Bachelor Thesis

The Effect of Association to Past Knowledge in Consumer Decision-Making

Case: The process of consuming foods and drinks

Research Question: Does the use of association to past knowledge help adults make more healthy-conscious decisions in purchasing foods and drinks?

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Abstract

The theory of association to past knowledge is used to investigate whether the use of associative statements, in the form of pictorial nutritional labelling, can influence consumers to consume a lower sugar intake, in comparison to when abstract, non-pictorial nutritional labelling is displayed. Three experiments were conducted in order to examine consumer behaviour and decision-making in the process of purchasing foods and drinks. The results showed that using pictorial nutritional labelling (showing vivid images of cubes of sugar) leads to statistically significantly lower sugar intake levels than when non-pictorial labelling was used (in numerical values of grams of sugar). The findings are discussed with reference to previous work on the theory of association, self-schemas and decision-making heuristics. Implications of the research findings are presented with recommendations to current government laws regarding nutritional labelling regulations and government actions to decrease obesity levels.

Introduction

Nearly 30% of the world's population, 2.1 billion people, are overweight or obese (The Economist, 2014). The phenomenon is found to account for 5% of the world's deaths. Additionally, statistics show that if no action is taken to lead people to healthier lifestyles, almost half of the global population of adults will be overweight by 2030 (The Economist, 2014).

According to the NHS, obesity can be caused by consuming too many calories, having a poor diet, and lack of physical activity (NHS, 2014). These reasons can be attributed to adults' lack of knowledge regarding what foods contain, leading to misinformed decisions and unhealthy lifestyle.

Governments' interventions to guide people's behaviour have ranged from controlling portions, changing food-product formulas, restricting high-calorie foods and drinks, and educating parents (The Economist, 2014). One interesting intervention, however, has been to improve food and drink labelling. Governments decided to make it mandatory to provide nutrition information on almost all food and drinks. The information will include energy levels (in kilocalories), amounts of fat, saturates, carbs, sugars, protein and salt. Further, The European Commission has issued a new EU law, to be applied as of December 2016, specifically on nutrition labelling on foodstuffs, mainly changing the labelling rules to improved eligibility and availability of information (EUROPA, 2014)

Problem Statement

The problem is that having abstract, numerical labelling of nutritional content, such as grams of sugar and grams of fat, may not be fully understood by consumers, as they may not comprehend what the number means, if it's high or low.

The aim of this research is to investigate whether having an abstract labelling, such as the number grams of sugar, really informs consumers about the contents of foods and drinks. The idea is that consumers may find

abstract information complex to access, and therefore may find difficulties in the decision-making process under uncertainty.
This research will compare the use of such abstract information, in the form of non-pictorial nutritional labelling, and the use of association to familiar knowledge that consumers already have, in the form pictorial nutritional labelling. In other words, when consumers purchase a food product, which states that it contains, for example, 32 grams of fat, they do not know what this number means and cannot relate to it, they cannot associate it with knowledge in their existing memory. However, using reasoning by analogies and the association to familiar knowledge may help consumers have a better-guided healthy decision-making, under dilemmas and uncertainty.

Literature Review

When consumers are faced with a decision-making problem, they do not analyse each alternative on its own; rather, they form associations between the information given and past knowledge and experiences they have had (Gilovich, 1981).

The schematic model of self-concept proposes that individuals' behaviours in particular situations are preceded by going through "schemas", which are knowledge structures that were constructed in the past (Markus, 1977; Goldfried & Robins, 1983). The model suggests that schemas are kept in people's memory and are used as basis for later judgements and decision-making (Markus, 1977).

Karen Farchaus Stein (1996) has used the self-concept schematic model in his theoretical approach in examining Eating Disorders. His research theorization suggested that a combination of a person's positive self-schemas

accessible in memory and a body-weight self-schema lead to eating disorder behaviours.

Stein's research highlighted an important advantage of the self-schemas model; it provides a theoretical connection between individuals' perceived environment and available information, and their subsequent behaviours. The results show that people go back in memory to form associations between current stimuli and past knowledge, to resolve a decision-making problem.

Tversky and Kahneman (1973) suggest that people use different heuristics that work to simplify judgements under decision-making uncertainty. Specifically, the *availability* heuristic is used to form associations of current stimuli and past experiences. Their research argues that the availability of the association between two stimuli reduces uncertainty regarding a particular decision-making problem. Therefore, it can be concluded that, when faced with a purchasing decision-making problem, a person could estimate the health consequences of a food product by assessing the ease with which the relevant mental operation of retrieval or association can be carried out.

Further, Thomas Gilovich (1981) has investigated the effect of association to familiar events, in judgements and decision-making. He argues that forming associations and using analogies is an important part of real-world decision-making. Gilovich's research asked participants to rate hypothetical football players in two situations, A) when they had information of a comparison of these players to well-known existing football players and B) when they had no information on the comparison of the players to existing players. The results demonstrated that those who had access to displayed associations to a familiar player were better informed and thus could rate the players higher. This suggests that forming associations and having displayed access to schemas helps individuals in making decisions under uncertainty.

Moreover, Chrles R. Schwenk (1984) has examined the effect of cognitive simplification, such as the use of analogies, in an organisational decision-making process. The results show that simplifying the information available for the decision-maker helps reach better strategic decisions in an organisation.
Similarly, Steinbruner (1974) has argued that reasoning by simple cognitive analogies helps reduce the uncertainty and complexity of the available information.

Although the use of association to familiar knowledge and reasoning by analogy in decision-making has been studied and applied before, a specific application of the theory in consumer behaviour, in the process of purchasing or consuming foods and drinks, is lacking.
This research aims to examine the effect of association to familiar stimuli, by comparing consumers' decision-making when they have abstract information and when association is readily available to display the information. The abstract information refers to the nutritional labelling in the numerical value of grams of sugar, while the association is mediated through the use of vivid images of cubes of sugar.

The research question of this paper is thus:
Does the use of association to past knowledge help adults make more healthy-conscious decisions in purchasing foods and drinks?

Hypotheses

According to the previously mentioned theories, we expect participants' level of sugar intake, measured in grams, to be higher in the presence of association to familiar knowledge, than when abstract information is displayed. Participants are expected to form associations when cubes of sugar are displayed as nutritional labelling, thus simplifying the available information and reducing uncertainty. Seeing a vivid display of cubes of sugar is predicted to ease the mental operation of retrieving the explanation and significance of the nutritional content, rather than the abstract numerical labelling. Mean sugar intakes are predicted to be lower when pictorial labelling used, than when non-pictorial labelling is used.

