

Can You Afford a Nudge? A Comparison between Two Grocery Shopping Interventions and the
Moderation Effect of an Activated Saving Goal

Ye Chen

Health and Clinical Psychology Master's Thesis

Supervisor: Tina Venema

Utrecht University

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Abstract

People of relatively lower socio-economic statuses (SES) are not able to benefit effectively from traditional healthy eating interventions that employ education and information campaigns, yet they stay as a high-risk group to overweight and obesity. By pre-selecting healthier options as defaults, people of low SES may be automatically nudged toward healthier food choices.

Questions remain whether a pre-selection will still be effective when it aids a healthy eating goal but hinders a money saving goal that is commonly active among groups of low SES. The current study therefore examined the effectiveness of a pre-selection and a price reduction on healthy food choices between two groups with either an activated or a non-activated saving goal. Data of healthy food choices was collected via an online grocery shopping survey in the Netherlands.

Participants (18-66 years, $N = 283$) were randomly assigned to a goal priming task followed by a second random assignment to three conditions: a pre-selection, a price reduction and a control.

They were asked to choose preferred products between two pictures, for a total of thirty choices per condition. Results of ANOVA analyses showed that compared to the control condition, a price reduction significantly increased healthy food choices whereas a pre-selection did not. The saving goal activation did not moderate the relationship between intervention types and healthy choices, but pre-existing health goals predicted healthy choices. These findings confirm theoretical accounts of the importance of an active, compatible goal in making healthy food choices and suggests that interventions could develop strategies to resolve the dilemma between health and price in making healthy food decisions.

Keywords: low SES, nudge, price, goal activation

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Introduction

Obesity has become one of the major health challenges over the past decades among people who have a relatively lower social-economic status (SES) (Hurk et al., 2007; Ogden et al., 2006; Schokker et al., 2007). People of low SES in relation to others have relatively lower economic and social positions in their societies based on measurements of education, income and occupation. Although policy makers have implemented various education interventions and campaigns to promote a healthy diet, subgroups with different SESs may not benefit from them equally (McGill et al., 2015). Alternatively, healthy eating interventions that utilize environmental cues or specifically target the influence of having a relatively lower income, lower education level or occupation may help to alleviate the disparity in health behavior among groups of different SESs. The current study aimed to examine whether these alternative health interventions would have better effects for people of low SES.

Low SES and an Unhealthy Diet

An increased intake of high caloric, high-fat food is recognized as one of the major causes for inflating rates of obesity and overweight worldwide (WHO, 2016). The consumption of refined grains, added sugars and added fats have been associated with low SES (Darmon & Drewnowski, 2008). This unhealthy diet increases risks for overweight and obesity, which further results in an increased susceptibility to non-communicable diseases such as cardiovascular disease (Poirier & Eckel, 2002), cancer and type 2 diabetes (Gallagher & LeRoith, 2015).

In addition, an ‘obesogenic environment’ (Swinburn, Egger, & Raza, 1999) amplifies the likelihood of forming an unhealthy diet. Consumers are frequently exposed to unhealthy

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

temptations including but not limited to readily available candy bars at checkout counters, high-caloric food with a lower price, and frequently promoted processed food in contrast to fruits and vegetables (Cassady, Jetter, & Culp, 2007; Drewnowski, 2004; Drewnowski & Darmon, 2005). A systematic review in the United States suggests that people of low SES were living in worse environments that encourage unhealthy diets, which may further negatively shape their eating behavior (Lovasi, Hutson, Guerra, & Neckerman, 2009).

Nudging Interventions

Unfortunately, the most vulnerable group to overweight and obesity is not benefiting effectively from traditional interventions that offers information about the risk of unhealthy diet and food nutrition. Interventions that used individual-based information such as counseling did not consistently promote healthy eating to people of low SES and even made inequality widen between groups of different SESs regards to their healthy eating behavior. (McGill et al., 2015). One possible explanation for this disparity is that most information interventions assume people to consistently make rational plans and systematically engage in courses of action. In fact, most of our momentary behavior occur in an automatic manner (Hassin, Uleman, & Bargh, 2004). Making food decisions, for example, is often automatic, impulsive, and habitual, instead of a rational cost-benefit analysis (Chandon & Wansink, 2011; de Ridder, 2014; Thaler & Sunstein, 2008).

Therefore, interventions that utilize the automaticity in food decisions are believed to be more effective and are identified as nudges (Thaler & Sunstein, 2008). Through a simple change in the presentation of healthier alternatives, a nudge targets automatic and habitual decision-making process (de Ridder, 2014) and preserves people's autonomy in behaving healthily without the use of any financial incentives (Thaler & Sunstein, 2008). For instance, making a

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

food harder to reach, changing the serving utensil at a salad bar from a spoon to tongs, displaying healthier foods at lunch lines, and reducing plate size have all been proved to be effective in changing eating behaviour (Hanks et al., 2012; Kalekken, 2011; Rozin et al., 2011).

Default Nudges

Default nudges are choice options that will happen when people do not actively choose against them. They are effective because they require limited effort and therefore simplify consumers' decision-making process (Smith, Goldstein, & Johnson, 2013). Default rules can be utilized in various domains to change individuals' health decisions. For example, restaurants can make a salad as a default side dish to replace fries, and hospitals can automatically enrol pregnant women for an AIDS testing unless they request an opt-out. In the domain of online grocery shopping interventions, a default nudge can be a pre-selected choice among a variety of products. In the current study, we will examine whether a pre-selected healthy product with increased salience will nudge individuals towards healthier choices.

Although defaults have been viewed as one of the most robust tools for making decisions (Camerer et al., 2003), the results are often assumed to generalize to various populations, such as groups of low SES (Bertrand et al., 2006). However, defaults may not have consistent optimal effects when the promoted option elicits an incompatible goal with the targeted population. A field study evaluated the effect of defaults saving among low-income tax filers and found that participants chose to opt out their tax refund from an automatic saving option, partly because that the low-income tax filers had plans to spend their refunds (Bronchetti, Dee, Huffma, & Magenheim, 2013). Therefore, it is crucial to explore whether a pre-selected healthy product will still be effective among groups of low SES when the option elicits a conflicted goal.

