

Investigation of the Efficacy of Social Proof Heuristics on Promoting
Healthy Eating Choices in Control and Deliberate Thinking Conditions

Hadiye Bostanci

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Supervisor: Laurens van Gestel

Utrecht University

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Abstract

It is assumed that different thinking conditions may influence individual's food choices in terms of healthiness. With an aim to investigate this assumption, participants within either control thinking condition or deliberate thinking condition have been examined for their amount of healthy food choices in the absence and presence of social proof heuristics. This examination consists of a manipulation that uses social proof heuristics and is based on the nudge theory. In addition to social proof manipulation, instructions are prepared for control and deliberate thinking conditions. Within this framework, an online survey that is named "Online Grocery Shopping Task", formed in 4 random branches that represent different conditions (deliberate thinking with social proof heuristics, deliberate thinking without social proof heuristics, control thinking with social proof heuristics, and control thinking without social proof heuristics) each of which consists of 15 items (10 food pairs, and 5 non-food pairs). To test the effect of thinking conditions, presence of heuristics, and their interaction on the number of healthy food choices, a 2x2 ANOVA was conducted, with thinking conditions and presence of heuristic as between-subject factors. There were no main effects of thinking conditions and the heuristics on the total number of healthy food choices made. In addition to that there was no interaction between thinking conditions and heuristics. In the light of these findings, it is observed that having no main effect on the number of healthy eating choices shows parallel results with the existing literature. In contrast, resulting in no interaction effect on the number of healthy eating choices differs from the suggestions of the existing literature.

Introduction

People tend to keep up with their healthy living goals in order to increase their life quality. They may look for eating healthier alternatives, quit smoking, increase physical activities, work or study regularly, and drink less alcohol. All these efforts are performed to achieve healthy behavior patterns (Wenzel, Kubiack, & Connor, 2016). Many theories have been suggested to provide the healthy life style modification for the people such as Theory of Reasoned Action (Ajzen, 1985), the Theory of Planned Behavior (Fishbein, 1980), and Protection Motivation Theory (Rogers, 1983). However, the theories' main focus was on rational thinking (Bargh, 2002) and people cannot always be aware and control their own behaviors (Bargh & Morsella, 2009). Even though people intend to eat more healthily, they have some difficulties in order to change eating behaviors (de Ridder, 2014).

The aforementioned health psychology theories agree on the idea that pays attention to the importance of the human intention as decisive on the people's actions in terms of performing healthy behavior (Sheeran, 2002). Even though the intention is important for adopting desirable and healthy behavior, the intention itself is not sufficient enough without taking other steps for achieving behavioral change in order to live more healthily (Sheeran, 2002). Performing healthy behaviors are also important for healthy living. In this case, the intention-behavior gap clearly describes the contradiction between performing and maintaining healthy behavior (Hofmann, Friese, & Strack, 2009; Wansink & Sobal, 2007).

In addition to the intention-behavior gap, there are different components of healthy behaviors. It can be said that self-control is another important aspect of performing and maintaining healthy behaviors. Self-control can be defined as the ability to override impulsive responses and regulate thoughts and behavior in order to keep on in line with individuals' long term and desired goals such as eating healthier or exercising regularly (Metcalfe & Mischel, 1999; Vohs & Baumeister, 2004). However, the capacity for self-control involves limited resource that uses the body's basic energy capacity. When this resource is depleted and decision making will start to act more automatically (Baumeister, Sparks, Stillman, & Vohs, 2008). This state which is explained as ego depletion may affect the people's decision making on their daily food choices. This argument is supported by several researches (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister, Sparks, Stillman, & Vohs, 2008; Hagger, Wood, Stiff, & Chatzisarantis, 2010; Muraven & Baumeister, 2000) which

