

The effect of descriptive social norm messages on unhealthy snack consumption.

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The effect of descriptive social norm messages on unhealthy snack consumption.

An intervention study on behavioral change among Dutch students regarding their unhealthy snack consumption: descriptive social norm message or regression to the mean.

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1. Introduction

Healthy eating behavior is a predictor for a healthy living; healthy diets help to prevent several health implications. Studies show that unhealthy eating patterns are a risk for people to become overweight ($BMI > 25 \text{ kg/m}^2$ (James, 2008)) or obese ($BMI > 30 \text{ kg/m}^2$ (James, 2008)). Obesity is said to be a fast growing, worldwide problem resulting in a lower global life expectancy (Dam and Seidell, 2007). Obesity is a problem in all levels of society due to shifts in diet and physical activity patterns (Popkink and Gordon-Larsen, 2004). An increasing intake of energy dense food results in a rise of obesity in many countries. This energy dense food is increasingly available because it is more processed, more affordable and more effectively marketed what leads to the increased intake of this food (James, 2008 and Swinburn et al, 2011). A problem of the increasing obesity around the world is the increasing chances to develop longer-term and life-threatening illnesses like diabetes and cardiovascular diseases due to people being obese (Van Gaal, Mertens and De Block, 2006). Also the chances for people to suffer from various types of cancer, premature death, arthritis and sleep apnea are increased when people are obese (Willett et al, 1999). Costs are wider than only individual health, obesity is also likely to be related to absenteeism (not showing up at work)(Duijvenbode, Proper, van Poppel and Hoozemans, 2007), health care costs related to obesity costs represent a major avoidable part of the costs of illness in general in many countries (Colditz, 1999) These are some examples to show that unhealthy diets are a serious problem for the entire society.

Considered that the increasing obesity is an issue for the entire society, there has to be looked for adaptations or solutions to deal with the problem. Aiming to tackle the problem by focusing on the cause –unhealthy diets- two possibilities for intervention will briefly discussed: health messages and social norm messages.

Health messages are one way to make consume people healthier by emphasizing the health benefits of healthy diets including foods like fruits and vegetables (Robinson, Flemming and Higgs, 2014). With these health messages, knowledge about food consumption is generated and therefore the consumer will be more conscious of his/her diet. However, even though the use of health messages increases knowledge about the health benefits, studies show that intake levels of fruit and vegetables are still below the recommended guidelines (Robinson, Flemming and Higgs, 2014). Another study shows that the use of health messages might be effective on the short term (Rani et al, 2013), but on the long term the application of health messages did not lead to healthy food choices (Kelder et al, 1995). Therefore several

researchers suggest that knowledge generation alone might not be sufficient to motivate a behavioral change towards healthy eating (Flemmings and Higgs, 2014; Sauton et al, 2014). In order to make the messages more effective, it would be useful to find out what factors motivate people in their decision making processes and what messages would be suitable to influence this process (Sauton et al, 2014).

When only knowledge generation is not enough, another message should be communicated to people to stimulate them to consume healthier. The communication of a descriptive social norm message is suggested by researchers to be a suitable alternative (Cialdini, Reno and Kallgren, 1990; Higgs, 2015). Descriptive social norm message provide people with information about the eating norms of most other people and this information would motivate people to perform similar behavior (Cialdini, Reno and Kallgren, 1990). Higgs (2015) states that social norms are especially important for eating behaviors because eating occurs often in a social context and therefore social norms about eating have a great effect on the food choice and the amount of food (Higgs, 2015). However, Robinson, Thomas, Aveyar and Higgs (2014) found that people are not always aware of eating norms in general and therefore the message does not affect the behavior since people are not able to place the information into perspective. If the information does not reach the people on a level on which they can identify themselves with the message, that might explain the failure of health messages on itself. Nevertheless, they also recommend the use of norm communication rather than only health messages.

Research that has tested the potential of social norm messages to influence behavior, has found these messages to influence littering (Cialdini, Reno and Kallgren, 1990) and alcohol consumption among college students (Halim, Hasking and Allen, 2012; Perkins, Haines and Rice, 2005). In the studies on alcohol consumption it was found that many students do not have realistic ideas about the actual consumption of others and therefore adapt their own consumption to what they think the consumption of others would be (Halim et al, 2012). This misperception about the actual norm could lead to an increase of alcohol consumption because an individual feels pressured to drink as much as the perceived norm because he/she has the idea that this is needed in order to be accepted by the group (Borsari and Carey, 2003). With the help of descriptive norm messages, researchers aim to correct these misperceptions about the norm (Cialdini, Reno and Kallgren, 1990) which would prevent people from performing more undesired.