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Conflicting Goals

People might have simultaneous goals that can differ in their importance and compatibility. For goals to be useful in directing subsequent behavior, the relevant goal must be salient and needs to be shielded from other potentially conflicting goals. Abraham Maslow's (1970) model of the hierarchy of needs proposes that humans seek to satisfy needs progressively, starting from physiological needs like food, clothing and shelter, to security, belonging and love, esteem and finally self-actualization (Maslow, 1970). People are motivated to fulfil each level of needs hierarchically when they are unmet. A person must satisfy lower levels of deficient needs before advancing to pursue higher levels of needs. In turn, a goal to pursue a need of lower level may trump goals about other higher level needs. For example, people of lower SES may focus on the goal to meet the needs for sufficient food and shelter whilst neglecting a higher level of need such as getting fit. The goal of eating healthy seems to be less relevant when there are more primary issues (e.g. keeping a monthly budget).

The tendency to focus on a primary goal whilst neglecting other goals can be explained by scarcity. A congruent theory with Maslow's hierarchical model suggests that having less may elicit a greater focus on some problems whilst produce an overlook of other issues (Shah, Mullainathan, & Shafir, 2012). In the context of healthy eating, people of lower SES may have limited grocery budget that leads them to focus more on the price rather than the healthiness of a product. Studies demonstrated that consumers who were sensitive to price were less concerned about the health aspects of food (Drewnowski et al., 2007; Honkanen & Frewer, 2009; Jetter & Cassady, 2007). This scarcity-induced neglect on health increases their risks to overweight and obesity. In summary, questions remain that whether a default nudge can work effectively among the low SES population when it aids the healthy eating goal but hinders the money saving goal.

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Price Interventions

Instead of provoking the competition between the goal of eating healthy and the deficient primary need of saving money, interventions that are compatible with targets' focal goal may have more a positive impact. In a focus group study, the price was considered as a chief factor in food choices among poor residents (Waterlander et al., 2010). McGill and colleagues (2015) identified interventions that targeted food price including tax, subsidies and economic incentives to be more effective in reducing the inequalities of healthy eating outcomes between groups of different socioeconomic positions (McGill et al., 2015). By making healthy food less expensive, people with limited food budget can benefit from this policy because it is compatible with their focal goal of saving money and eliminates the dilemma between the price and the healthiness.

Current Research

Cues in the environment can activate a goal that can be then pursued unconsciously (Dijksterhuis & Aarts, 2010), a phenomenon known as goal priming (Bargh & Chartrand, 2000). A meta-analysis indicated that the mere exposure to goal-related words can induce motivated behavior (Weingarten et al., 2016). For example, a dieting banner successfully primed people to increase low energy food choices and decrease high energy food choices (Van Der Laan, Papies, Hooge, & Smmets, 2017). In the current study, one group of participants was asked to rank a saving goal with four less assumedly important goals in order to make it active. In contrast, the other group of participants was asked to rank the same saving goal with four more assumedly important goals in order to deactivate it.

The current research aims to compare the effects between a default nudge and a price change intervention for people holding a strong money saving goal. An online grocery study is a

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

valid platform to conduct different types of intervention due to the growing popularity of using the Internet for grocery shopping. It is expected to accurately measure participants' food choices. Participants were asked to choose a product they would normally purchase out of each product pair. A pre-selected product was used in the nudge intervention and a price reduction was used in the price intervention. Participants' food choices in each condition were measured and compared to the control group. We hypothesized that by comparing with the control condition, the price intervention and the nudge intervention can both make participants choose more healthy products. We also expected to see a moderating effect from the saving goal on the relationship between intervention type and healthy product choices. Specifically, people with an activated saving goal would choose more healthy products compared to people with a non-activated saving goal in the price intervention. However, in the nudge and control conditions, people with an activated saving goal would choose less healthy products compared to people with a non-activated saving goal.

Method

Participants

In total, 331 people responded to the online supermarket experiment advertised on flyers, poster and social media (e.g. Facebook). Inclusion criteria were Dutch and international students who live in the Netherlands. The study included 283 valid responses (226 females) between the ages of 18 to 66 years ($M = 22.29$, $SD = 4.06$), all of whom had at least graduated from high school. The average monthly grocery shopping budget was 178.24 euros and 88.3% of the participants perceived their own budget to be sufficient. Compensation was a food basket raffle and optional course credit.

Design and Procedure

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

This study compared the effects between two types of interventions: a default nudge versus a reduction of price on healthy food. It used a 2×3 (Goal Importance [activated, non-activated] \times Intervention [nudge, price, control]) between-subjects factorial design.

The study was performed in Qualtrics. Participants could access the study by clicking on the link provided in the advertisement. The informed consent specified that the researchers were interested in consumers' preferences about the set-up of an online shopping website as a cover story and participants would have to make a choice between pairs of products. The study started with some demographic questions. Individual monthly grocery budget and the perceived budget sufficiency were recorded.

Participants were then randomly assigned to the goal priming task in which they rank five goals in terms of importance. Immediately following this task, all participants were randomly assigned to three intervention conditions in the product selection task. They were instructed to select the option they were most likely to buy in real life by clicking on the product. This action changed the background color of this product from white to black. Then participants clicked 'next' to proceed. Notably, because the healthy option in the nudge condition was pre-selected as a default, participants had the option of simply clicking 'next' to continue the task.

At last, participants reported their preference on the fonts and positioning of pictures to support the cover story. In addition, current healthy eating goals were rated. Participants were then instructed to write their own understanding of the study's objective. Finally, they were thanked and debriefed, and were asked to leave their email addresses for the food basket raffle.

Materials

Demographics. In addition to basic demographic questions including gender, education, ethnicity, age, allergies and special diets. Participants were also asked to estimate their monthly

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

grocery budget in euros and the perceived sufficiency (*yes* or *no*). Although food allergies and special diets may affect consumers' choices, they were expected to be randomly distributed across different conditions.