Thus the first statistical hypothesis can be formulated as:

H0: mean sugar intake levels are equal when consuming foods and drink, in the presence of pictorial labelling and in the presence of non-pictorial labelling
Ha: mean sugar intake levels are lower when consuming foods and drink in the presence of pictorial labelling than in the presence of non-pictorial labelling

Additionally, we expect that when both pictorial and non-pictorial labelling are displayed on foods and drinks, the increased availability of information in various forms, will make it more accessible to consumers, thus reducing uncertainty and complexity. Consequently, it is predicted that participants' level of sugar intake is *lower* when both abstract labelling and association labelling are displayed on foods and drinks, than when only one method of nutritional labelling is used

Thus, the second statistical hypothesis can be formulated as:

H0: mean sugar intake levels are equal when consuming foods and drink, in the presence of pictorial labelling and in the presence of non-pictorial labelling, and when both labelling methods are present
Ha: mean sugar intake levels are lower when consuming foods and drink in the presence of both labelling methods, than when only one method of labelling is present.

Furthermore, it is also expected that giving participants a recommended daily sugar intake, with an association statement (pictorial sugar cubes recommendation), prior to their consumption, enhances the power of association of the current stimuli to past experiences and knowledge. Thus, the use of "recommendation" through an association statement is expected to affect participants into consuming lower levels of sugar, than when recommending them using an abstract statement (numerical values of grams of sugar recommended).

Thus, the third statistical hypothesis can be formulated as:

H0: mean sugar intake levels are equal when consuming foods and drink, in the presence of pictorial recommendation and in the non-pictorial recommendation
Ha: mean sugar intake levels are lower when consuming foods and drink in the presence of pictorial recommendation than in the non-pictorial recommendation

Methodology

The type of research that will be conducted is causal research. This will determine cause-and-effect relationships, thus help answer whether the decision-making condition, i.e. with abstract labelling information or with the use of association and analogies to display information (independent variable) influences the amount of sugar intake (dependent variables).

The population considered in this research is the general population of students living in The Netherlands, aged 18-25 years old. The sample consisted of students who attend Erasmus University Rotterdam.

Three experiments are conducted in order to investigate each of the three proposed hypotheses.

Experiment 1

Design

The experiment had a 2-group (pictorial labelling: present vs. absent) between-subjects design, and participants were randomly assigned to conditions.

Participants

Students aged 18 to 25 years old from Erasmus University Rotterdam participated in this experiment. In order to be eligible for the study, students were informed that they could only be part of the experiment if they liked the foods and drinks listed in the study, and were willing to consume them during the experiment. They were also informed that only non-vegetarian participants could participate.

The total sample consisted of 20 student participants, 10 males and 10 females.

Procedure

Participants were told that the experiment was part of a consumer behaviour research study.

A causal experiment was carried out, to determine a cause-and-effect relationship, to answer whether the decision-making condition (i.e. using pictorial labelling or non-pictorial labelling) influences the level of sugar intake. The idea of the experiment is to measure participants' sugar intake, in grams of sugar, when they consume foods and drinks A) labelled using pictorial (association) nutritional labelling and B) labelled using non-pictorial (abstract) nutritional labelling.

Each participant was invited for a lunch buffet, where 10 participants were asked to consume foods and drinks with pictorial content labelling, and 10 participants where asked to consume foods and drinks with non-pictorial content labelling.

The experiment took place in a laboratory setting, a room with a table and two chairs, with no other distraction. This is to minimise other possible influences on the participants' amount of sugar intake.

The list of foods and drinks offered in the experiment, with their respective content of sugar (in grams of sugar and cubes of sugar), can be found in appendix 1.

Participants were told that they had to fill in a questionnaire after they finish their lunch. After the initial questions of gender and age, participants were asked to note their condition of consumption, A) pictorial labelling and B) non-pictorial labelling, and the amount of eat food and drink consumed. The questionnaire can be found in appendix 2.

Statistical measures

To test the first hypothesis, an independent samples t-test was run using SPSS software, to compare the means of sugar intakes in the two conditions; when consuming with A) pictorial content labelling and B) non-pictorial

content labelling, using the "*condition of consumption*" as a nominal variable, and "*sugar intake*" (grams of sugar) as a scale variable.
The normality assumption was tested before the independent t-test, using a Shapiro-Wilk test, to assure that the data were normally distributed, so that the independent samples t-test was fit to be used.

The baseline (control variable) was the condition of consumption with non-pictorial labelling, using numerical values grams of sugar as nutritional labelling. The control variable was used to examine the change (or no effect) in sugar intake levels during the consumption with pictorial labelling, using association to past knowledge (manipulated variable).

Results

The data collected of sugar intake levels, in grams of sugar, in the two decision-making conditions of a) pictorial labelling and b) non-pictorial labelling is given in appendix 3 and 4, respectively.
The results of the independent samples t-test comparing sugar intakes in the two conditions show that the first null hypothesis, stating that; H0: mean sugar intake levels are equal when consuming foods and drink, in the presence of pictorial labelling and in the presence of non-pictorial labelling, can be rejected at the 5% significance level.
The experiment found that the mean sugar intake when consuming foods and drinks, labelled using pictorial nutritional labelling, was significantly lower (M=32.03. SD= 9.00 grams of sugar) than when consuming using non-pictorial nutritional labelling (M=87.03, SD=11.77 grams of sugar), $t(18) = -11.7333$, $p < 0.05$.
The following histogram presents the mean sugar intake in the two conditions of consumption decision-making A) using pictorial labelling and B) using non-pictorial labelling.

