The effect of a repeated nudge on food choices

MSc Thesis

Jill Verlinden

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Supervisor: Merije van Rookhuijzen MSc

Examiner a: prof.dr. Emely de Vet

Examiner b: dr. Sanne Boesveldt

Examiner c: Pepi Burgos Y Guillen PhD

Chair group: Strategic communication

Name: Jill Verlinden

Student number: 940122877070

Email: jill.verlinden@wur.nl

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Preface

Before you lies my thesis: ''The effect of a repeated nudge on food choices''. This thesis is written as part of the Master Communication, Health and Life Sciences at Wageningen University.

This thesis was a big challenge for my especially with a lack of experience in quantitative research. My aim was to gain more experience in this kind of research. After all I am glad I faced this challenge and that I received great help in doing this. That is why I would like to thank the following people:

First I would like to thank my supervisor Merije van Rookhuijzen for keeping me motivated through the whole process. Her critical questions and experience helped me to keep improving my thesis. Second, I would like to thank Sanne Boesveldt for her feedback, this helped me to improve the quality of my thesis. Third I would like to thank my family, friends and my boyfriend that helped me to stay motivated through the whole process. I would like to thank my brother Thomas especially for the discussions on the data of my experiment.

I hope you enjoy reading!

Jill Verlinden,

Nijmegen, November 22, 2018

Abstract

Background Worldwide overweight and obesity are growing phenomena. Not only in high income countries but also in middle income countries numbers of overweight and obesity are rising. A poor diet is one of the biggest factors for people being overweight or obese. It is difficult to make healthy food choices because we are constantly surrounded by food. A way to help people make healthier choices is nudging. Nudging is making changes in the choice architecture to let people make certain choices, in this case healthier food choices. Research has shown that nudges can be effective. Not much research is done to find out what the repeated effect of nudges is.

Objective To find out whether nudges can be effective when used repeatedly.

Methods A digital experiment was carried out to find out the repeated effect of default nudges on food choices. Within this experiment participants were randomly assigned to one of the two groups: the control group and the experimental group. Both the control group and the experimental received the same task for three days in a row. The manipulation in the experimental group was a default nudge. Each trial consisted of four food images. To test whether there is an effect a repeated measures ANOVA was conducted.

Results No significant main effects where found and the test showed also no interaction effects. The only significant effect that was found was between response time and time(days). Response time decreased after the days continued.

Discussion The experiment did not show an effect over time or between the control group and the experimental group. This means the nudge was not effective on the first day. Previous research did show an effect over time. This may be due to a stronger nudge. More research is needed to gain more information on what the effects are of repeated nudging.

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1.Introduction

We are living in a world where food is constantly around us. On average, we make around 200 food choices a day (Wansink & Sobal, 2007). Research shows that making healthy food choices can be difficult (Li & Chapman, 2013). As a consequence, people can become unhealthy and gain weight. Worldwide obesity and being overweight are growing phenomena (being overweight is indicated by a Body Mass Index (BMI) above 25 kg/m2, and obesity is indicated by a BMI above 30 kg/m2). These phenomena are increasing in high income countries as well as in middle income countries (Gregg & Shaw, 2017). In the eighties 27 percent of the Dutch population above four years old was found to be overweight. This percentage grew to 43 percent in 2017. The amount of people in the Netherlands dealing with obesity has almost tripled since the beginning of the eighties. The amount of Dutch people that are obese is 12 percent, this stayed the same the last few years(Centraal Bureau voor de Statistiek(CBS), 2018). Being overweight and obese can cause a lot of diseases such as cardiovascular diseases (such as strokes or heart attacks), diabetes, cancer and breathing difficulties (FAO, IFAD, UNICEF, WFP & WHO, 2018).

The largest factors that causes people to be overweight and obese are the irregular intake of energy and a diet that lacks quality (Romieu et al., 2017). For example people eat merely unhealthy foods as well as people exceed their daily energy intake regularly. The exceeding intake of food suggests that people should not overconsume. And the poor quality of a diet could suggest that people should make healthier food choices. This seems easier than it is. Surrounded by food it becomes difficult to always make the most healthy choices. The current context in which food is all around us plays a big role in the food choices that are made on a daily basis. Not to mention the increase of portion sizes in the last decades (Young & Nestle, 2002). Thomadsen et al. (2018) name two kinds of context: social context and situational context. The social context is formed by people like family or friends. The situational context refers to for example: time or location. Both social and situational context plays a big role in nudging in order to influence people's behaviour. The idea of nudging was developed by Richard H. Thaler and Cass R. Sunstein in 2008. Thaler and Sunstein (2008) use the following definition:

> *''A nudge, as we will use the term, is any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives.''* (Thaler & Sunstein, 2008, p. 6)

Nudging can be seen as changing or setting up a choice architecture in which people will be led to the most beneficial choice for themselves. Nudges are designed to steer people to the best possible option for themselves (Thaler & Sunstein, 2008; Downs et al. 2009). A characteristic of nudging is that other options in the choice architecture are not restricted (Thaler & Sunstein, 2008).