Goal priming. The money saving goal was expected to be activated in one condition and non-activated in the other condition. The goal priming manipulation was adapted from the study done by Davis and Haws (2013). In the activated goal group ($N= 141$), the statement “avoid spending too much money” was compared with other four superficial goals such as “going to the hairdresser regularly”. In contrast, in the non-activated goal group ($N =142$), the same statement was compared with other four important goals such as “living up to my ambitions” (Wedell, Hicklin, & Smarandescu, 2007). In each condition, participants were asked to rank the five goals in order of importance (1=the least important to 5=the most important). Participants were expected to develop a strong focus on price in the activated goal condition because they would perceive saving money as a more important goal to pursue at this moment. Contrarily, they were expected to develop a weak focus on price in the non-activated goal condition because they would perceive other goals of similar importance at this moment.

Food pairs. Thirty pairs comprised various products such as snacks (e.g. potato chips), beverages (e.g. green tea) and meals (e.g. soup) as well as four non-food products (e.g. toothpaste). The product pairs were pilot tested and matched such that two products had similar ratings in perceived taste, familiarity and attractiveness but only differed in perceived healthiness. Each pair was presented horizontally and of same pixel. The order of product pairs was randomized and the position of healthy products was counterbalanced between left and right. In the nudge condition, the pre-selected healthy option was therefore randomly presented either on the left or right position.

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Food price. The product prices were adjusted to ensure a constant price difference between healthy and unhealthy products. To illustrate, an average price was taken from the original prices of the mixed nuts and raisins and Lay’s classic chips. The price of the cheaper option (*C*) was calculated by multiplying the average by 90% (see and the price of the more expensive option (*E*) was calculated by multiplying the average by 110%.

$$C_{\text{adjusted}} = \frac{(C \text{ original} + E \text{ original})}{2} \times 90\% \quad (1)$$

$$E_{\text{adjusted}} = \frac{(C \text{ original} + E \text{ original})}{2} \times 110\% \quad (2)$$

The adjusted prices for mix nuts and raisins and Lay’s classic chips were now €1.93 and €1.61, respectively (see Figure B1). The resulting difference between healthy and unhealthy products was therefore always less or equal to 20%.

Health goal strength. Two healthy eating goals were measured as “I try to eat more healthily in my daily life.” and “I try to eat less unhealthily in my daily life.” on a scale from 0 to 100 (0=extremely disagree, 100=extremely agree). Both positive and negative eating goals were included because people could compensate the goal of eating more healthily by consuming more unhealthy food. These questions were asked after the product selection task because the questions might confound with the priming effect of price goal importance (Fitzsimons & Williams, 2000; Morwitz, Johnson, & Schnittlein, 1993). The answers to these two questions were averaged and coded as one variable named health goal strength as they are correlated.

Intervention: Nudge vs. Price vs. Control

Thirty product pairs were consistently used across all three intervention conditions. In the nudge condition, the healthier product was pre-selected in black and was always more expensive than the unhealthy product (see Figure B1). In the price condition, the prices of each pair were switched to mirror the nudge group so that the healthy option was always cheaper than the

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

unhealthy option (see Figure B2). The control condition had the same matching products and prices as in nudge condition except omitted the pre-selection (see Figure B3). A dilemma between health and price was therefore created in both the nudge and the control condition.

Results

Randomization Check

Demographic features were expected to be randomly distributed across six conditions. Chi-square tests of independence were performed for gender, education, ethnicity, allergies, diets and perceived food sufficiency separately, with the six conditions as the independent variable. No significant differences were observed, $p > .253$. Separate ANOVAs were performed for age and health goal strength, with the six conditions as the independent variable. Participants' ages were randomly distributed across the six conditions, $F(5, 277) = .55, p = .741$. Only health goal strength differed significantly between the six conditions, $F(5, 267) = 2.31, p = .044$. A post hoc test using Turkey method, however, did not find significant differences between conditions for health goal strength.

Manipulation Check on Goal Priming

We predicted that the participants in the activated goal condition would rank the money-saving goal as more important compared to participants in the non-activated goal condition. A Mann Whitney U test was performed with the goal priming condition as the predictor and the rank of money-saving goal as the outcome. The test showed that the goal priming manipulation did not make participants in the activated goal condition consider money-saving as significantly more important compared to the not-activated goal group, $U = 10.03, z = .036, p = .972, \eta^2 = 4.54 \times 10^{-6}$ (see Figure A1).

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

It was expected that the participants in the activated goal condition would select products mainly based on price, i.e. select the cheapest product of a pair. To test whether the contrasting effect might still influence product choice, a one-way ANOVA was performed with the goal priming condition as the predictor and the number of cheap product choices as the outcome.

Results confirmed that the activated goal group ($M_{activated} = 16.03, S.D. = 4.95$) did not choose a significantly greater number of cheap products compared to the non-activated goal group ($M_{non-activated} = 16.10, S.D. = 5.00$), $F(1, 281) = .014, p = .906, \eta^2 = 5.01 \times 10^{-8}$.

Effects of the Type of Intervention on Healthy Product Choices

Participants were expected to choose a greater number of healthy products in the nudge intervention than in the control group, and to choose a greater number of healthy products in the price intervention than in the control group. A two-way factorial ANOVA was performed with the number of healthy product choices (larger number=higher effectiveness) as the dependent variable, the goal priming manipulation (activated vs. non-activated) and the type of intervention (nudge vs. price vs. control) as independent variables. The main effect of the type of intervention yielded an F ratio of $F(2, 277) = 23.81, p < .001, \eta^2 = .15$, indicating that the mean number of healthy product choices was significantly different between the three intervention conditions (see Table A1). Planned comparisons further showed no significant difference between participants in the nudge condition ($M_{nudge} = 14.17, SD = 4.77$) and control condition ($M_{control} = 14.67, SD = 4.59$) with regard to the number of healthy product choices, $p = .76$. However, participants in the price condition ($M_{price} = 18.41, SD = 4.59$) selected significantly a greater number of healthy products than participants in the control condition, $p < .001$.