indicate that people have shifted toward less rational and more self-indulgent choices. In this case, people show a tendency to adopt impulsive decision-making strategies and become more vulnerable for tempting foods and other situational cues (Bruyneel, Dewitte, Vohs, & Warlop, 2006; Hofmann, Strack, & Deutsch, 2008). However, people show high level of self-control will show fidelity and stick to their long term goals and values in order to live healthier (Baumeister, Gailliot, DeWall, & Oaten, 2006; Hofmann, Friese, & Strack, 2009). Owing to these characteristics of the self-control concept, traditional approaches in health psychology have rooted in the idea of improving self-control level. While these approaches focus on increasing the level of self-control, they have achieved limited results for promoting healthy eating behavior (Herman & Polivy, 2011; Michie, Abraham, Whittington, McAteer, & Gupta, 2009). In fact, sufficient numbers of studies indicate that people mostly make their eating choices unconsciously (Bargh, 2002; Wansink & Sobal, 2007). For this reason, contemporary approach, which will be discussed below, has shifted the focus on from fighting against the self-control to accepting itself.

People may encounter lots of information while making their food choices however they usually rely on intuitive thoughts and make their choice automatically. According to the Dual System Theory (Kahneman & Frederick, 2002) human behavior can be explained by the interaction of the two information processing in an intuitive or rational way. According to these two explanations it is possible to say that people's decisions are determined by two different modes of thinking: System 1 and System 2 (Kahneman, 2015; Stanovich & West, 2000). System 1 might be explained as experiential, affective, and intuitive, being described by fast, effortless, automatic and associative responses. However, system 2 might be explained rational, deliberative and analytical, being slow, effortful, and deliberate responses (Stanovich & West, 2000). According to Kahneman (2003) most of daily decisions are made automatically and unconsciously which are determined by system 1 thinking. System 2 controls the decisions of System 1 by evaluating information in a detailed way (Kahneman & Frederick, 2002), which requires more mental capacity and source (Sloman, 1996). Thus, according to this point of view the human behavior consists of the interaction between deliberate and automatic thinking (Epstein, 1994). Consequently, different thinking styles have a great impact on people's eating patterns and motivation behind their food choice.

Even though it could be said that different thinking styles will influence people's food choice, there are also several ways like heuristics in order to improve people's health food choices. Heuristics are simple decision rules that facilitate the decision making process, by excluding part of the information, and consequently save self-control resources (Gigerenzer & Gaissmaier, 2011; Shah & Oppenheimer, 2008). They give an automatic and "easy way out" for individuals who are low in self-control (Salmon et al., 2014).

Heuristics may also provide opportunities in order to create nudges for different settings in order to promote healthy living conditions of people. According to Thaler and Sunstein (2009, p.6) nudging can be defined as "*any aspect of the choice architecture that alters people's behavior in a predictable way without inhibiting any alternatives or significantly changing their economic incentives*". For this reason, nudges may provide an alternative to existing arrangements for promoting healthy behavior which support people to make effortful changes to their lifestyle that are difficult to maintain. Nudges may take the advantage of the nature of health behavior as automatic and reflexive, admitting the fact that people engage in unhealthy behavior with explicit or implicit intent (De Ridder, 2014). Nudges use people's cognitive biases, converting decisions to the alternative which seems to be the "default", is most remarkable (Hansen & Jespersen, 2013). Thus, nudging has become popular in recent years in health psychology (Kroese, Marchiori, & de Ridder, 2015). Although nudging is a developing intervention for promoting healthy eating behavior, several studies have investigated the effectiveness of nudging on healthy eating.