Using nudges can help people to make healthier choices more easily. Research shows that these nudges on food choices can be effective. For example, Christoph and An (2018) showed in their systematic review and meta-analysis that nudging has a neutral to positive medium effect on food choices. Lin, Osman and Ashcroft (2017) also show the effectivity of different kind of nudges on health behaviour. The systematic review and meta-analysis of different kind of nudges (Arno & Thomas, 2016) shows that there is a 15.3% increase in healthier food choices.

Several studies show a long-term effect of nudging. For example, van Gestel, Kroese and de Ridder (2018) show a long-term effect of nudging on food choices in a field study over eight weeks. Other

studies also show positive long-term effects of nudging in a real life setting over twelve weeks (Velema, Vyth, Hoekstra & Steenhuis, 2018). These long-term effects are mostly measured in field studies in which results are based on sales data. However this does not necessarily show a repeated effect on an individual level. Differences on an individual level are difficult to detect because the population to whom the nudge is exposed to can vary. Due to this variance in population results can be based on new participants and this shows no long-term effects, this shows measurements of a new population.

Therefore, this study focuses on measuring the effect of a repeated nudge on an individual level. To measure if a repeated effect takes place it is necessary to follow the same individual and track their results. To investigate a repeated effect the following research question was formed:

What is the effect of a repeated nudge on the food choices of individuals?

In this study, an online experiment was set up to investigate whether there is a repeated effect.

2.Theoretical framework

This chapter will present theories in order to gain more insight into behaviour and the theory of nudging. A selection of the most relevant and recent theories are described. In the first paragraph (2.1) dual process theories are described to gain more insight into how behaviour works. The second part (2.2) will be about Nudge Theory. This is of great importance because this shows what nudges are and how they work. In the third part (2.3) repetition specifically will be explained and linked to nudging. In the last paragraph (2.4) the information of previous parts will be brought together and will form the basis for the hypothesis of this study.

2.1 Behaviour and behaviour change

A lot of research has been conducted on the topic of behaviour and behaviour change. Various theories have been developed to gain a better understanding of how behaviour is formed and how behaviour can be changed. For a long time research on behaviour focused on rational thinking and self-control. Well known theories, such as the Theory of Reasoned Action and the Theory of Planned Behaviour (Fishbein, 1967; Ajzen & Fishbein, 1980) focus mainly on attitudes and intentions before the actual behaviour takes place. Later there was a shift towards looking at other factors that also influence behaviour, such as context.

Nowadays research on behaviour and behaviour change is not only based on the idea of behaviour being based on rational decisions. After much research, different scientists speak of thinking and decision-making as two systems. The two-system model explains the ways in which behaviour is formed. Strack and Deutsch (2004) describe the two systems as the impulsive system and the reflective system. The impulsive system is an automatic and fast system. The reflective system is a slower system that relies on knowledge, values and facts. Kahneman and Frederick (2002) also describe this two-system thinking. System 1 as the fast and automatic system and system 2 as slow and rational.

On a daily basis people often rely on fast and automatic thinking (system 1). People have to make so many choices that people sometimes get overwhelmed (Mick, Broniarczyk & Haidt, 2004). That is why system 1 takes over easily when system 2 gets too exhausted. Roy (2016) mentions that people are making decisions almost every few seconds. These decisions are not always consciously. In a study conducted by Wansink and Sobal (2007), people thought they have to make 20 to 30 food related choices a day. In reality, this appeared to be around 200 food related choices every day. This shows that many of the choices people make are unconscious. This suggests that a lot of food related choices are system 1 thinking. By using system 2 and having the right information people can often choose better what is most healthy. This is more difficult when people rely on system 1. A lot of reasons can play a role in making food choices relying on system 1, for example: smell, remembered enjoyment, habit or reward factor (Shepherd & Raats, 2006; Higgs, 2011). This can cause impulsive decisions that do not always result in the most healthy choice.

In practice it seems hard to keep in mind long-term goals such as health (De Ridder, Van Lensvelt-Mulders, Finkenauer, Stok & Baumeister, 2012). Relying on fast thinking (system 1) makes it harder for people to keep in mind long-term goals such as health. Choices are then merely based on short-term effects (Torma, Witzel & Thøgersen, 2017; Lourenço, Ciriolo, Almeida, & Troussard, 2016).To reach the goal of being healthy people should make healthy food choices. This seems difficult when people are tired, distracted or not motivated at that exact moment. This is why people sometimes

make unhealthy food choices. In contrast with their long-term goal: being healthy (De Ridder et al., 2012). Ariely (2010) confirms this lack of rational control over behaviour. In his book, he describes several examples that show peoples lack of control over their behaviour.