The Interaction between Intervention and Goal Priming on Healthy Product Choices

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

We hypothesized that the goal priming manipulation moderate the relationship between intervention condition and food choices. Specifically, in the nudge and control conditions, the activated saving goal would make participants choose fewer healthy products compared to the non-activated goal prime. Contrarily, in the price condition, the activated goal prime would make participants choose more healthy products compared to the non-activated goal prime. The same two-way ANOVA was performed to examine the interaction between goal and intervention on the numbers of healthy product choices. The interaction was not significant, $F(2, 277) = .393$, $p = .68$, $\eta^2 = .003$ (see Table A1), which means that participants either with activated or non-activated saving goal did not differ in healthy food choices in each intervention condition (see Figure A2 for healthy product choices in six conditions).

The Effect of Health Goal Strength on Healthy Product Choices

Although the health goal strength was measured after the experiment, it may still have a positive impact on the number of healthy product choices. A one-way ANCOVA was performed with the number of healthy product choices as the dependent variable, the type of intervention as the independent variable, and the health goal strength as the covariate. Results indicated that the health goal strength was positively related to the number of healthy product choices, $F(1, 267) = 52.83$, $p < .001$, $\eta^2 = .17$. Consistently, there was no significant effect of the type of intervention on numbers of healthy product choices after controlling for the strength of health goal, $F(2, 267) = .31$, $p = .732$, $\eta^2 = .002$. The interaction was also not significant, $F(2, 267) = 1.29$, $p = .278$, $\eta^2 = .010$ (see Table A3), indicating that participants' healthy choices were not moderated by their pre-existing health goals (see Figure A3).

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Discussion

The effects of nudges on population with a relatively lower SES has not yet been clarified, so it is not obvious whether a simple default nudge can elicit a similar extent of behavior change when compared to financially related interventions among low SES groups. Therefore, the current study explored the effects of a default nudge and a price reduction on encouraging people to choose healthy products in an online grocery-shopping scenario. As Maslow's hierarchy of needs (1970) implies that people with low SES are more prone to pursue a financial goal, we used a goal-ranking task to activate a money-saving goal among one group of participants to simulate real life goal pursuit for people with low SES. This money-saving goal was predicted to have a moderating role in the relationship between interventions and food choices. Results showed that the default nudge did not yield a significant difference in encouraging healthy product choices compared to the control condition. In contrast, the price reduction on healthy food was significantly effective compared to the control condition. Meanwhile, the results with regard to the expected moderating effect of a money-saving goal are still inconclusive due to the failed manipulation in the goal activation task. Participants in the activated goal condition did not purchase significantly more healthy products compared to participants in the non-activated saving goal condition, regardless of intervention type condition. In summary, our study demonstrated that only a price reduction was able to encourage consumers to purchase healthy products in an online shopping setting.

Existing literature has mixed explanations on whether people with low SES are susceptible to nudges. On the one hand, theories of automatic behavior and habits all converge on the idea that not every life's simple decision requires deliberation, as it would exploit people's time and resources for other demands in their daily life (Chartrand & Bargh, 1999). For people

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

with low SES, demands such as paying debt, spending within a budget, and dealing with other challenging needs in life have all been occupying their time and resources. They are more prone to make food decisions based on an automatic thinking process and therefore are more likely than others to have an unhealthy diet due to the obesogenic environment that encourages impulsive and automatic purchase of unhealthy food (Vohs, 2013). Based on this notion, pre-selecting a product known as a default nudge on the online shopping platform serves the purpose of saving consumers' deliberating time and resources and thus directly benefit people with low SES in making healthier choices.

On the other hand, however, our finding implies that the default nudge may not always be effective. Although a healthy eating goal may preexist among participants and corresponds to the pre-selected product, it contradicted to a money-saving goal in our experiment because all pre-selected products in the nudge condition were always more expensive. This conflict may result in participants prioritizing goals in terms of their importance, which confirms with previous literature that having greater focus on certain problems can result in neglecting other issues (Shah, Mullainathan, & Shafir, 2012). In the experiments, the greater focus was possibly paid to the price of a product because the majority of participants are students with limited income. This explains why the default nudge had little impact as it elicited two conflicting goals.

Additionally, the finding that a price reduction greatly increased healthy choices is consistent with the previous research showing that financial incentives have a major role in promoting healthy eating (McGill et al., 2015). It further provides evidence to support the theory about conflicting goals. Once the saving goal and health goal do not impede each other, significant behavior change can be realized.

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Unfortunately, the goal manipulation task did not differentiate participants in terms of their money-saving goal ranking between the activated group and the non-activated group. This might explain why we did not find significant difference in healthy product choices between two goal conditions, regardless of types of interventions. Ample evidence have demonstrated that goal priming by using environmental cues is a valid method to elicit subsequent goal pursuit (Bargh & Chartrand, 2000). Although the goal ranking task is derived from the notion that assimilating a saving goal with other equally important goals is likely to make it deactivated, the mere exposure to the goal-related words may already motivated the saving behavior (Wedell, Hicklin, & Smarandescu, 2007; Weingarten et al., 2016). This priming process may be strengthened by the fact that most of the participants in the study were students who have limited income and therefore may have a pre-existing saving goal. However, the finding that majority of students perceived themselves having sufficient food budgets rules out this possibility. Future studies can add a healthy eating goal in the goal ranking task. As the health goal is more relevant to the food choice task, it would be interesting to see how participants resolve the conflicts between a health goal and a saving goal exhibited in their food choices.

In addition, an exploratory analysis on health goal strength alone significantly predicted the number of healthy product choices. This result must be interpreted with caution because the health goal strength was measured after the experiment. After a repeated exposure to healthy and unhealthy products comparisons, participants were possibly primed with health concept and hence activated the goal of eating healthy.