Nudging targets system 1 thinking and facilitates choosing healthy options by using several concepts such as environmental cues and heuristics. These concepts provide reasonable and practical solutions while rearranging the disadvantageous environmental settings such as the obesogenic environment which contributes to unhealthy eating behaviors in the society. Swinburn and Egger (2002) describe the obesogenic environment as creating the environment by arranging conditions which increases the risk of obesity among the people. Thus, nudging helps the people to access healthy options in an obesogenic environment and they can make their healthy choices in this rearranged environment (van Kleef et al., 2012; Wilson, Buckley, Buckley, & Bogomolova, 2016). Especially, nudges based on the social proof heuristic are also found to be effective when people have the low state of self control, which is generally thought as a contributor of risky and unhealthy

behaviors (Salmon et al, 2014). In the light of previous research, the current study investigates the effectiveness of nudging in promoting healthy eating behavior for the people who use system 2 thinking. While constructing the hypothesis of the study it is assumed that participants who are in the control condition will be more open than people who think deliberately to the external cues and react more impulsively. It is hypothesized that people in the control condition will make less healthy choices when there is an absence of the heuristics than when the heuristics are present. In addition, it is hypothesized that people in the deliberate thinking condition will make healthy choices in higher amount when there is a presence of the heuristics than when the heuristics are absent.

Furthermore, it is assumed that people who have enough motivation for healthy eating and think deliberately will choose healthy food options regardless of the presence of the heuristic. It is assumed that deliberate thinking will not change the amount of healthy food choices either in the presence of the heuristic or in the absence of the heuristic. Hence, the people who think deliberately will approximately make the same number of healthy food choices in the conditions of with heuristics and without heuristics. However, the people in the control condition will choose different numbers of healthy food choices in the line with having heuristics and not having heuristics.

Consequently, we focus on the two conditions of thinking (control-deliberate) and the presence of the heuristic during the selection between healthy and unhealthy food choices. Owing to the fact that there has not been examined the effect of nudging to the extent of different thinking conditions, we are going to explain the hypothesis by using the studies which focus on the conditions of self control and related findings in the literature. For instance, Salmon and colleagues (2015) suggest that under low self control conditions, presenting social heuristics may benefit healthy food choices. The impulsive choice under low self-control conditions may transform into a healthy eating choices, by associating the healthy choice with presence of a heuristic (Salmon et al., 2014). Importantly, heuristics such as social proof are especially effective in influencing behavior under conditions of low self-control when people do not have enough the capacity or motivation to make well-deliberated choices (Salmon et al., 2014). These current studies show us the low self control condition will be thought as an advantageous contributor on healthy eating behavior when it is connected to social proof heuristics. Similar to the current result, in this study it is assumed that control condition of thinking will not have to result in unhealthy food intake in the

presence of a social heuristic. According to the assumptions and several researches which were mentioned above, it is expected to find the answers for the related hypothesis of the study.

Method

Participants and Design

One hundred sixty participants (121 female, 39 male) with an average age of 24.73 years ($SD=5.30$) participated in an online experiment in exchange for a gift card raffle (€ 10) or course credit (0.25 PPU). The study used a 2 (thinking condition: control vs. deliberate) X 2 (social proof: heuristic vs. no heuristic) between subject factors design, with the number of healthy food choices as dependent variable. A convenience sample consisting of Dutch and International students and also the adults who live in Netherlands was recruited for participation by distributing flyers and posting advertisements on online platforms such as face book groups.

Procedure

The experiment is represented as a study which investigates the online grocery choices of the people who live in The Netherlands. Before answering the online survey, the participants read and agree on the informed consent which is given at the beginning of the survey. This section also provides information for the participants regarding the study. Then, the participants are asked to answer online study which is briefly explained in this section.

As it indicated before, the study investigates promoting healthy food choices under control condition by implementing the influence of social proof heuristic. The control and deliberate thinking conditions are manipulated by stating the instructions at the beginning of the experiment and also the related instructions for each condition are repeated at every grocery online choice task item. In order to manipulate the participant's food product choices, social proof heuristic is used by providing salient statistical information by giving statistics regarding the food and non-food product choice of the people who has participated in the

previous study ostensibly. After completing the online grocery choice task the participants fill the demographic information form in order to obtain demographic details.

Materials

The participants were asked to provide gender, age, height, and weight. In addition to that, participant's diet status (yes or no) was. The second part includes some 7-point Likert scale questions (1) not at all - (7) very much. The variables are briefly explained as below:

Hunger. Hunger was measured by the question "How hungry do you feel at this moment?" on a 7-point scale ranging from 1 (not at all) to 7 (very much).