Kahneman and Frederick (2002) mention that sometimes choices that were system 2 can eventually become system 1 choices. For example the first time people have to cook according to a recipe they will probably rely more on system 2. After repeating this several times, people can carry out the steps faster. This suggests that system 1 takes over what was originally system 2. If choosing and buying of food is considered as a daily routine, this would be mostly system 1 thinking. People mostly use system 1 for repeatedly occurring events. Otherwise people have to rethink every daily decision instead of holding on to their routine (Kahneman, 2003). According to Hoyer (1984) these everyday decisions are low-involvement purchases. This suggests that people do not need to make use of system 2.

2.2 Theory of nudging

Several theories in the past were founded on the idea that human beings make only rational decisions. For this reason, numerous theories on behaviour change already make use of system 2 thinking. Current policies are often based on system 2 thinking like informing people so that they will have the right information to make good choices (Schwarz, 2017). It can be difficult to make these healthy choices in practice (Li & Chapman, 2013). As mentioned before rates of overweight and obesity are still rising(CBS, 2018). A big factor in making food choices is that people need to choose from what is available. In this obesogenic environment people tend to overeat because of the way that choices are designed. People think that the decisions they make are based on their freedom of choice although this is not always true(Levitsky & Pacanowski, 2011). People are steered into certain behaviours by a choice architecture. Nudging shows that the way a choice architecture is designed can have an effect on the choices people make. Nudging is used to change behaviour by using system 1 thinking. Thaler and Sunstein (2008) developed the concept of the Nudge Theory.

Where choices are made, a choice architecture exists. Choice architecture is the way that choices are presented to people. Nudging is basically changing the choice architecture or setting up a choice architecture to influence peoples' choices. A choice architecture always exists and people will always be influenced by the choice architecture. The design can be set up to steer people in a certain direction or it is set up without any intention. Nudging refers to changing the physical environment in which choices are made. These changes cause people to behave differently, and this is called a nudge. People cannot always observe nudges. This does not mean that they are intentionally made difficult to see.

Two other aspects are important in nudging as well. These aspects are: freedom of choice and beneficially for most. In nudging it is important that no options are restricted. People should have the freedom to make a choice and not be limited. Additionally, a nudge should be beneficial for most people. Nudges should be thought of to benefit the majority of people, which means that a nudge has a positive effect on a large part of the population. This could be to make them healthier or happier for example. A nudge should not be disadvantageous for the majority of the people.

There are a lot of different nudges and the world of nudges is constantly developing (Sunstein, 2014). Nudging can be seen as a way to design choices. Sunstein (2014) sums up the most important nudges. A very effective nudge is the default nudge. A default nudge is described as the most

powerful nudge by Sunstein (2014) because it takes too much effort to change the default option. An example of a default nudge is an automatic enrolment. People have to actively make another choice than the choice that was automatically chosen for them. For example in the Netherlands a new law has been adopted in the field of donor registration. Dutch citizens will be registered as an organ donor automatically. Still people are free to choose other options (e.g. no donor). To change this people should actively change their registration on a website. Expected is that more people will become an organ donor, because it takes effort to change the default option.

2.3 Repetition

Besides system 1 thinking, repetition is important to name. When people are repeatedly exposed to the same task learning can occur. One of the first scientist to write about this topic was Ebbinghaus (1913). He shows that there is a positive relationship between learning time and amount learned. This means that when people become faster after repetition of the same task.

Other disciplines show theories about repetition. According to consumer decision-making studies people make daily decisions almost automatically (Torma, Witzel & Thøgersen, 2017). Such automatic behaviour arises from daily repetition. Schwartz (2017) shows that people mostly rely on habitual choices when making health choices. This automatic behaviour links to system 1 thinking of which nudging is making use.

Not much research has been done about repeated effects of nudging (de Ridder, Kroese & de Vet, 2016). Research that has shown long-term effects mostly measured a group of people instead of tracking the same individuals. The disadvantage of these previous studies is that they include different participants in the sample. The sample does not stay the same. As a consequence, a long-term effect of nudging within the same sample size still remains unknown.

Van Gestel et al. (2018) mention that much evidence on nudges comes from short duration experiments. Furthermore, they mention the need for long-term experiments. To see if an effect of nudge was measured at one moment in time also shows effective over a longer period of time. Long-term studies should measure more than one point in time. There is a possibility that repetition of nudges could make them stronger (Arno & Thomas, 2016).