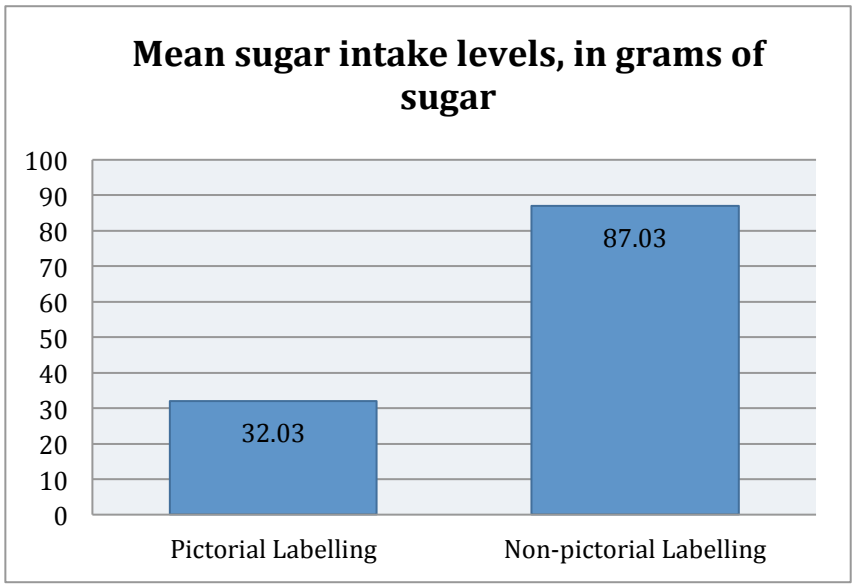

Figure 1: Mean amounts of sugar intake levels that participants consumed, when they were provided with pictorial nutritional labelling and when they were provided with non-pictorial nutritional labelling.

The data collected indicated that gender could be a confounding factor that needs to be accounted for. Thus, an ANCOVA was run with "gender" as a fixed factor. The results show that the effect of gender was statistically significant, $F(1,16) = 18.268$, $p < 0.05$. Simple main effects analysis showed that sugar intake consumption was significantly lower for women than for men.

Discussion

This experiment was designed to test whether the use of association to past knowledge in the case of decision-making in food consumption could reduce the level of sugar intake consumed, rather than the use of abstract information. The association to past knowledge was translated into the use of pictorial labelling of cubes of sugar as the foods' and drinks' nutritional content labelling, and the abstract information was translated into the use of non-pictorial, numerical labelling, in grams of sugar.

The results show that the use of pictorial nutritional labelling can be a causal factor in consumption decision-making behaviours, which can cause people to reduce the amount of foods and drinks they consume, thus reduce their amount of sugar intake. The mean sugar intake levels displayed in the histogram, figure 1, show that using pictorial nutritional labelling can reduce consumers' sugar intake by more than 270%. The data collected also showed that when participants were given the pictorial labelling, many switched their food choices, from non-healthy choices, such as pizza and Coke Cola, to chicken salad and water, which were equally fulfilling but contained less sugar. Additionally, the ANCOVA analysis showed that women were more influenced by the use of association to past knowledge, thus the use of pictorial labelling of sugar cubes had a bigger effect on women than men. This could be traced to the possibility that women are more attentive and caring about the content of their food, due to the incentive to stay in shape.

This experiment shows that the theory of association can be applied in consumers' behaviour during the decision-making process of purchasing foods and drinks. The mere idea of providing information that consumers can associate their past knowledge with, leads to better understanding of food and drink nutritional contents, thus to lower consumption levels.
The experiment results affirm Gilovich's (1981) findings, depicting that consumers whom had access to displayed associations showed that they were better informed, and thus could make more healthy-conscious decisions. Furthermore, the data also confirm Schwenk's (1984) research, showing that the effect of cognitive simplification, such as the use pictorial labelling rather than abstract numerical labelling, helped reduce complexity and uncertainty of consumers, thus led them to better and more strategic decision-making.

Experiment 2

The idea of the experiment is to measure participants' sugar intake, in grams of sugar, when they consume foods and drinks A) labelled using pictorial (association) nutritional labelling, B) labelled using non-pictorial (abstract) nutritional labelling and C) labelled using both pictorial and non-pictorial nutritional labelling.

The data collected in the *first* experiments from a sample of 20 people was used in this experiment, in addition to 10 people who had access to the third condition (C) of both types of labelling available.

Design

The experiment had a 3-group (pictorial labelling: present vs. absent vs. combined) between-subjects design, and participants were randomly assigned to conditions.

Participants

Students aged 18 to 25 years old from Erasmus University Rotterdam participated in this experiment. Only students who were non-vegetarian and who liked the foods and drinks listed in the experiment were recruited.

The total sample consisted of 30 student participants, 20 of which were already recruited in the previous 2-group experiment. Thus, 10 more student participants are recruited for this experiment.

Procedure

Participants were told that the experiment was part of a consumer behaviour research study.

A causal experiment was carried out, to determine a cause-and-effect relationship, to answer whether the decision-making condition (i.e. using pictorial labelling vs. non-pictorial labelling vs. both pictorial and non-pictorial labelling) influences the level of sugar intake.

Participants were invited for a lunch buffet to consume foods and drinks labelled using both pictorial and non-pictorial nutritional labelling.
The same foods and drinks were offered in this lunch buffet as the ones in experiment 1, in addition to the same questionnaire after the experiment.

Statistical measures

To test the second hypothesis, ANOVA analysis was run using SPSS software, to compare the means of sugar intakes in the three conditions; when consuming with A) pictorial content labelling, B) non-pictorial content labelling, and C) both pictorial labelling and non-pictorial labelling, using the "*condition of consumption*" as a nominal variable, and "*sugar intake*" (grams of sugar) as a scale variable.
The normality assumption was test prior ANOVA analysis, using a Shapiro-Wilk test, to assure that the data were normally distributed, so ANOVA analysis was fit to be used.

Results

The data collected of sugar intake levels, in grams of sugar, in the decision-making condition of C) both pictorial labelling and non-pictorial labelling can be found in appendix 5.

The results of the ANOVA analysis, comparing sugar intakes in the three conditions show that the first null hypothesis, stating that; H0: mean sugar intake levels are equal when consuming foods and drink, in the presence of association labelling and in the presence of abstract information labelling, and when both labelling methods are present, can be rejected at the 5% significance level.
There was a statistically significant difference between the three groups as shown by one-way ANOVA, $F(2,27) = 93.04$, $p < 0.05$.
However, the experiment results do not affirm that the mean sugar intakes of the "Both Labelling" condition were significantly lower than when only one

method of labelling is used. Rather, sugar intake levels in the condition of both pictorial and non-pictorial labelling are significantly higher than when only pictorial nutritional labelling is used (M=32.03. SD= 9.00 grams of sugar). The sugar intake levels under "both labelling" are still, however, significantly higher than when only non-pictorial nutritional labelling is used, (M=87.03, SD=11.77 grams of sugar).

The following histogram presents the mean sugar intake in the three conditions of consumption decision-making A) using pictorial labelling, B) using non-pictorial labelling and C) when both pictorial and non-pictorial labelling are used.

