21 €

20



## APPENDIX B – RESULTS

**Table 1**

*Two-way ANOVA with **healthy eating attitude** and research condition as predictors and Nutri scores of the **first** supermarket task as outcome.*

Predictor	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	partial $\eta^2$	partial $\eta^2$ 90% CI [LL, UL]
(Intercept)	8.07	1	8.07	3.87	.050		
Research condition	0.77	2	0.39	0.18	.832	.00	[.00, .01]
Healthy Eating Attitude	55.78	1	55.78	26.77	<b>.000</b>	.07	[.03, .12]
Research condition X Healthy Eating Attitude	9.01	2	4.50	2.16	<u>.117</u>	.01	[.00, .04]
Error	710.48	341	2.08				

*Note.* LL and UL represent the lower-limit and upper-limit of the partial  $\eta^2$  confidence interval, respectively.

**Table 2**

*Two-way ANOVA with **healthy eating attitude** and research condition as predictors and Nutri scores of the **second** supermarket task as outcome.*

Predictor	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	partial $\eta^2$	partial $\eta^2$ 90% CI [LL, UL]
(Intercept)	2072.29	1	2072.29	551.24	.000		
Research condition	0.77	2	0.39	0.10	.903	.00	[.00, .00]
Healthy Eating Attitude	26.24	1	26.24	6.98	<b>.009</b>	.02	[.00, .05]
Research condition X Healthy Eating Attitude	17.62	2	8.81	2.34	<u>.098</u>	.01	[.00, .04]
Error	1270.66	338	3.76				

*Note.* LL and UL represent the lower-limit and upper-limit of the partial  $\eta^2$  confidence interval, respectively.

**Table 3**

Two-way ANOVA with *importance of healthy eating* and *research condition* as predictors and *Nutri scores of the first supermarket task* as outcome.

Predictor	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	partial $\eta^2$	partial $\eta^2$ 90% CI [LL, UL]
(Intercept)	1.55	1	1.55	0.75	.386		
Research condition	0.82	2	0.41	0.20	.819	.00	[.00, .01]
Importance of healthy eating	71.65	1	71.65	34.81	<b>.000</b>	.09	[.05, .14]
Research condition X Importance of healthy eating	4.06	2	2.03	0.99	.374	.01	[.00, .02]
Error	701.95	341	2.06				

Note. LL and UL represent the lower-limit and upper-limit of the partial  $\eta^2$  confidence interval, respectively.

**Table 4**

Two-way ANOVA with *importance of healthy eating* and *research condition* as predictors and *Nutri scores of the second supermarket task* as outcome.

Predictor	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i>	partial $\eta^2$	partial $\eta^2$ 90% CI [LL, UL]
(Intercept)	2216.70	1	2216.70	603.23	.000		
Research condition	0.39	2	0.20	0.05	.949	.00	[.00, 1.00]
Healthy Eating Attitude	64.66	1	64.66	17.60	<b>.000</b>	.05	[.02, .09]
Research condition X Healthy Eating Attitude	8.35	2	4.17	1.14	.322	.01	[.00, .02]
Error	1242.06	338	3.67				

Note. LL and UL represent the lower-limit and upper-limit of the partial  $\eta^2$  confidence interval, respectively.

**Table 5**

*Two-way ANOVA with **healthy food habits** and research condition as predictors and Nutri scores of the **first** supermarket task as outcome.*

Predictor	Sum of Squares	df	Mean Square	F	p	partial $\eta^2$	partial $\eta^2$ 90% CI [LL, UL]
(Intercept)	1.08	1	1.08	0.55	.459		
Research condition	0.97	2	0.48	0.25	.783	.00	[.00, .01]
Healthy Food Habits	99.59	1	99.59	50.43	<b>.000</b>	.13	[.08, .18]
Research condition X Healthy Food Habits	5.14	2	2.57	1.30	.273	.01	[.00, .03]
Error	673.42	341	1.97				

*Note.* LL and UL represent the lower-limit and upper-limit of the partial  $\eta^2$  confidence interval, respectively.