2.4 Hypothesis

Expected is that people that are confronted with a nudge repeatedly will choose for the nudged product equally or will slightly increase. This hypothesis is based on theories named previously. Expected is that people will rely more on system 1 when an event keeps repeating.

In previous longitudinal experiments the effect of the nudge continued. On the other hand, no research has shown a repeated effect on an individual level. What is expected is that through repetition nudging will become stronger (Arno & Thomas, 2016). Therefore the following research question is formed:

What is the effect of a repeated nudge on the food choices of individuals?

3.Method

To investigate the repeated effect of nudges on food choices a digital experiment was carried out. The experiment was conducted with two groups: an experimental group and a control group. These groups both received one task each day, for three days in a row. During each trial participants were exposed to four images of which they had to choose one of the images. In the experimental group one image was nudged. The control group received the same tasks without a nudge. Both groups received food choices and non-food choices as fillers.

3.1 Design

In this experimental design, the repeated effect of a nudge was measured. The experiment collected data at three time points from two groups. Participants were randomly placed in one of the two groups(control group or experimental group). The dependent variable that was measured was the percentage chosen picture 1 food. Picture 1 is the same image on the same position. To prevent a preference for one of the four images the control group and the experimental group were divided into four groups each. In these groups a different image was positioned on picture 1. So in total there were eight groups. Four control groups and four experimental groups. For example in control group 1 the same image on position picture 1 was displayed as in the experimental group 1. Each day participants had to complete 20 trials. Each trial contains four images, the next trial showed a new set of four images and so on. In the experimental group picture 1 was nudged by a default nudge as shown in figure 2. The control group received the same trial without a nudge as shown in figure 1.

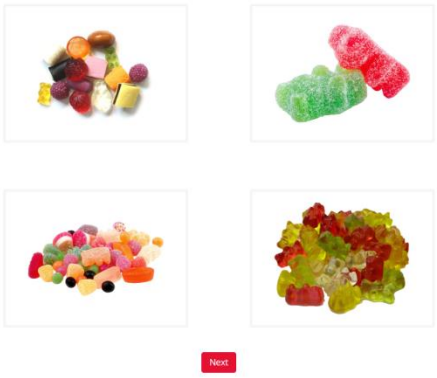

FIGURE 1: VISUAL REPRESENTATION OF A TRIAL

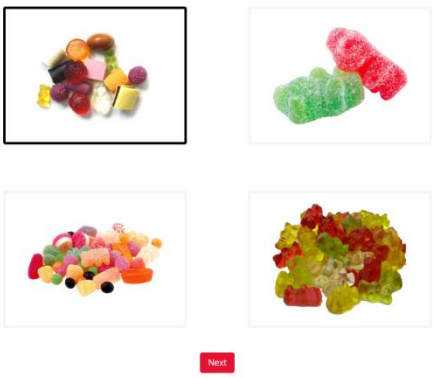

FIGURE 2 : VISUAL REPRESENTATION OF A TRIAL WITH A NUDGE

3.2 Participants

The participants of this research are men and women from the age of eighteen years and older. An exclusion criterion for participants is that they are not allowed to follow any kind of diet. A diet could exclude one or more options from the trials they had to fulfil and this could have influenced the results. Participants were recruited via an online platform called Prolific. The experiment was conducted with 135 participants. This amount of participants is sufficient according to the amount of participants calculated before using G*Power. 70 participants (51.9%) were randomly allocated to the control group and 65 participants (48.1%) were allocated to the experimental group. The participants are not equally divided to the two groups due to the online experiment tool. Because

this tool randomly divided the participants. Of 135 participants, 84 participants (62.2%) were female and 51 participants (37.8%) were male. All participants conducted the experiment using a laptop or desktop computer. The average age of participants was 37.87 (*SD*= 11.604) and the median was 35. UTC+1 was the most common time zone among participants (77.5 %). UTC+1 is Central European Time and West African Time

3.3 Materials

The experiment was conducted via an online experiment computer programme called Gorilla. People who were signed up for Prolific could register to join the experiment. Participants received the task for three days. Every day the participants received 20 trials. In each trial participants had to select one of the four images that were displayed (as shown in figure 1). Participants had to select one out of four images that they would like to have at that moment.

To nudge the experimental group a default nudge was used. One of the four images was preselected for the experimental group (as shown in figure 2). This preselection meant that one of the four images was marked by a darker line, as if already selected. The control group were shown the exact same choices, without a nudge (as shown in figure 1). This nudge is called a default nudge. People still had the freedom to select a different image than the default picture.

The stimuli in this study were visual representations of products. The food and non-food images were carefully selected from a database (Blechert et al, 2014). Images were selected to be most visually similar to each other within each set of four images. This to prevent preference. Within these series of trials different images were shown to participants. In total the 20 trials consisted of twelve food related trials and eight non-food trials each day. These non-food trials were included as control images. Participants were exposed to healthy and unhealthy foods.