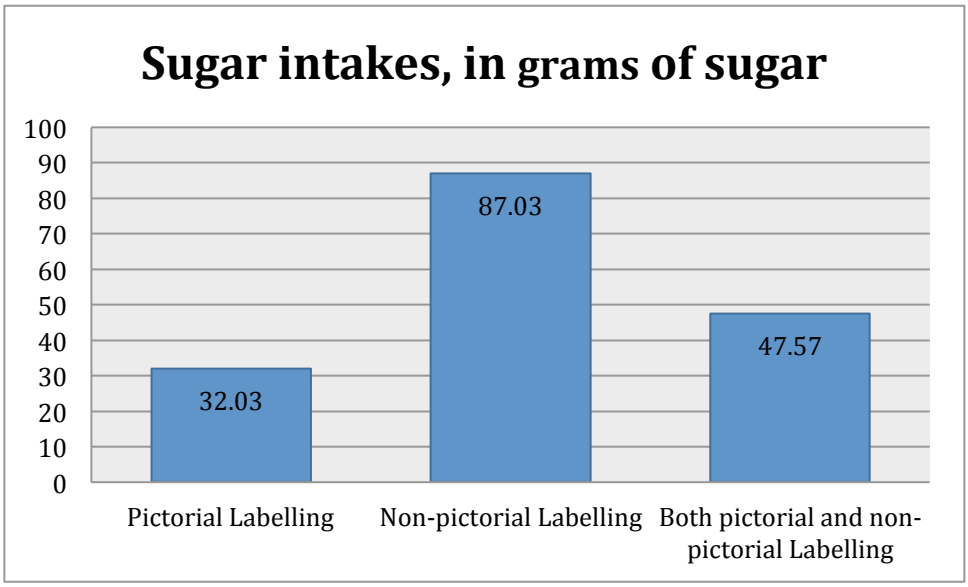

Figure 2: Mean amounts of sugar intake levels that participants consumed, when they were provided with pictorial nutritional labelling, when they were provided with non-pictorial nutritional labelling and when they were provided with both nutritional labelling.

Discussion

This experiment was designed to test whether the use of association to past knowledge in the case of decision-making in food consumption, *in addition* to the use of abstract numerical information, could reduce the level of sugar

intake consumed, rather than the use of one method of nutritional labelling alone.

The results show that the use of both pictorial and non-pictorial nutritional labelling does not lead to a lower amount of food intake level than when only pictorial labelling is used; thus does not reduce the level of sugar intake.

The mean sugar intake levels displayed in the histogram; figure 2, show that using both pictorial and non-pictorial nutritional labelling on the same food product can reduce sugar intake levels by almost 150%, in comparison with using only non-pictorial labelling. However, the sugar intake levels are still almost 150% higher than when only pictorial labelling is used.

This means that the association theory, where consumers can associate the current stimuli to past knowledge and experiences, is more effective if it considered on its own. Combining an associative statement with an abstract, non-associative, statement, reduces the effectiveness of the theory.

Steinbruner's (1974) argued that reasoning by analogies, using association, reduces uncertainty and complexity for individuals, leading for more strategic decision-making. The case here can be described as an increase of complexity of available information, as a wider choice of available information may lead to the confusion of the consumer, thus leading to higher uncertainty and even less healthy-conscious decision-making.

Furthermore, the results can also be explained by the too-much-choice effect. According to Scheibehenne, B., Greifeneder, R., & Todd, P. M. (2009), the too-much-choice effect takes place when an increase in the number of available options can lead to a reduction in consumers' motivation to make a choice. Having an additional choice of information available to consumers is found to make it more complex for consumers to comprehend the nutritional labelling, leading to a lower motivation in making a choice of which type of information to follow, resulting in significantly higher sugar intake levels than when only pictorial nutritional labelling is displayed.

Experiment 3:

The idea of the experiment is to measure participants' sugar intake, in grams of sugar, when they consume foods and drinks A) labelled using pictorial (association) nutritional labelling and B) labelled using non-pictorial (abstract) nutritional labelling. Additionally, those who had access to pictorial nutritional labelling received a pictorial recommendation of daily sugar intake, using cubes of sugar. In contrast, those who had access to non-pictorial nutritional labelling received a numerical recommendation of daily sugar intake, using grams of sugar.

Design

The experiment had a 2-group (condition: pictorial labelling and pictorial recommendation vs. non-pictorial labelling and numerical recommendation) between-subjects design, and participants were randomly assigned to conditions.

Participants

Students aged 18 to 25 years old from Erasmus University Rotterdam participated in this experiment. Only students who were non-vegetarian and who liked the foods and drinks listed in the experiment were recruited.
The total sample consisted of 12 student participants, 6 males and 6 females.

Procedure

Participants were told that the experiment was part of a consumer behaviour research study.
A causal experiment was carried out, to determine a cause-and-effect relationship, to answer whether the decision-making conditions of nutritional labelling (pictorial vs. non-pictorial) and recommendation type (pictorial vs. numerical) had an effect on mean sugar intake level.

Each participant was invited for a lunch buffet, where 6 participants were asked to consume foods and drinks with pictorial content labelling and pictorial recommendation, and 6 participants where asked to consume foods and drinks with non-pictorial content labelling and numerical recommendation.
The two statements of recommendation can be found in appendix 6.
Participants had to fill in a questionnaire after finishing their lunch, where they were specifically asked to note their condition of consumption A) pictorial labelling and pictorial recommendation and B) non-pictorial labelling and numerical recommendation.

Statistical measures
To test the third hypothesis, an independent samples t-test was run using SPSS software, to compare the means of sugar intakes in the two conditions of consumption; when consuming with A) pictorial labelling and pictorial recommendation and B) non-pictorial labelling and numerical recommendation, using the "*condition of consumption*" as a nominal variable, and "*sugar intake*" (grams of sugar) as a scale variable.
The normality assumption was test prior the independent samples t-test analysis, using a Shapiro-Wilk test, to assure that the data were normally distributed.

Results
The data collected of sugar intake levels, in grams of sugar, in the two decision-making conditions of a) pictorial labelling and pictorial recommendation and b) non-pictorial labelling and numerical recommendation can be found in appendix 7 and appendix 8, respectively.

The results of the independent samples t-test comparing sugar intakes in the two conditions show that the first null hypothesis, stating that; H0: mean sugar intake levels are equal when consuming foods and drink, in the

presence of pictorial recommendation and in the non-pictorial recommendation, cannot be rejected at the 5% significance level.