**Table 6**

*Two-way ANOVA with **healthy food habits** and research condition as predictors and Nutri scores of the **second** supermarket task as outcome.*

Predictor	Sum of Squares	df	Mean Square	F	p	partial $\eta^2$	partial $\eta^2$ 90% CI [LL, UL]
(Intercept)	2253.60	1	2253.60	632.53	.000		
Research condition	0.55	2	0.28	0.08	.926	.00	[.00, .01]
Healthy Food Habits	107.98	1	107.98	30.31	<b>.000</b>	.08	[.11, .23]
Research condition X Healthy Food Habits	3.37	2	1.69	0.47	.623	.00	[.00, .01]
Error	1204.24	338	3.56				

*Note.* LL and UL represent the lower-limit and upper-limit of the partial  $\eta^2$  confidence interval, respectively.

## APPENDIX C – MAIN QUESTIONNAIRES (DUTCH)

### ***1. INFORMED CONSENT***

Beste deelnemer,

Leuk dat je interesse hebt om deel te nemen aan dit onderzoek. Dit onderzoek is onderdeel van een thesisproject voor de master *Social, Health and Organisational Psychology* aan de Universiteit Utrecht. Het is belangrijk dat je eerst goed deze informatiebrief doorleest.

Het doel van dit onderzoek is om de keuzes die mensen in een supermarkt maken beter te begrijpen. Je kunt deelnemen aan dit onderzoek als je in Nederland woont en minimaal 18 jaar oud bent. Je voert dit onderzoek uit op je eigen telefoon, tablet of computer. Mensen die een streng dieet volgen om gewicht te verliezen, een gediagnostiseerde eetstoornis hebben of een aandoeningen aan het spijsverteringskanaal (bijv. Coeliakie, de ziekte van Crohn of lactose-intolerantie) kunnen helaas niet deelnemen aan dit onderzoek.

Als je akkoord gaat met deelname, krijg je eerst instructies en wat algemene vragen. Daarna zal de online supermarkt omgeving geïntroduceerd worden waarin je twee productkeuze taken uitvoert. Vervolgens zal je een korte vragenlijst over jouw eetgewoontes invullen. Het totale onderzoek duurt ongeveer 20 minuten.

Deelname aan dit onderzoek is geheel vrijwillig en je kunt op elk gewenst moment stoppen. Alle verzamelde informatie wordt vertrouwelijk behandeld, en wordt opgeslagen voor maximaal 10 jaar in een veilige database. Alleen de onderzoekers hebben inzicht in de gegeven antwoorden. Er zullen geen namen of andere persoonlijke informatie over jouw identiteit worden gevraagd, gebruikt of opgeslagen. Alle antwoorden zijn dus volledig anoniem.

Indien je nog vragen of opmerkingen hebt over het onderzoek, kun je contact opnemen via het onderstaande e-mailadres.

Nogmaals bedankt voor je deelname aan dit onderzoek

Met vriendelijke groet,

Bo Brummel

[b.brummel@students.uu.nl](mailto:b.brummel@students.uu.nl)

Officiële klacht indienen: [klachtenfunctionaris-fetcsocwet@uu.nl](mailto:klachtenfunctionaris-fetcsocwet@uu.nl)

Data protection officer UU: <https://www.uu.nl/en/organisation/data-protection-officer>

### **Verklaring van Toestemming (informed consent)**

Door op het onderstaande vakje **ja** aan te klikken geef je aan dat je de bovenstaande informatie gelezen hebt en akkoord gaat met het volgende:

- Ik heb deze informatiebrief gelezen en heb de mogelijkheid gekregen om vragen te stellen.
- Ik ben geïnformeerd over het onderzoek en de manier waarop er met data wordt omgegaan.
- Ik geef toestemming voor het gebruik van de gegevens die in dit onderzoek verzameld worden voor de beschreven doeleinden in de informatiebrief.
- Ik weet dat deelname aan dit onderzoek geheel vrijwillig en dat ik op ieder moment mijn deelname aan dit onderzoek kan stopzetten zonder daarbij een reden aan te hoeven geven.

*Ja*

*Nee*

Door hier het vakje **Ja** aan te vinken verklaar ik dat ik 18 jaar of ouder ben en voldoe aan de in de informatiebrief benoemde criteria om deel te kunnen nemen aan dit onderzoek.

*Ja*

*Nee*

## **2. QUESTIONNAIRES**

### **2.1. ALGEMENE DEMOGRAFISCHE VRAGEN**

Gelieve alle vragen zo goed mogelijk naar waarheid in te vullen. Alle antwoorden zijn volledig anoniem. Als je toch een vraag liever niet beantwoordt kun je er altijd voor kiezen om een vraag over te slaan.

**1. Wat is je geslacht?**

- a. Man
- b. Vrouw
- c. Niet gespecificeerd
- d. Anders, namelijk ...