In total, each day participants were exposed to 80 images. The images were displayed until participants made a choice. They selected an image by clicking on the picture using their mouse. After selecting the desired image the participant had to click on a button 'next' to show the next trial. There was no time limit, participants had the freedom to take as much time as possible. Response time was measured for each task. To see what happens to the reaction times as time goes on. The size of all four images were similar for each trial. The overall size differed because of the variety in computer screens from participants taking the experiment at home.

3.4 Procedure

The experiment consisted of the task and some questions. On the first day of the experiment participants received a practice trial. This trial was designed to let people get used to the trial. Before completing the task, demographics (hunger, thirst and alertness) were measured using a 7 point Likert scale. Hunger was measured from 'not hungry at all'(1) to 'very hungry'(7). Thirst was measured from 'not thirsty at all'(1) to 'very thirsty'(7). Alertness was measured from 'not alert at all' (1) to 'very alert'(7). After these questions the task took place. Participants made 20 decisions every day. After these 20 trials they answered some questions. The questions addressed how distracted they were, how carefully they considered their answer, and how much they followed their intuition. These answers were all measured by a 7 point Likert scale. Distraction was measured from 'not at all'(1) to 'completely' (7). How carefully did you considered every product before you made a decision was measured from 'fully disagree'(1) to 'fully agree' (7). Intuition was measured from 'fully

disagree'(1) to 'fully agree' (7). The second and third day the same procedure was repeated. Only after participating for all three days participants were rewarded with money.

3.5 Data analysis

Before conducting the experiment a pilot study was conducted among 20 participants. This pilot study was used to test the experiment and calculate how much time was spend on the task. Feedback was used to remove errors from the final experiment. The experiment did not showed any big errors, everything was understandable for the participants. The only feedback was that it was difficult to repeat the task every day and that some people remembered the choices that they had made the previous day.

After gathering the data of participants taking part in the experiment, data analysis took place. First data was prepared in Excel. Every day data was collected from both groups on the percentage of chosen picture 1. The images were coded with yes or no. Yes for a nudged image and no for products that were not nudged. For the control group the same product that was nudged in the experimental group was coded as a yes. There was no nudge visible for the control group. The amount of yes was converted to the percentage of chosen picture 1 products. The statistical analyses that were used to analyse the data were performed using SPSS version 23. SPSS was used to find out if there was a causal relationship between the independent variable and the dependent variable.

There are two percentages of picture 1 products chosen, one for the percentage of picture 1 food products chosen and the other for the picture 1 non-food products chosen. These non-food images are included to see whether there is an effect in comparison to the food trials.

After conducting the experiment data was analysed using IBM SPSS Statistics 23. A repeated measures ANOVA was conducted. In SPSS a general linear model was selected and then repeated measures was chosen. The within subjects variable were the percentages of chosen picture 1 food over three days. Picture 1 is the same image on the same position. And the between subjects variables where the control and experimental group. Before conducting this RM ANOVA the following assumptions should be met according to Field (2014). The first assumption is normality. Data was not normal. After removing the outliers, data was almost normally distributed between a span of -1.96 and +1.96. Except for the experimental group on day 2. The skewness was too high (z=2.00). However according to Field (2014) and Keselman et al. (2001) repeated measures ANOVA is a robust model that can still function when data is not completely normal. Outliers were removed because this brought the data most close to normality. In total three outliers were removed with the criteria of a standard deviation above 3.

Another assumption that should be met is the assumption of sphericity. This assumption is tested with (p =.821) and without outliers (p =.683) according to Mauchly's Test of Sphericity. In both cases this assumption is met. The last assumption that was met is the independence. Observations were independent of each other. Because this is a repeated measures ANOVA the data is not independent for each measure point in time (day 1, 2, 3).To test homogeneity Leven's test and Box's test were conducted. Leven's test (p =.093, p =.066, p =.236) and Box's test(p =.415) shows that homogeneity is met. All assumptions for a repeated ANOVA are met. Removing the outliers did not have an effect on the outcome. The repeated measures ANOVA showed no significant effect with or without outliers.

The dependent variable is the percentage of chosen picture 1 products food. This was measured each day. These outcomes are compared across these three days within subjects the experimental group. Also the effect between the outcomes of the experimental group and the control group was measured. This was measured to exclude the general preferences of participants.

It was expected that the percentage of chosen picture 1 food in the experimental group will be higher than that percentage chosen picture 1 food from the control group. In the experimental group it is expected that the same level of chosen nudges will be observed or will slightly increase within this group.