Thirst. Thirst was measured by the question "How thirsty do you feel at this moment?" on a 7-point scale ranging from 1 (not at all) to 7 (very much).

Healthy eating goal. Healthy eating goal was measured by the question "To what extent do you have the goal to eat healthily?" on a question on 7-point scale ranging from 1 (not at all) to 7 (very much).

Time. The perception of time period of the participants regarding the experiment process was measured by, "How much time did you spend during the online grocery shopping task?" on a question on 7-point scale ranging from 1 (not at all) to 7 (very much).

Effort. The effort perception of the participants regarding the experiment process was measured by, "How much effort did you spend during the online grocery shopping task?" on a question on 7-point scale ranging from 1 (not at all) to 7 (very much).

Online Grocery Shopping Task

The online grocery choice task includes ten trade-off and five non-food product pairs. These product pairs are taken from the study which is about standardized food images (Charbonnier, van Meer, van der Laan, Viergever, & Smeets, 2015). According to the instruction, it is requested from the participants to choose one product between two alternatives. The dependent variables are the number of healthy food choices for trade-off product pairs, ranging from zero to ten. In order to create a contradictory situation, the food product pairs in the study have to represent a trade-off between the goal to eat healthy and the goal to enjoy palatable but unhealthy food products. Ten food product pairs are arranged to represent the self-control dilemma, a dilemma in which the pairs suggest a trade-off between the goal to eat healthy and the goal to enjoy palatable but unhealthy food products. Such

arrangement indicates significant differences on the healthiness and the attractiveness dimensions such as milk chocolate versus carrot, bonbon chocolate versus raisins, smarties versus sweet corn. Moreover, five nonfood product pairs which represent control pairs are chosen among the data set (Charbonnier et al., 2015) such as eraser versus sticky note, staple versus glue, and pin versus tape. The non food product pairs are added in order to conceal the main goal of the study.

Deliberate Thinking Manipulation

Two different types of instructions were written in order to manipulate deliberate thinking. Participants in the control condition were informed to choose a product in each pairs. However, participants in the deliberate thinking condition received the same instructions but were also informed to use critical thinking, elaboration and evaluation skills during the online grocery choice task.

Social Proof Manipulation

The social proof heuristic is linked with the healthy options in the food-choice task. A pie chart is provided next to each product pair, which shows the percentage of choices of people who previously participated in this experiment ostensibly. These percentages which vary from 65% to 85% are used for manipulation of healthy food choices without directly informing that the selected product is the healthy option. Giving statistical information about the majority of a reference group can be described as a practical way to manipulate social proof heuristic among the people (Goldstein, Cialdini, & Griskevicius, 2008). In the condition without the social proof heuristic, no statistical information is shared about participants' choices in previous studies was provided.

Results

Descriptive Statistics and Randomization Check

Participants reported a mild level of hunger ($M = 3.34$, $SD = 1.61$), a mild level of thirst ($M = 3.70$, $SD = 1.49$), and BMI ($M = 22.52$, $SD = 3.24$). On average, participants valued the goal of healthy eating ($M = 4.98$, $SD = 1.22$). In order to examine the randomization, one-way

variance analyses were conducted for each variable which were described in this section. The five separate analyses of variance (ANOVAs) with age ($F < 1$, $p = .456$), hunger ($F < 1$, $p = .755$), thirst ($F < 1$, $p = .950$), healthy eating goal ($F < 1$, $p = .419$), and BMI ($F = 1.28$, $p = .284$) showed no significant differences between the four conditions, which indicates that randomization of participants was successful. In addition, two chi-square tests with gender $X^2(3, N=160) = 7.83$, $p = .645$, and diet status $X^2(3, N=160) = 13.43$, $p = .200$ indicated that there were no significant differences between four conditions, so the randomization of gender and diet status were also found successful.