The experiment found that there was no statistically significant difference in the mean sugar intake levels in the two conditions; when consuming foods and drinks, labelled using pictorial nutritional labelling and pictorial recommendation, and when labelled using non-pictorial nutritional labelling and numerical recommendation; $t(10) = -0.439$, $p > 0.05$, ns.

The following histogram presents the mean sugar intake in the two conditions of consumption decision-making A) using pictorial labelling and pictorial recommendation and B) using non-pictorial labelling and numerical recommendation

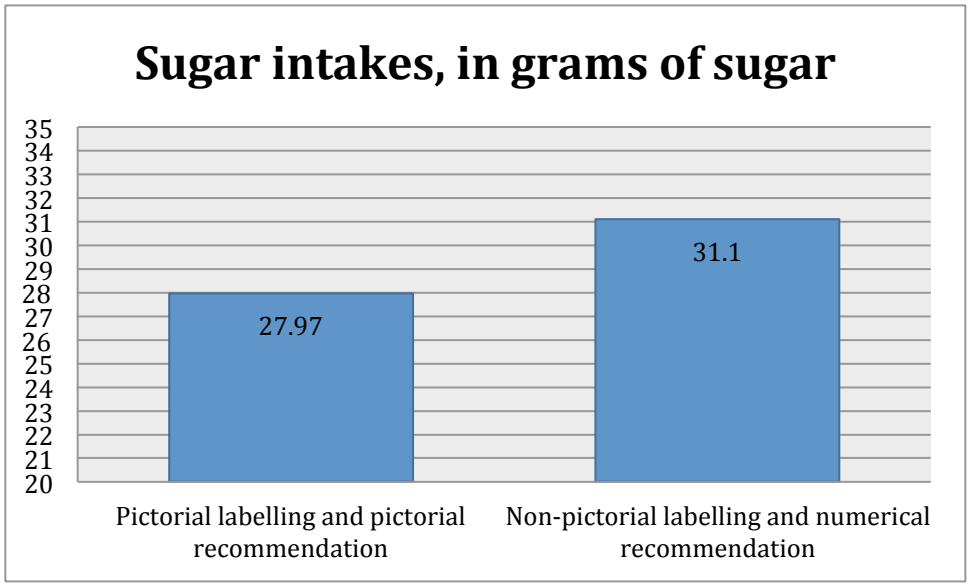

Figure 3: Mean amounts of sugar intake levels that participants consumed, when they were provided with pictorial labelling and pictorial recommendation and when they were provided with non-pictorial labelling and numerical recommendation.

Discussion

This experiment was conducted in order to investigate whether giving participants a recommended daily sugar intake, with an association statement using pictorial sugar cubes, strengthens the association effect, in

comparison with giving recommendation using a numerical statement, here considered as abstract information.

The results indicate that the use of pictorial and non-pictorial recommendation had statistically similar effects, with no significant influence of the independent variable (condition of consumption) on the dependent variable (mean sugar intake). This means that applying the theories of association and self-schemas fail to lead to the desired effect of leading consumers to more healthy-conscious behaviours than when only abstract information is used.

One explanation to the results could be the fact that the abstract information of nutritional available was not so ambiguous to participants when recommendation was used. This is because consumers could relate to the number of grams of sugar that was labelled in the content, by comparing it to the number of grams of sugar they *should* be consuming per day. Therefore, the inclusion of a recommended daily intake of sugar had a similar effect of using pictorial associative labelling; it reduced consumers' uncertainty in the decision-making process.

As indicated by Schwenk (1984) the simplification of the available information leads to less complex decision-making. Thus, regardless of the method of simplification, whether it is a use of daily recommendation or reasoning by analogy, less uncertainty under decision-making leads to better, healthy-conscious decisions, in the case of purchasing foods and drinks.

General Discussion

The main aim of this research was to investigate whether the use of association to past knowledge helped consumers in the decision-making process. Three experiments were conducted in order to test whether the theory can be applied in real-life decision-making, in the process of purchasing foods and drinks.

The first experiment showed that the use of pictorial labelling, which refers to the use of association to familiar knowledge, could be a causal factor in consumer behaviour while consuming foods and drinks. It can cause individuals to reduce the overall amount of foods and drinks they consume, and therefore reduce their sugar intake level.
The experiment results support the findings of Gilovich (1981), as the mere display of associative information showed that consumers had better access to understandable knowledge, thus can make more healthy-conscious decisions. Further, the experiment affirms Steinbruner (1974) research, such that the use of pictorial nutritional labelling simplifies the decision-making process, due to reasoning by analogy, thus consumers can make more informed decisions.

The second experiment shows that the combination of both pictorial and non-pictorial nutritional labelling does not necessarily mean that consumers are better informed; rather, it increases the uncertainty due the availability of too many information options. As concluded by Schwenk (1984), higher uncertainty leads to less strategic decision-making, which is depicted in the results of experiment 2. The increase in available information led to higher sugar intake levels than when only pictorial labelling was presented, but lower sugar intake levels than when only non-pictorial labelling was used.

The results could also be explained by the too-much-choice effect (Scheibehenne, Greifeneder & Todd, 2009), where the increase of available options (i.e. information options in this case) leads to a lower incentive of making a decision.

The third experiment aimed to investigate whether the introduction of a recommended daily sugar intake to consumers, in the form of pictorial cubes of sugar, leads to lower sugar intake, as opposed to when the recommendation was presented in numerical values of grams of sugar. The results showed that there was no statistically significant difference between the sugar intake levels in the pictorial recommendation and the non-pictorial recommendation. The logical explanation to the results is that the availability of a recommendation, in grams of sugar, meant that consumers could relate the non-pictorial (numerical) labelling, in grams of sugar, to what they should consume per day. This led to a simplified decision-making process, since the whole point of presenting consumers with associative, pictorial labelling was to allow consumers to relate to the available information and reduce their uncertainty. The display of a recommended daily sugar intake reached a similar purpose, thus leading to relatively low sugar intake consumption.

Overall, the results of the three experiments show that the availability of pictorial nutritional labelling leads to lower sugar intake levels than when non-pictorial nutritional labelling was presented. Additionally, too much information option leads to less healthy-conscious decisions than when only pictorial labelling was used. Finally, the use of a recommended daily sugar intake, using vivid images of cubes sugar, does not lead to statistically lower sugar intake levels when only non-pictorial recommendation is used.