To see whether participants made the same choices the chosen images where compared. In Microsoft Excel the percentages were calculated of how many times participants would choose the same image. The images were compared between day 1 and day 2, day 2 and day 3. Further choices between day 1, day 2 and day 3 were compared to see if how many times people choose for the same image.

4.Results

In figure 3 a histogram is presented to show the differences between the means of the control group and the means of the experimental group over three days. This histogram shows that both the means of the control group and the experimental group are around 15% chosen picture 1 food images. Each bar represents one day and this represents the percentage chosen picture 1 food of twenty trials.

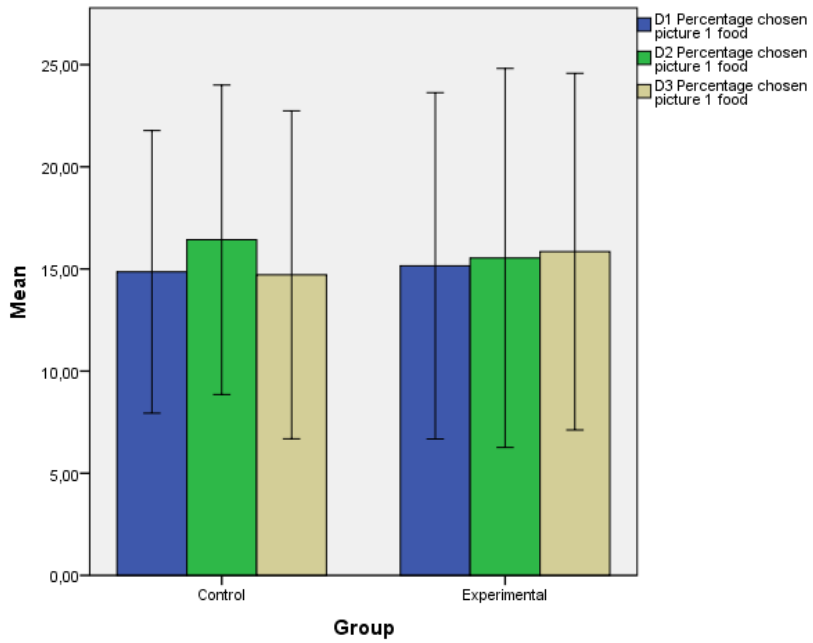

FIGURE 3 HISTOGRAM OF THE MEANS OF THE CONTROL GROUP AND THE EXPERIMENTAL GROUP OVER THREE DAYS IN PERCENTAGES CHOSEN PICTURE 1 FOOD WITH ERROR BARS REPRESENT ONE STANDARD ERROR

A repeated measures ANOVA was carried out to see if there was an effect between the control group and the experimental group. No significant main effect between subjects was found between the control group and the experimental group, $F(1,133) = 0.027$, $p = .869$. This means that control and experimental group did not significantly differed in the percentage chosen picture 1 food.

The repeated measures ANOVA was also carried out to see if there was a main effect over time of percentage chosen picture 1 food. No significant main effect was found over time (within subjects) on percentage chosen picture 1 food in one of the two groups ($F(2,266) = 0.847$, $p = .430$). This means that there is no significant difference over time in the control group or the experimental group. No interaction effect was found between time and group ($F(2,266) = 0.859$, $p = .425$. This means that group (control or experimental) did not had a different effect on the percentage chosen picture 1 food.

A repeated measures ANOVA was carried out to see if there was a main effect on the percentages chosen picture 1 non-food between the control group and the experimental group. No significant main effect between subjects was found between the control group and the experimental group, $F(1, 133) = 0.676$, $p = .412$. This means that the control and the experimental group did not significantly differed in the percentage chosen picture 1 non-food. The repeated ANOVA showed no main effect

over time of percentage chosen picture 1 non-food. No significant main effect was found over time (within subjects) on percentage chosen picture 1 non-food in one of the two groups $F(2,266) = 1.258$, $p = .286$.

A significant effect was only found between response time and time over the days (day 1, day 2, day 3) $F(1.365,181.602) = 16.026$, $p = < .001$. Day 1 the mean response time was 116,91 seconds (sd = 82,89). Day 2 the mean response time was 92,05 seconds (sd = 35,45). Day 3 the mean response time was 88,38 seconds (sd = 46,52). This means response time decreases as days continue.