**2. Wat is je leeftijd?**

\_\_\_\_\_ jaar

**3. Volg je een specifiek dieet?**

- Biologisch
- Lactosevrij
- Glutenvrij
- Vegetarisch
- Pescotarisch
- Veganistisch
- Anders namelijk ....

**4. Doe je zelf jouw boodschappen?**

- Ja
- Nee

**5. Wat omschrijft het best jouw arbeidssituatie?**

- Arbeidsongeschikt
- Niet werkend (werk zoekende)
- Niet werkend (niet werkzoekend)
- Student
- Werkend (full-time)
- Werkend (part-time)
- Gepensioneerd
- Anders, namelijk ...



**6. Wat is jouw hoogst behaalde opleidingsniveau?**

- Lagere school
- LBS, vso
- VMBO/MAVO
- HAVO/VWO
- MBO
- HBO
- Universiteit (bachelor)
- Universiteit (master)
- PHD of hoger

**7. Wat is je lengte?**

- \_\_\_\_\_ cm
- Ik geef liever geen antwoord

**8. Wat is je gewicht?**

- \_\_\_\_\_ kg
- Ik geef liever geen antwoord

## 2.2. CHECKLIST VOOR EETGEWOONTEN VAN ADOLESCENTEN

*Nu komen er vragen over je gebruikelijke eetgewoontes.*

### **1. Als ik buitenshuis ga lunchen, kies ik vaak voor een vetarme optie.**

- Waar
- Niet waar
- Ik lunch nooit buitenshuis

### **2. Ik vermijd meestal het eten van gefrituurd voedsel.**

- Waar
- Niet waar

### **3. Ik eet meestal een dessert als er één beschikbaar is.**

- Waar
- Niet waar

### **4. Ik zorg ervoor dat ik minstens één portie fruit per dag eet.**

- Waar
- Niet waar

### **5. Ik probeer mijn totale vetinname laag te houden.**

- Waar
- Niet waar

### **6. Als ik chips koop, kies ik vaak een merk met weinig vet.**

- Waar
- Niet waar
- Ik koop nooit chips

### **7. Ik vermijd het eten van veel worstjes en hamburgers.**

- Waar
- Niet waar
- Ik eet nooit worstjes of hamburgers

### **8. Ik koop vaak gebakjes of cakejes.**

- Waar
- Niet waar

**9. Ik probeer mijn totale suikerinname laag te houden.**

- Waar
- Niet waar

**10. Ik zorg ervoor dat ik minstens één portie groenten of salade per dag eet.**

- Waar
- Niet waar

**11. Als ik thuis een dessert eet, probeer ik iets te nemen dat weinig vet bevat.**

- Waar
- Niet waar
- Ik eet geen toetjes

**12. Ik eet zelden afhaalmaaltijden.**

- Waar
- Niet waar

**13. Ik probeer ervoor te zorgen dat ik voldoende fruit en groenten eet.**

- Waar
- Niet waar

**14. Ik eet vaak zoete snacks tussen de maaltijden door.**

- Waar
- Niet waar

**15. Ik eet meestal minstens één portie groenten (behalve aardappelen) of salade bij mijn maaltijd.**

- Waar
- Niet waar

**16. Als ik frisdrank koop, kies ik meestal voor een light versie.**

- Waar
- Niet waar
- Ik koop nooit frisdrank

**17. Als ik boter of margarine op brood doe, smeer ik het meestal dun uit.**

- Waar
- Niet waar
- Ik heb nooit boter of margarine op brood

**18. Als ik zelf lunch meeneem, doe ik er meestal wat chocolade en/of koekjes bij.**

- Waar
- Niet waar
- Ik neem nooit zelf lunch mee

**19. Als ik een tussendoortje neem, kies ik vaak fruit.**

- Waar
- Niet waar
- Ik eet nooit tussendoortjes

**20. Als ik een dessert eet in een restaurant, kies ik meestal de gezondste optie.**

- Waar
- Niet waar
- Ik eet nooit desserts in restaurants

**21. Ik heb vaak (slag)room op mijn desserts.**

- Waar
- Niet waar
- Ik eet geen desserts

**22. Ik eet de meeste dagen minstens drie porties fruit.**

- Waar
- Niet waar

**23. Ik probeer over het algemeen gezond te eten.**

- Waar
- Niet waar



## 2.6. VRAGEN OVER HET EXPERIMENT

### Wat vond je van de manier waarop de producten gepresenteerd waren?

*De presentatie van de producten was:*

Heel erg onaantrekkelijk	1	2	3	4	5	6	7	Heel erg aantrekkelijk
Helemaal niet uitnodigend	1	2	3	4	5	6	7	Heel erg uitnodigend
Heel erg onopvallend	1	2	3	4	5	6	7	Heel erg opvallend