The current study has three major limitations, including a time-bound between-person design, the online grocery shopping paradigm, and a lack of manipulation check on default options. Firstly, the study only measured between individuals food choices. Participants did not

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

experience all types of interventions due to the random assignment. An intensive longitudinal study showed that within-person intention changes were associated with the number of unhealthy snacks consumption instead of the between-person intention differences (Inauen et al., 2016). In order to enhance the effectiveness of behavior change strategies, it is critical to assess how and when a price or a nudge intervention may work better within individual. For example, a nudge may work better when it shield the person from the context of saving the money. Secondly, we used on online shopping paradigm to measure participants' food choices, whereas in reality, food choices and display are more versatile. Nevertheless, simulated online shopping methods have been shown to be effective research tools for investigating food choices (Benn, Webb, Chang, & Reidy, 2015; Heard, Harris, Liu, Schwartz, & Li, 2016; Papies et al., 2016). Therefore, the results from the current study can represent participants' real grocery shopping choices. Thirdly, no manipulation check was performed on whether participants in the nudge condition actually paid attention to the pre-selection. The shifted visual attention has been recently identified as the primary mediator for people primed with health content to make a healthier food choice (Van Der Laan, Papies, Hooge, & Smeets, 2016). They primed the experimental group with a health, dieting goal and found that the goal-primed participants increased low energy food choices with an increased dwell times on low energy food products. Although inattention may result in sticking with the default, it can only work if decision makers do not have strong preferences on options (Samuelson & Zeckhauser, 1988; Slovic, 1995). Future research can incorporate eye-tracking devices in the experimental design to discover how much attention is paid to the price and nutrition information for people with different focal goals.

Conclusion

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

In conclusion, this is the first study that examined both the influence of an active saving goal and different types of interventions using an online shopping experimental design. The study demonstrated that a price reduction is a more effective intervention to promote healthy food choices compared to a default nudge. With a growing interest in studying nudging techniques in the domain of promoting healthy eating, questions remain the feasibility of completely excluding financial incentives from intervention designs. Previous evidence on successful nudge interventions on healthy eating may simply be contributed to the fact the most participants can afford the price hidden behind the nudged option. Although the price gap between healthy and unhealthy grocery may not be large in the Netherlands, the perception that healthy food cost more has been a barrier in preventing consumers from forming a healthy eating habit (Talukdar & Lindsey, 2013). Financial incentives to promote healthy eating should therefore continue to be of the high importance such as subsidizing healthy food and taxing unhealthy food. Unfortunately, a simple price change may not be feasible as food prices depend on various factors and may have a high, uncontrollable volatility depending on the economic market (Gilbert & Morgan, 2010). Therefore, health promoters should explore the possibility of shielding the conflict between saving goal and health goal to encourage healthy eating behavior among groups with low SES. With the rising obesity rate worldwide, there is an imminent need to increase vulnerable group's affordability of accepting new behavior change interventions that do not involve financial rewards.

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

References

- Bargh, J. A., & Chartrand, T. L. (2000). The mind in the middle. *Handbook of research methods in social and personality psychology*, 253-285.
- Benn, Y., Webb, T. L., Chang, B. P., & Reidy, J. (2015). What information do consumers consider, and how do they look for it, when shopping for groceries online? *Appetite*, 89, 265–273. doi: 10.1016/j.appet.2015.01.025
- Bertrand, M., Mullainathan, S., & Shafir, E. (2006). Behavioral economics and marketing in aid of decision making among the poor. *Journal of Public Policy & Marketing*, 25(1), 8-23. doi: 10.1509/jppm.25.1.8
- Bronchetti, E. T., Dee, T. S., Huffman, D. B., & Magenheimer, E. (2013). When a nudge isn't enough: defaults and saving among low-income tax filers. *National Tax Journal* 66(3), 609-634. doi:10.3386/w16887
- Camerer, C., Issacharoff, S., Loewenstein, G., O'donoghue, T., & Rabin, M. (2003). Regulation for Conservatives: Behavioral Economics and the Case for "Asymmetric Paternalism". *University of Pennsylvania law review*, 151(3), 1211-1254. doi: 10.2307/3312889
- Cassady, D., Jetter, K. M., & Culp, J. (2007). Is price a barrier to eating more fruits and vegetables for low-income families?. *Journal of the American Dietetic Association*, 107(11), 1909-1915. doi:10.1016/j.jada.2007.08.015
- Chandon, P., & Wansink, B. (2011). Is food marketing making us fat? A multi-disciplinary review. *Foundations and Trends in Marketing*, 5(3), 113-196. doi:org/10.1561/17000000016

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

- Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: the perception–behavior link and social interaction. *Journal of personality and social psychology*, 76(6), 893. doi:10.1037/0022-3514.76.6.893
- Darmon, N., & Drewnowski, A. (2008). Does social class predict diet quality?. *The American journal of clinical nutrition*, 87, 1107-1117. Retrieved from <http://ajcn.nutrition.org>
- Davis, S., & Haws, K. (2013). This Is Important (But Don'T Tell Me That): the Backfire Effect of Emphasizing Goal Importance. *NA-Advances in Consumer Research Volume 41*. Retrieved from <http://www.acrwebsite.org/volumes/1015634/volumes/v41/NA-41>.
- De Ridder, D. (2014). Nudging for beginners. *The European Health Psychologist*, 16(1), 2-6. Retried from http://selfregulationlab.nl/wp-content/uploads/2012/04/16_1_EHP_February2014-de-Ridder.pdf
- Dijksterhuis, A., & Aarts, H. (2010). Goals, attention, and (un)consciousness. *Annual Review of Psychology*, 61(1), 467–490. doi:10.1146/annurev.psych.093008.100445
- Drewnowski, A. (2004). Obesity and the food environment: dietary energy density and diet costs. *American journal of preventive medicine*, 27(3), 154-162. doi.: 10.1016/j.amepre.2004.06.011
- Drewnowski, A., & Darmon, N. (2005). Food choices and diet costs: an economic analysis. *The Journal of nutrition*, 135(4), 900-904. Retrieved from <http://jn.nutrition.org/content/135/4/900.short>.
- Drewnowski, A., Monsivais, P., Maillot, M., & Darmon, N. (2007). Low-energy-density diets are associated with higher diet quality and higher diet costs in French adults. *Journal of the American Dietetic Association*, 107(6), 1028-1032. doi: 10.1016/j.jada.2007.03.013