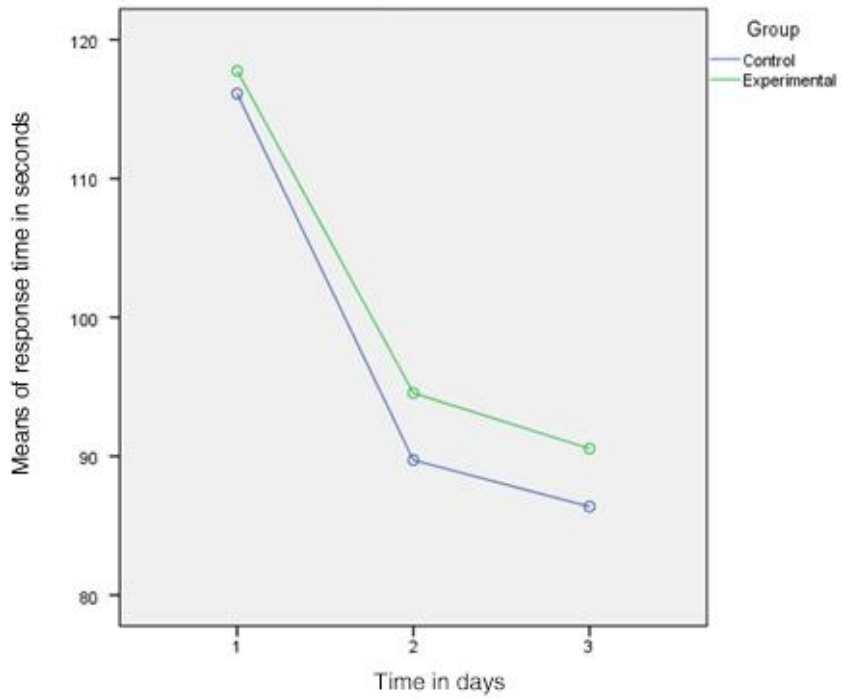

FIGURE 4 GRAPH OF RESPONSE TIME MEANS IN SECONDS BETWEEN CONTROL GROUP AND EXPERIMENTAL GROUP

Figure 4 shows that in both control group and the experimental group response time decreases. Other variables such as hunger, thirst, alertness of day one were analysed in relationship to percentage chosen picture 1 food in the experimental group. A Pearson correlation was used to determine whether there is a relationship between alertness and percentage chosen picture 1 food on day 1. There was no significant relationship between these variables, r (64) = -.097, p = .440. No significant relationship was found between hunger and percentage chosen picture 1, r (64) =0.177, p = .159 on day 1. No significant relationship was found between thirst and percentage chosen picture 1 on day 1 r (64) = -0.019, p = .879. And no significant relationship between distraction and percentage chosen picture r (64) = -0.007, p = .954. No significant relationship was found on day 1 between how carefully participants considered every product before they made a decision r (64) = 0.179, p = .154. No significant relationship was found on day 1 between intuition and percentage chosen picture 1 in the experimental group, r (64) = 0.117, p = .351.

For day two the variables hunger, thirst, alertness of day two were analysed in relationship to percentage chosen picture 1 food of the experimental group. No significant relationship was found between alertness and percentage chosen picture 1 food, r (64) = -0.134, p = .287. No significant relationship was found between hunger and percentage chosen picture 1, r (64) =0.081, p=.519. No significant relationship was found between thirst and percentage chosen picture 1 r (64) = -0.035, p = .780. No significant relationship was found between distraction and percentage chosen picture 1 food, r (64) =0.091, p = .470. No significant relationship was found between 1 between how carefully participants considered every product before they made a decision, r (64) = 0.085, p = .502. And no significant relationship was found between intuition and percentage chosen picture 1, r (64) =-0.30, p = .815.

For day three the variables hunger, thirst, alertness of day three were analysed in relationship to percentage chosen picture 1 food of the experimental group No significant effect was found between alertness and percentage chosen picture 1 food, r (64) = 0.081, p=.522. No significant relationship was found between hunger and percentage picture 1, r (64) =0.023, p = .857. No significant relationship was found between thirst and percentage chosen picture 1 food, r (64) = -0.032, p = .799. No significant relationship was found between distraction and percentage chosen picture 1 food, r (64) = -0.162, p = .199. No significant relationship was found between how carefully participants considered every product before they made a decision and percentage chosen picture 1 food, r (64) = 0.061, p = .629. And no significant relationship was found between intuition and percentage chosen picture 1 food, r (64) = -0.031, p = .804.

No significant relations where found between one of the variables and percentage chosen picture 1 food of the control group and the experimental group.

Percentages of how many times participants chose for the same image was calculated in Microsoft Excel. Between day 1 and day 2 the mean was 21,09% (sd = 5,648). And between day 2 and 3 the mean was 21,04% (sd = 6,348). On average participants have chosen 15,95% (sd = 6,972) of the same images over three days.

5.Conclusion and discussion

The goal of this research was to investigate the repeated effect of default nudges on an individual level. Expected was that the control group would choose the nudged picture more often and maintained the same level of percentage chosen nudged pictures. However the results show that there was no difference between the control group and the experimental group.