### Wat vind je van de manier waarop de producten gepresenteerd werden in de supermarkt?

Heel erg negatief	1	2	3	4	5	6	7	Heel erg positief
-------------------	---	---	---	---	---	---	---	-------------------

### Het selecteren van de producten was:

Heel erg moeilijk	1	2	3	4	5	6	7	Heel erg makkelijk
Heel erg vervelend	1	2	3	4	5	6	7	Heel erg prettig

### Hoe voelde je je toen je een product selecteerde?

*Ik voelde me:*

	<i>Helemaal mee oneens</i>					<i>Helemaal mee eens</i>		
... aangemoedigd	1	2	3	4	5	6	7	
... betutteld	1	2	3	4	5	6	7	
... gestuurd	1	2	3	4	5	6	7	
... alsof ik bekeken werd	1	2	3	4	5	6	7	
... serieus genomen	1	2	3	4	5	6	7	

### Over het poppetje op het scherm:

	<i>Helemaal mee oneens</i>				<i>Helemaal mee eens</i>			
Ik vond de animatie leuk		1	2	3	4	5	6	7
Ik kon mijzelf identificeren met de animatie	1	2	3	4	5	6	7	

## 2.7. AFSLUITENDE VRAGEN

### Is je iets opgevallen terwijl je de producten selecteerde?

- Nee
- Ja, namelijk: \_\_\_\_\_

### Wat denk je dat het doel van dit onderzoek was?

\_\_\_\_\_

### **3. DEBRIEFING**

Dit is het einde van dit onderzoek. Hartelijk dank voor je deelname! Het doel van dit onderzoek was om beter te begrijpen hoe mensen beslissingen nemen in de supermarkt en de rol van de supermarktomgeving hierin. In dit onderzoek waren er 3 condities:

- 1) Eén supermarkt met daarin een geanimeerd figuur die alleen vooruitkijkt (controle conditie)
- 2) Eén supermarkt met een geanimeerde figuur die in de richting van 1 van de 2 items staart
- 3) Eén supermarkt met een geanimeerde figuur die in de richting van 1 van de 2 items staart en die zijn duim opsteek als je dit product selecteerde

We gaan onderzoeken of deelnemers in conditie 2 en 3 mogelijk andere productkeuzes maken dan deelnemers in de eerste conditie. We kijken hierbij hoe kleine aanpassingen in de supermarktomgeving (ook wel nudges genoemd) mensen kunnen verleiden om gezondere producten te selecteren. Daarnaast kijken we of dit “nudgen” van gezondere opties effect heeft op andere factoren, zoals bijvoorbeeld een positievere of negatievere attitude naar gezondere voedselopties. Tot slot willen we kijken of, indien er een effect wordt gevonden, dit nog terug te zien is in de gezondheid van de producten die geselecteerd worden direct na het weghalen van de nudge (de tweede voedselkeuzetaak).

Wij verzoeken je vriendelijk om de inhoud van dit onderzoek niet te bespreken met andere mensen. Voor het onderzoek is het namelijk van belang dat deelnemers vooraf niet op de hoogte zijn van de onderzoeksvraag en onderzoeksmethoden.

Nogmaals bedankt voor je deelname. Met onderstaande knop kun je je gegevens indienen. Vanwege de anonimiteit van de verzamelde data is het helaas niet mogelijk om deze op een later moment nog te verwijderen. Mocht je daarom nu alsnog af willen zien van je deelname dan kun je dat hieronder aangeven en zal de verzamelde data verwijderd worden.

*Ik ben op de hoogte dat ik na het indienen van de gegevens die verzameld zijn in dit onderzoek deze niet meer kan terugtrekken. Ik geef nogmaals mijn toestemming voor het gebruik hiervan voor de doeleinden zoals eerder beschreven in de informatiebrief:*

*Ja*

*Nee*

Voor vragen over dit onderzoek kun je contact opnemen met de onderzoeker via het volgende emailadres: [b.brummel@students.uu.nl](mailto:b.brummel@students.uu.nl)

Met vriendelijke groet,

Bo Brummel