Conclusion

The goal of this paper was to investigate the issue of consumer behaviour in the process of consuming foods and drinks. The research question was: "*Does the use of association to past knowledge help adults make more healthy-conscious decisions in purchasing foods and drinks?*"

The results showed that presenting consumers with associative statements (i.e. pictorial nutritional labelling) led to statistically lower sugar intake levels, than when abstract statements (i.e. non-pictorial nutritional labelling) were displayed. Therefore, the use of association can be an influential factor in the process of consuming foods and drinks, leading to consumers making more healthy-conscious decisions.

However, combining both pictorial and non-pictorial statements led to less healthy conscious-decisions than when only pictorial statement were used. Additionally, the theory was challenged when it was used in a recommendation setting, where the result of the use of a numerical recommended daily sugar intake was not statistically different than when pictorial recommendation was used.

The findings of this research imply that the new laws regarding nutritional labelling may not be as effective as the European Commission aims.

The results show that adults still consume a significantly high amount of sugar, found in unhealthy foods and drinks, even when content labelling, in grams of sugar, is clearly displayed on each product. Therefore, government interventions to guide consumers' behaviours, by improving nutritional labelling on food products, may not be useful if they keep nutritional labelling as abstract information.

Additionally, if no action is taken to restrict people's consumption of unhealthy foods and drinks, almost half of the world population will be overweight or obese in 15 years (The Economist, 2014). Thus, obesity will be on the rise despite the governments' attempts to improve nutritional

labelling.

Therefore, governments and the European Commission should work together to introduce more effective regulations to improve nutritional labelling. The findings presented by this research suggest that they should regulate nutritional labelling by making foods and drinks companies use vivid images of nutritional content, such as sugar, to inform consumers during their decision-making process. This will lead to lower uncertainty faced by consumers, and result in more healthy-conscious decisions. According to the conducted experiments, the use of pictorial labelling is found to reduce consumers sugar intake by more than 270%. If implemented, this action will help slow down the current trend of increasing obesity, especially when accompanied with other government regulations aiming to improve individuals lifestyles and lead to healthy decisions.

Furthermore, the findings of this research can also help companies that aim to offer healthy products of foods and drinks. The display of pictorial nutritional content that specifically shows a lower number of, for example, sugar cubes, may encourage consumers to purchase the product. Additionally, the companies can also use vivid images of the content of their products in their advertisements, as part of their marketing campaign. As found in the research, consumers tend to divert their consumption from unhealthy products to healthy products, when pictorial nutritional labelling is displayed. Thus, the use of vivid images of food content can help attract customers to try the healthy products.

Review of the thesis

In this section, the thesis will be subject to critical review with respect to various aspects, including a critical evaluation of the method of research, limitations of the research, and recommendations for further research.

Evaluation of method of research

The type of research used is causal research, where three experiments were conducted in order to investigate the research's hypotheses. The goal was to determine whether the decision-making condition, i.e. pictorial labelling vs. non-pictorial labelling (independent variable) influences the level of sugar intake (dependent variable).

The internal validity of the research findings is high, due to the fact that the experiments were conducted in a laboratory setting with minimum amount of external influences. The experiment design, however, did not closely control for other variables, such as the difference in hunger states among participants, mood variation, and eating preferences, since they are closely dependent on each individual and are thus personal factors. Taste preferences were all the same since participants were specifically and clearly asked if they liked the food and drink list offered in the experiment.

On the contrary, the research findings have a relatively low external validity, considering the limited laboratory setting of the three experiments, which does not reflect consumers' purchasing process in the supermarkets, where they face many distractions that are not accounted for in the laboratory experiment.

Furthermore, the sample size is relatively small, compared to the general population of students living in the Netherlands, aged 18-25 years old. This is due to the costs of the experiment, since it involves a foods and drinks buffet; thus, the sample may not be of high representativeness.
However, the sample used in the experiments successfully matches the population, as all the recruited participants were adult students aged 18-25 years old, and were randomly recruited and assigned to different conditions.

The measurements of the experiment can be considered reliable, as "grams of sugar" is a universally used measurement instrument to refer to the sugar content of foods and drinks. Additionally, the available grams of sugar in each food and drink were found using the USDA, which is a highly reliable source of nutritional content.

However, considering the stability of the study findings, the consuming behaviour of individuals may highly depend on hunger, which alone is a volatile factor. Thus, the repetition of the experiments may result in different findings if participants had a different hunger state, hence the use of lunchtime as the time of the experiment. But if the experiment were to be repeated under the same conditions, it must generate the same results, due to the relatively high reliability of the research method.

Limitations

The study provides evidence that the use of pictorial nutritional labelling can be a causal factor that leads to lower sugar intake consumptions. However, the research has several limitations. Firstly, the small sample of the experiments meant that the findings were not highly representative. The limited time and budget led to having a limited number of participants that could be used for the study, especially due to the high cost associated with this specific experiment.

Secondly, the limited laboratory setting led to a relatively low external validity of the study, since consumer behaviour during the purchasing process is surrounded by many external influences that are not controlled for in the laboratory setting.

Thirdly, there are many other variables that could influence consumer behaviour while purchasing foods and drinks, such as mood, weather and

shape. This study could only control for a few variables, such as gender, hunger state, and taste preferences.
Lastly, the application of the theory of association was only implemented on one nutritional content in foods and drinks, grams of sugar. Nutritional contents are various; fat, protein, sodium, cholesterol, and carbs. This experiment only considered sugar due to the limited scope of the research.

Recommendations for further research

Further research could investigate the influence of pictorial labelling in real life situations. For example, it may be useful to consider a field study, where the researcher investigates consumers' behaviour while purchasing foods and drinks in the supermarket, using pictorial and non-pictorial labelling. This will lead to a higher external validity of the research.
Additionally, further research could also investigate a wider variety of food nutritional content. This can be a challenge since it is relatively difficult to find an effective associative statement, in the form of a pictorial labelling that reflects other contents, such as fats and carbs.
Further, it is recommended that future researchers use a larger sample of adults in The Netherlands, to provide more representative results, which adds to the quality of the research. Even more, the research could also consider a larger population, where not only adults aged 18-25 years old living in The Netherlands are studied, but a wider range of age groups living in the European Union. This will lead to even more representative findings that can be used as basis to criticise the European Commissions' ineffective new laws.