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

- Fitzsimons, G. J., & Williams, P. (2000). Asking questions can change choice behavior: does it do so automatically or effortfully? *Journal of Experimental Psychology: Applied*, 6(3), 195. doi:10.1037/1076-898X.6.3.195
- Gallagher, E. J., & LeRoith, D. (2015). Obesity and diabetes: the increased risk of cancer and cancer-related mortality. *Physiological reviews*, 95(3), 727-748. doi: 10.1152/physrev.00030.2014
- Gilbert, C. L., & Morgan, C. W. (2010). Food price volatility. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), 3023-3034. doi:10.1098/rstb.2010.0139
- Hanks, A. S., Just, D. R., Smith, L. E., & Wansink, B. (2012). Healthy convenience: nudging students toward healthier choices in the lunchroom. *Journal of Public Health*, 34 (3): 370-376. doi: <https://doi.org/10.1093/pubmed/fds003>
- Hassin, R. R., Uleman, J. S., & Bargh, J. A. (Ed.). (2004). *The new unconscious*. Location: Oxford University Press.
- Heard, A. M., Harris, J. L., Liu, S., Schwartz, M. B., & Li, X. (2016). Piloting an online grocery store simulation to assess children's food choices. *Appetite*, 96, 260-267. doi: 10.1016/j.appet.2015.09.020
- Honkanen, Pirjo & Frewer, Lynn. (2009). Russian consumers' motives for food choice. *Appetite*, 52, 363-371. doi:10.1016/j.appet.2008.11.009
- Jetter, Karen M & Cassady, Diana L. (2006). The Availability and Cost of Healthier Food Alternatives. *American Journal of Preventive Medicine*, 30, 38-44. doi:10.1016/j.amepre.2005.08.039

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

- Kallbekken, S., & Sælen, H. (2013). 'Nudging' hotel guests to reduce food waste as a win-win environmental measure. *Economics Letters*, *119*(3), 325-327.
doi:10.1016/j.econlet.2013.03.019
- Kromhout, D., Spaaij, C. J. K., de Goede, J., & Weggemans, R. M. (2016). The 2015 Dutch food-based dietary guidelines. *European journal of clinical nutrition*.*70*, 869–878;
doi:10.1038/ejcn.2016.52
- Lovasi, G. S., Hutson, M. A., Guerra, M., & Neckerman, K. M. (2009). Built environments and obesity in disadvantaged populations. *Epidemiologic reviews*, *31*(1), 7-20. doi:
10.1093/epirev/mxp005
- Maslow, A. H., Frager, R., & Cox, R. (1970). Motivation and personality (Vol. 2, pp. 1887-1904). J. Fadiman, & C. McReynolds (Eds.). New York: Harper & Row.
- McGill, R., Anwar, E., Orton, L., Bromley, H., Lloyd-Williams, F., O'Flaherty, M., ... & Allen, K. (2015). Are interventions to promote healthy eating equally effective for all? Systematic review of socioeconomic inequalities in impact. *BMC public health*, *15* (1), 1. doi: 10.1186/s12889-015-1781-7
- Morwitz, V. G., Johnson, E., & Schmittlein, D. (1993). Does measuring intent change behavior?. *Journal of consumer research*, *20*(1), 46-61. doi:https://doi.org/10.1086/209332
- Ogden, Cynthia L, Carroll, Margaret D, Curtin, Lester R, McDowell, Margaret A, Tabak, Carolyn J & Flegal, Katherine M. (2006). Prevalence of Overweight and Obesity in the United States, 1999-2004. *JAMA: Journal of the American Medical Association*, *295*, 1549-1555. doi:10.1001/jama.295.13.1549

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Papies, E. K. (2016). Health goal priming as a situated intervention tool: How to benefit from nonconscious motivational routes to health behavior. *Health Psychology Review*.

Advance online publication. doi:10.1080/17437199.2016.1183506

Poirier P, Eckel RH. (2002) Obesity and cardiovascular disease. *Curr Atheroscler Rep*.

2002;4(6):448-453. doi:10.1007/s11883-002-0049-8

Rozin, Paul, Scott, Sydney, Dingley, Megan, Urbanek, Joanna K, Jiang, Hong & Kaltenbach, Mark. (2011). Nudge to nobesity I: Minor changes in accessibility decrease food intake.

Judgment and Decision Making, 6(4), 323-332. Retrieved from

<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc8&NEWS=N&N=2011-16539-006>

Schokker, D. F., Visscher, T. L. S., Nooyens, A. C. J., Van Baak, M. A. and Seidell, J. C. (2007),

Prevalence of overweight and obesity in the Netherlands. *Obesity Reviews*, 8, 101–107.

doi:10.1111/j.1467-789X.2006.00273.x

Shah, A. K., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little.

Science, 338(6107), 682-685. doi: 10.1126/science.1222426

Smith, N.C., Goldstein, D.G., & Johnson, E.J., (2013). Choice Without Awareness: Ethical and Policy Implications of Defaults. *Journal of Public Policy & Marketing*, 32, 159-172.

doi: 10.1509/jppm.10.114

Sunstein, C., & Thaler, R. (2008). *Nudge, improving decisions about health, wealth, and happiness*. United States: Yale University Press.

Swinburn, B., Egger, G., & Raza, F. (1999). Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

environmental interventions for obesity. *Preventive medicine*, 29(6), 563-570.

doi:10.1006/pmed.1999.0585

Talukdar, D., & Lindsey, C. (2013). To buy or not to buy: Consumers' demand response patterns for healthy versus unhealthy food. *Journal of Marketing*, 77(2), 124-138.

doi:10.1509/jm.11.0222

Van Den Hurk, K., Van Dommelen, P., van Buuren, S., Verkerk, P. H., & HiraSing, R. A.