On the first day the nudge showed to have no effect. This is probably the most important reason why no effect was found over time. It was expected that the nudge would have an effect and that this effect would stay the same during the days. When the nudge did not have an effect, a repeated effect can also not be found.

This means that the default nudge did not have an effect on the participants' choice between four food images. A reason that people did not choose for the nudge could be that the nudge was not strong enough. Because no effect was measured on the first day. In comparison to other default nudges this could be a less steering default nudge. As mentioned in the theoretical framework the example of a default nudge like automatic enrolment. When using this kind of nudge it takes more effort for people to undo the premade choice. In this experiment it did not take a lot of effort to differ from the default option.

The only effect that showed was that response time decreases after making the tasks over three days. People become faster when they have to perform the same task repeatedly (Ebbinghaus, 1913). Rubinstein (2007) found an effect on response time between virtual choices that are merely system 1 thinking and choices that are merely system 2 thinking. Choices that are fast and automatic (system 1) result in a shorter response time in comparison with choices that are slow and rational(system 2). The difficulty when studying response time is the large variance between response times (Rubinstein, 2007). There is no proof that decisions made by one system show faster response times than the other system(Krajbich, Bartling, Hare & Fehr, 2015). Participants will learn each day and are able to perform the task faster each day. This can indicate that in the first place people rely more on system 2 thinking, the slow and rational way of thinking. Because this is a new task. The more this task starts to look like a routine the faster participants answer, the more they will probably rely on system 1 thinking. The nudge that was used in the experiment was a default nudge. This nudge can have an effect when relying in system 1 thinking. Looking at the results the nudge did not showed any effect. It is not clear by which system the decisions are made.

The images were selected to be most comparable to each other. This makes the chance smaller that there is a preference for one of the products. Of course pictures are never similar to each other, otherwise there would not be a choice. This could cause a preference. This seems to be a small chance that there is a preference for one of the pictures because of the close similarity. Pattanaika and Xu (2000) explain that a series of choices that are not very similar to each other give more freedom than of those who are very much alike.

Not much research has been done on longitudinal effects of nudges on food behaviour. The studies discussed earlier are field studies. These studies show a long-term effect of nudging (van Gestel, et al.,2018; Velema et al., 2018). That is why it was expected that this study would also show an effect of nudging. These longitudinal studies were conducted in real life settings, this means that other factors could have played a role in making the food decision instead of solely the nudge (Schwartz, 2017). And people would really have to eat the food that they have chosen. It could be that there is

difference between choices people make online and in real life. Because people will be eventually eating the food. Choices are based on a lot of factors. For example on time, location or where the product is placed (Shaw & Bagozzi, 2018). This differs from the computer screen on which participants had to choose in the experiment.

Moreover previous longitudinal studies were aimed to let people make more healthy choices. This means that there is contrast between the choices participants could have made. In this study the four images in each trial are similar to each other, this could cause the fact that there is no effect found over time. Also effects in longitudinal field studies of nudging are based on sales data. This means that an effect is measured over time and not specifically a repeated effect in which people will have the exact same nudge three days in a row. This could cause the effect to appear as a repeated effect but in fact could be new people who experience the nudge for the first time. Because of the changing population in the sample size.

5.1 Limitations

A limitation of this research could be the similarity between the pictures. As mentioned before freedom becomes less if choices are more similar to each other(Pattanaika & Xu, 2000). In the previous studies that did showed an effect differences in choice were larger. For example the difference between healthy and unhealthy foods. This were different products of which participants could choose.

A limitation of this research could be that people remember the choices they have made on day one of the experiment. Participants from the pilot study have mentioned that they partly remembered which choices they had made the previous day. The results show a somewhat consistent line, so the percentages chosen nudged products stays the same.

5.2 Further research

In further research it is important that the nudge will have an effect on the first day. The nudge that will be used in further research on repeated effect should first be tested. If a nudge showed an effect than this nudge can be used for further research.

In this experiment a default nudge was used to see if this would influence participants food choices. To investigate if default nudges do have an repeated effect more research is needed. Most people remember choices on a short term and this could influence the choices they had to make the next day. This could mean that the first choice is most important. In further research a bigger amount of time could be scheduled between the measurements to see if it is the nudge rather than remembering the choice of the previous day that has an effect.

Further research could combine a field experiment and a digital experiment. To test whether there is a difference between a nudge in real life and in a digital setting. It would be interesting to find out if a digital nudge could work. Especially with the growing amount of online supermarkets. Maybe there is difference between the intention in a digital experiment and a real life setting in which more factors could influence people.

It would be interesting to investigate repeated effect of nudges more to see if there is a longer lasting effect. Because of the small amount of longitudinal studies on the effect of nudges on food choices there is not a good overview of what nudges can do over a longer period of time.

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