Manipulation Check

Two separate analyses of variance (ANOVAs) with time taken to complete the experiment ($F = 1.02$, $p = .385$) and effort taken to complete the experiment ($F = 2.09$, $p = .104$) as dependent variables revealed no significant differences between the four conditions, which explained that the manipulation was not successful. Manipulation check results were not in the line with the assumption which was constructed at the beginning of the study because it was expected that the participants who were in the condition of deliberate thinking would spend more time and effort than the participants who were in the condition of natural thinking. However, the results indicated there were no significant differences between the conditions.

The Effects of Thinking Conditions and Nudging on Healthy Food Choice

The average of healthy eating choices was measured for each conditions such as deliberate thinking with heuristics ($M = 3.14$, $SD = 1.60$), deliberate thinking without heuristics ($M = 3.98$, $SD = 1.96$), control condition of thinking with heuristics ($M = 3.90$, $SD = 2.00$), and control condition of thinking without heuristics ($M = 4.10$, $SD = 2.17$). In order to test the effect of thinking conditions, presence of heuristics, and their interaction on the number of healthy food choices, a 2x2 ANOVA was performed, with thinking conditions and presence of heuristic as between-subject factors. There were no main effects of thinking conditions ($F(1, 156) = 1.94$, $p = .165$) and the heuristics ($F(1, 156) = 2.69$, $p = .103$) on the total number of healthy food choices made. In addition to that there was no interaction between thinking conditions and heuristics $F(1, 156) = 1.05$, $p = .307$.

While constructing the hypothesis, it is also assumed that people who have enough motivation for healthy eating and think deliberately will choose healthy food options regardless of the presence of the heuristics. For this reason, goal to eat healthy was added to the main analysis as a covariate variable. According to the covariance analysis results, goal to eat healthy ($F=34.80$, $p=.00$, $\eta^2=.18$) was significant as covariate. In addition, there was a difference observed in the main results. The results suggested that heuristics $F(1,156)= 6.48$, $p=.012$, $\eta^2=.04$ has a main effect on choice type. However, the main effect of thinking conditions and the interaction effect remained insignificant.

Discussion

In this study, it is shown that implementing social proof heuristic does not reveal significant effect in order to promote healthy food choices. Therefore, the current study is in the line with previous researches (Salmon et al., 2014; Salmon et al, 2015). In this point of view, the current study indicates several similar findings regarding the main effect. However, the formerly referred studies indicated an interaction effect in their own context. Thus, the current study differs from the previous studies in the line of interaction effect (Salmon et al., 2014; Salmon et al, 2015).

Previously, it is hypothesized that people in the control condition will make less healthy choices when there is an absence of the heuristics than when the heuristics are present. In addition, it is hypothesized that people in the deliberate thinking condition will make healthy choices in higher amount when there is a presence of the heuristics than when the heuristics are absent.

In the light of the hypotheses, it can be said that the assumptions of the study were not verified by the results which were obtained from the statistical analysis of the collected data. The results showed that there were no main effects of thinking conditions and the heuristics on the total number of healthy food choices made, thinking conditions. However, the results expressed different outcomes which were expected at the beginning of the study. These different results also might be explained several reasons which will be mentioned below. First of all, the manipulations regarding the thinking conditions and the social proof heuristic would not be constructed in an effective way in order to provide significant differences

between the four conditions which are provided in the results section. So, the ineffectiveness of the manipulations both thinking conditions and social proof heuristics will help to clarify having no main effects and also interaction effect in the context of the current study.

According to the previous studies (Salmon et al., 2014; Salmon et al, 2015) regarding the effect of heuristics on promoting healthy food options, heuristics may increase the number of healthy food choices in experimental settings which aimed at promoting healthy eating behaviors. However, the result of this study is not in the same line with the studies which are indicated above. This difference may be result from several reasons which are going to be mentioned in this section.