(2007). Prevalence of overweight and obesity in the Netherlands in 2003 compared to 1980 and 1997. *Archives of disease in childhood*, 92(11), 992-

995. doi:10.1136/adc.2006.115402

Van Der Laan, L. N., Papiés, E. K., Hooge, I. T., & Smeets, P. A. (2016). Goal-directed visual attention drives health goal priming: An eye-tracking experiment. *Health*

Psychology, 36(1), 82. doi:10.1037/hea0000410

Vohs, K. D. (2013). The poor's poor mental power. *Science*, 341(6149), 969-970. doi:

10.1126/science.1244172

Waterlander, W. E., De Mul, A., Schuit, A. J., Seidell, J. C., & Steenhuis, I. H. (2010).

Perceptions on the use of pricing strategies to stimulate healthy eating among residents of deprived neighbourhoods: a focus group study. *International Journal of Behavioral*

Nutrition and Physical Activity, 7(1), 1. doi: 10.1186/1479-5868-7-44

Wedell, D. H., Hicklin, S. M., Smarandescu, L. O. (2007). Contrasting models of assimilation and contrast. In D. A. Stapel and J. Suls (Eds.) *Assimilation and Contrast in Social Psychology* (pp. 45-74), New York: Psychology Press.

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Weingarten, E., Chen, Q., McAdams, M., Yi, J., Hepler, J., & Albarracin, D. (2016). From primed concepts to action: A meta-analysis of the behavioral effects of incidentally presented words. *Psychological Bulletin*, *142*(5), 472–497. doi:10.1037/bul0000030

World Health Organization. (2016). *Obesity and overweight* (Fact Sheet No. 311). Updated June 2016. Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en/>

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Appendix A

Figure A1. Money-saving goal ranks in the goal priming task.

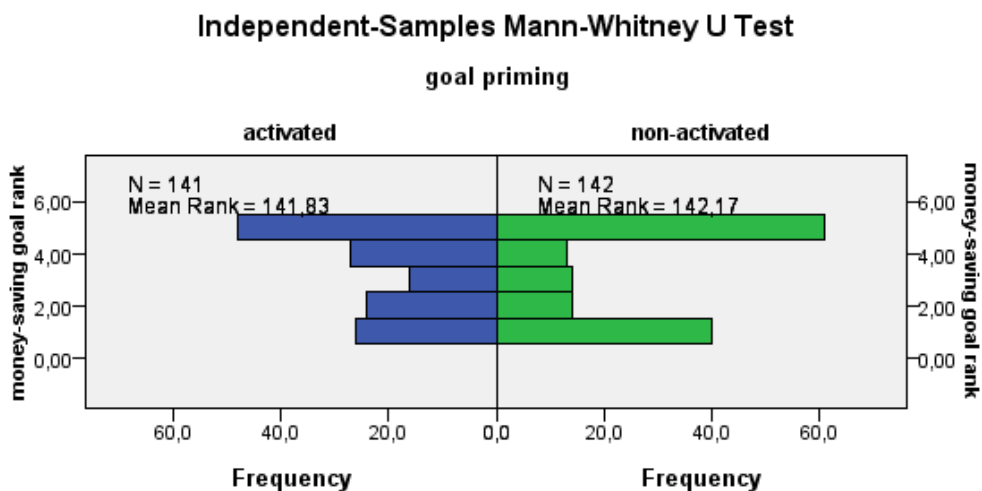


Table A1

Two-Way ANOVA for healthy product choices by intervention and goal

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
intervention	2	1014.25	507.12	23.81	** .000
goal * intervention	2	16.72	8.36	.39	.676
error	277	5899.40	21.30		
total	283	76811.00			

Note. Significance level is .05

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

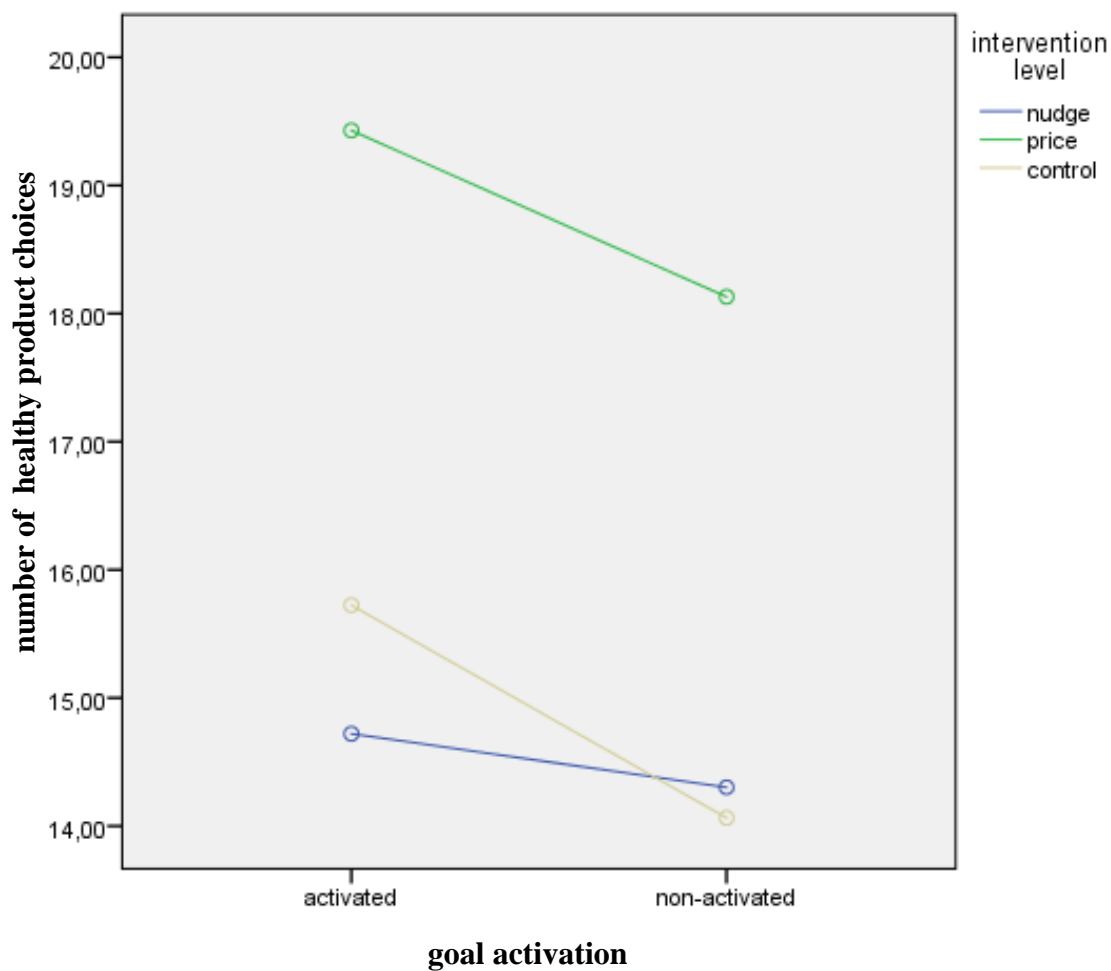
Healthy number choices in six conditions