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Appendices

Appendix 1

List of foods and drinks offered in the experiment's lunch buffet:

Foods and drinks	Labelling: grams of sugar	Labelling: Cubes of sugar
Pizza slices	4.0g per slice	1 cube of sugar per slice
Chicken Salad	6.3g per one bowl	1.6 cubes of sugar per bowl
Can of Coke	38.0g per can	9.5 cubes of sugar per can
Water	0.0g	0.0 cubes of sugar
Snickers	30.0g per snack	7.5 cubes of sugar per snack
Strawberries	0.3g per 1 strawberry	0.5 cubes of sugar per 6 strawberries

Source: USDA

Appendix 2: Questionnaire to fill after the experiment

Please specify your age: _____

Please specify your gender:

A) Female

B) Male

Please specify the type of nutritional labelling you had:

A) Pictorial labelling – cubes of sugar

B) Non-pictorial labelling – grams of sugar

C) Both types of labelling – cubes of sugar and grams of sugar

Please write down the amount of food you have consumed per category:

- Pizza (in number of slices): _____
- Chicken salad (in number of bowls): _____
- Can of coke (in number of cans): _____
- Water (in number of bottles): _____
- Snickers (in number of bars): _____
- Strawberries (in number of strawberries): _____

Appendix 3: Questionnaire Answers (Pictorial labelling version)

3a: Food products consumed per participant

Food product	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Pizza	4	3	4	2	7
Chicken Salad	1	1	1	¾	0
Can of Coke	0	0	0	0	¼
Water	½	½	¼	½	0
Snickers	¼	0	0	1	¼
Strawberries	7	9	10	6	1

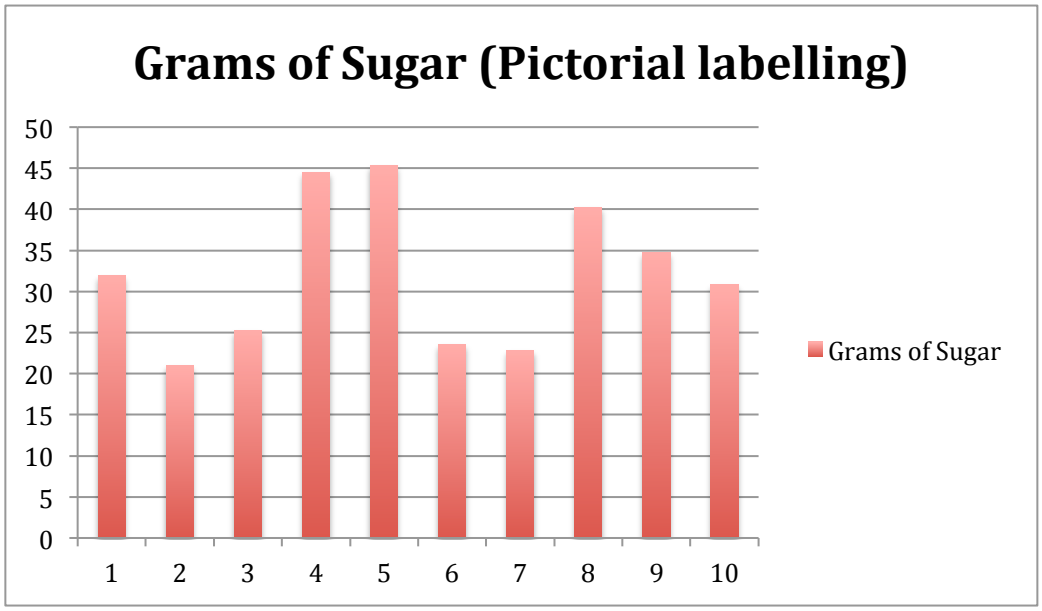
Food product	Participant 6	Participant 7	Participant 8	Participant 9	Participant 10
Pizza	2	4	4	4	5
Chicken Salad	1	¾	1	½	¼
Can of Coke	0	0	¼	0	0
Water	½	½	¾	½	½
Snickers	¼	0	¼	½	¼
Strawberries	6	7	3	2	6

3b: Sugar intake levels per participant

Sugar intake	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Grams of sugar	31.9g	21.0g	25.3g	44.5g	45.3

Sugar intake	Participant 6	Participant 7	Participant 8	Participant 9	Participant 10
Pizza	23.6g	22.8g	40.2g	34.8g	30.9

3c: Graphic Representation – sugar intake levels per participant



Appendix 4: Questionnaire Answers (Non-pictorial labelling version)

4a: Food products consumed per participant

Food product	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Pizza	8	7	7	7	6
Chicken Salad	0	¼	¼	0	½
Can of Coke	1	1	1	1	1
Water	0	0	0	0	½
Snickers	½	½	1	1	1
Strawberries	6	6	0	6	4

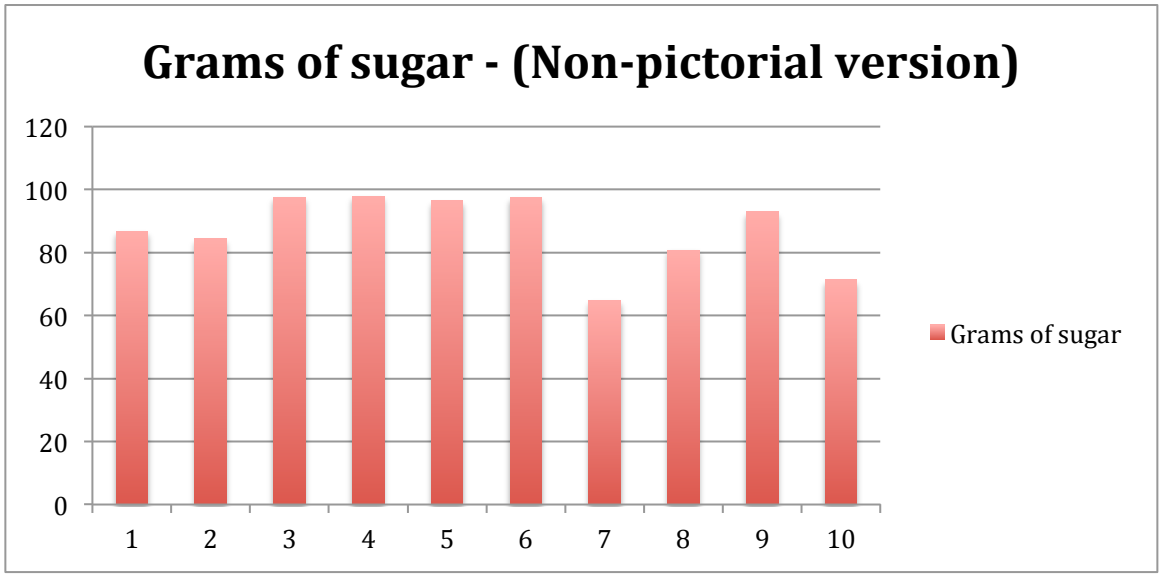
Food product	Participant 6	Participant 7	Participant 8	Participant 9	Participant 10
Pizza	7	8	7	6	6
Chicken Salad	0	¼	½	0	0
Can of Coke	1	0	½	1	1
Water	0	½	0	0	½
Snickers	1	1	1	1	¼
Strawberries	5	4	2	3	6