Several factors may have played a critical role in the results of the study. The factors such as psychological, social, and physiological (Scheibehenne, Miesler, & Todd, 2007) may have an impact promoting healthy food choices. In addition to that, the feature and the arrangement of the environmental settings (Cohen & Babey, 2012) such as super market, canteen, or vending machine might affect individual's daily food choices. Since the environment of the study was not controlled like the laboratory setting, it can be possible to say that the participants' decisions may have been influenced by these factors which are indicated above.

The study has several limitations. First, the study conducted as an online research and the participants filled the online survey in different environmental settings such as campus, library, cafes, or other places. Thus, the first examination of the study was not performed in the laboratory setting. Conducting the study in a controlled setting like laboratory would provide opportunity to see how the results would have changed in different environmental condition. Doing the study in a laboratory setting would also give some clues regarding implementation of the study in different settings. Second limitation of the study is that the social proof heuristic was used in this study and it did not result in significant effect. For this reason, the different type of heuristic might be changed instead of social proof in order to increase the effect of manipulation.

Since it is the first study that investigates the interaction between thinking conditions and heuristics on healthy food choices, more attention to this topic is required. The current interventions which aim to promote healthy eating choices usually target on system 1

thinking, however, this study investigated the effect of social proof heuristics on deliberate thinking condition too. So, the results will provide an idea that how the nudges will be effective while they are implementing in a deliberate way.

To achieve that requirement, further studies with different designs need to be conducted for finding effective implications and instructions, and for observing the significant differences between deliberate and natural thinking. Different kind of heuristics might be implicated in order to examine its effect on promoting healthy eating choices.

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Appendix A

Table A1
Perceived Healthiness of Food Products

Pair	Healthiness		
	<i>M</i>	<i>SD</i>	<i>t test values</i>
Milk chocolate*	3.74	1.91	t(46) = 11.38
Carrot	8.24	0.78	
Tortilla chips*	2.64	1.22	t(61) = 8.39
Pickles	6.42	2.02	
Bonbon chocolate*	1.72	0.67	t(38) = 13.27
Raisins	6.27	1.32	
Cheese twists*	2.78	1.22	t(51) = 6.73
Shrimps	5.69	1.87	
Smarties*	1.67	0.72	t(39) = 5.88
Sweet corn	4.73	1.93	
Pancake*	3.71	1.27	t(29) = 10.15
Mini pepper	7.86	1.03	
Chocolate nuts*	2.61	1.29	t(57) = 11.27
Olives	6.48	1.34	
Mini donut*	1.95	1.00	t(38) = 17.79
Pear	7.81	1.08	
Crisps*	2.32	1.29	t(36) = 8.66
Grissini	6.42	1.61	
Chocolate cupcake*	2.25	1.03	t(43) = 10.96
Crackers	5.67	1.06	

*p<. 001.

Appendix B

Table B1
Perceived Attractiveness of Food Products

Pair	Attractiveness		
	<i>M</i>	<i>SD</i>	<i>t test values</i>
Milk chocolate*	7.30	1.64	t(46) = 2.18
Carrot	6.08	2.18	
Tortilla chips*	6.84	1.82	t(61) = 2.02
Pickles	5.71	2.37	
Bonbon chocolate**	7.61	1.38	t(38) = 2.73
Raisins	6.27	1.67	
Cheese twists*	6.19	1.49	t(51) = 2.07
Shrimps	4.96	2.69	
Smarties**	7.00	1.60	t(39) = 3.05
Sweet corn	4.68	2.58	
Pancake**	7.82	0.88	t(29) = 2.50
Mini pepper	6.21	1.81	
Chocolate nuts**	7.43	1.20	t(57) = 2.75
Olives	5.94	2.63	
Mini donut*	5.55	2.70	t(38) = 2.12
Pear	4.11	1.08	
Crisps*	6.92	1.79	t(36) = 2.48
Grissini	5.56	1.72	
Chocolate cupcake**	7.29	1.71	t(43) = 3.41
Crackers	5.57	1.66	

*p < .05. **p < .01.