Figure 2A. This profile plot showing the effects of intervention level and goal activation on number of healthy product choices in six conditions.

Table A2

ANCOVA for healthy product choices by intervention and the health goal strength as a covariance

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
intervention	2	9.44	4.72	.31	.732

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

health goal strength	1	799.12	799.12	52.83	** .000
Intervention * health goal strength	2	38.93	19.47	1.29	.278
error	267	4038.57	15.13		
total	273 ^a	76066.00			

Note. Significance level is .05.

^aTen participants did not complete the health goal measurements and are therefore not included in the table.

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Appendix B

Select the product that you are most likely to buy.

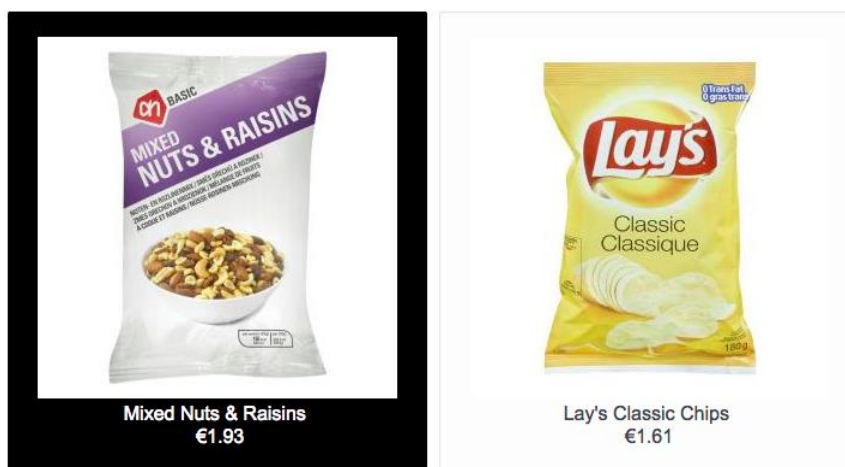


Figure B1. A pre-selection in nudge condition.

Select the product that you are most likely to buy.

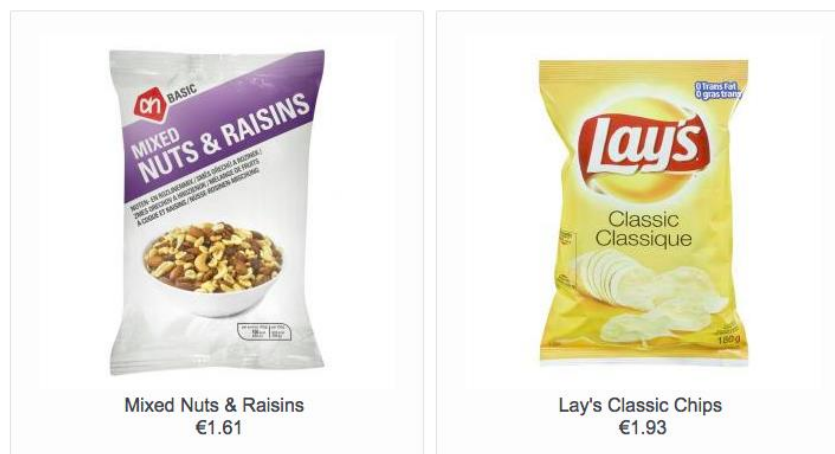


Figure B2. A price reduction in price condition.

A COMPARISON BETWEEN TWO GROCERY SHOPPING INTERVENTIONS

Select the product that you are most likely to buy.

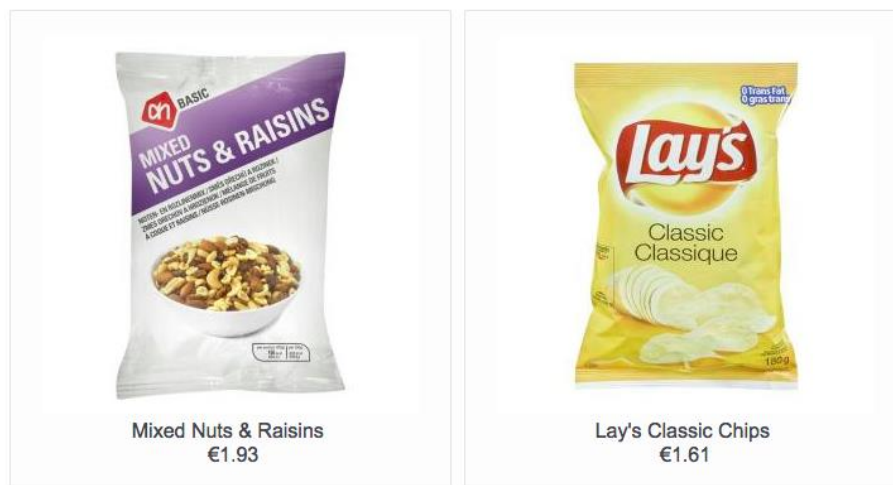


Figure B3. A control condition.