4b: Sugar intake levels consumed per participant

Sugar intake	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Grams of sugar	86.8g	84.4g	97.6g	97.8g	96.4g

Sugar intake	Participant 6	Participant 7	Participant 8	Participant 9	Participant 10
Grams of sugar	97.5g	64.8g	80.75g	92.9g	71.3g

4c: Graphic representation of: sugar intake levels consumed per participant



Appendix 5: Questionnaire Answers (Both pictorial and non-pictorial labelling used)

5a: Food products consumed per participant

Food product	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Pizza	5	5	6	4	6
Chicken Salad	½	¼	0	¾	0
Can of Coke	½	¼	1	½	¼
Water	0	¼	½	0	0
Snickers	¼	½	0	¼	¼
Strawberries	5	3	2	3	4

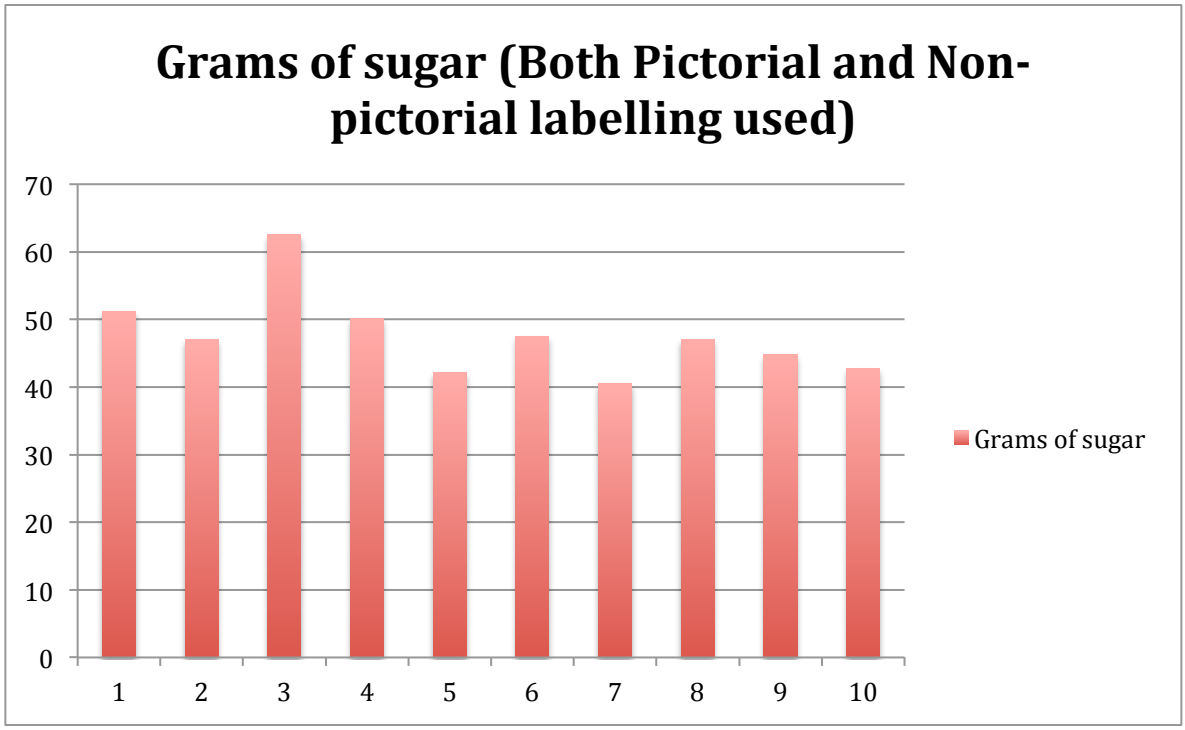
Food product	Participant 6	Participant 7	Participant 8	Participant 9	Participant 10
Pizza	4	6	5	5	6
Chicken Salad	½	0	¼	0	0
Can of Coke	½	0	¼	¼	¼
Water	0	½	¼	½	0
Snickers	¼	½	½	½	¼
Strawberries	6	5	3	1	6

5b: Sugar intake levels per participant

Sugar intake	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Grams of sugar	51.2g	47.0g	62.6g	50.1g	42.2g

Sugar intake	Participant 6	Participant 7	Participant 8	Participant 9	Participant 10
Pizza	47.5g	40.5g	47.0g	44.8g	42.8g

5c: Graphic Representation: sugar intake levels per participant



Appendix 6: Two statements of recommendation

Abstract Version: Numerical

Recommended daily Sugar Intake:

Men: 37.6g of sugar Women: 25g of sugar

Association Version: Pictorial

Recommended daily Sugar Intake:

Men: 9 cubes of sugar Women: 6 cubes of sugar

Source: American Heart Association (AHA)

Appendix 7: Questionnaire Answers (Numerical recommendation used)

Product	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Pizza	2	3	1	2	4	0
Chicken salad	1	1	1	½	1	½
Can of coke	½	0	½	¼	0	½
Water	¼	½	0	0	½	½
Snickers	½	0	¼	0	0	0
Strawberries	9	12	7	12	10	10

7b: Sugar intake level per pariticpant

SugarIntake	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Grams of sugar	51	21.9	38.9	24.25	25.3	25.15

Appendix 8: Questionnaire Answers (Pictorial recommendation used)

Product	Participant 1 | M	Participant 2 | M	Participant 3 | M	Participant 4 | F	Participant 5 | F	Participant 6 | F
Pizza	1	2	2	0	1	0
Chicken salad	1	½	1	½	1	½
Can of coke	½	½	¾	0	0	¼
Water	¼	½	0	0	½	½
Snickers	¼	0	0	½	0	0
Strawberries	9	12	7	8	10	10

8b: Sugar intake level per participant

Sugar Intake	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
Grams of sugar	39.5	33.75	44.9	20.55	13.3	15.65

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