Despite the research that has been carried out on the effect of descriptive norm messages, there is a lack of knowledge regarding social norms influencing unhealthy snack consumption. Therefore, the aim of this thesis is to find out if providing a descriptive social norm message regarding unhealthy snack consumption among Dutch students has an effect on the snack consumption of these students.

2. Theoretical background

In the introduction several concepts and theories were briefly mentioned regarding health interventions, in the following part there will be elaborated upon these. First the social norm theory will be explained in which the different norms relevant for this thesis are explained. Then there will be an explanation of the use of this theory in social norm campaigns with examples to illustrate the relevance. Subsequently the theory of planned behavior is briefly explained in which the concept of intention is explained. Thereafter, the theory of regression to the mean is explained which shows the relevance of a control group when establishing the effect of a norm message.

2.1 Social norm theory

The social norm theory is a theory which is concerned with the idea that social norms influence human behavior. Individuals perform a specific behavior because the social norms give a certain guideline about what is considered to be socially accepted (Reno, Cialdini and Kallgren, 1993).

According to the social norm theory there are two types of norms to distinguish: *descriptive norms* and *injunctive norms*. The descriptive norm is defined as ‘*the norms which specify what is typically done in a given setting*’ (Cialdini, Kallgren, Reno, 1991). By informing people what is the general behavior, the informed people are expected to see this general behavior as effective and therefore are motivated to perform the same behavior (Reno, Cialdini and Kallgren, 1993). For example, by telling people that their peers eat three pieces of fruit a day, people would feel the urge to consume the same amount of fruit.

The injunctive norm is defined as ‘*the norms which specify what is typically approved in society*’ (Cialdini, Kallgren, Reno, 1991). These norms direct the behavior of people since they assure a social approval; the norm gives insight in the culture of the relevant society by which people can judge if their behavior is according to the norm or counter normative (Reno, Cialdini and Kallgren, 1993). For example, in a clean park where other visitors clean up their own mess, people feel that it is not accepted to litter and therefore they are also ought to clean up their own mess. Individuals fear the consequences of not being normative and the social sanctions that will follow rather than the norm itself (Reno, Cialdini and Kallgren, 1993; Rimal and Real, 2005).

Another important distinction is the difference between *perceived norms* and *actual norms*. The term perceived norm relates to what a person thinks that is typical for a group. This does

not have to be in line with the actual norm, it is the perception of somebody. When the norm is corresponding with reality, this is called the actual norm. The actual norm reflects the beliefs and actions of a group. When the perceived norm differs from the actual norm, there is a misperception. This misperception might lead to undesired behavior because a person thinks he/she is living up to the expected norm of the peers, but actually this is not the case. Often the perceived norm is higher than the actual norm. For example, students tend to think that their peer students drink more than they actually do; the perception of the prevalence is exaggerated (Rimal and Real, 2005). Therefore, a misperception can lead to increasing undesired behavior when one thinks his/her peers are performing more of the behavior than they actually do (Park and Smith, 2007). An underestimation of the actual norm will discourage people to perform a behavior. Perceived norms are found to be stronger predictors for behavior than actual norms (Halim et al, 2012) and food habits are one of the items on which the influence of the perceived norm is the strongest (Park and Smith, 2007). This makes it important to research the opportunity to correct the perceived norms. The social norm theory as described above suggests that changing the perceived norms into actual norms by communicating these actual norms will result in a decrease of the undesired behavior and an increase of the desired behavior.

An example to illustrate these concepts: a new student goes out with a group of students he just met in class. This new student has the perception that students drink a lot of alcohol while going out, at least ten glasses (perceived norm). When the new student joins the group to a party, he will feel the need to consume at least ten glasses of beer while it could be the reality that normally this group of students consumes only six glasses alcohol (the actual norm). In this described case, the undesired behavior of one individual has increased because he thought that this was needed in order to perform similar to his peers even though this was not in line with reality (Perkins and Berkowitz, 1986). Alcohol campaigns using posters to communicate the actual norm are a method used to correct the perceived norm and are in some studies used to endorse a decline in alcohol consumption of students. However, interventions based on social norms are not always successful. Rimal and Real (2005) underline that the literature does not provide enough guidance to construct good interventions which is one of the causes that interventions based on social norms are not found to be effective in US colleges interventions on alcohol consumption.

In the case of alcohol consumption the descriptive and injunctive norms are often used without a clear distinction (Rimal and Real, 2005). In this thesis there will only be focused on

the role of the descriptive norm in relation to the behavioral change of an individual. In relation to unhealthy snack consumption, daily food choices play an important role. Mollen et al (2013) found that daily food choices that are made by individuals are influenced by their social environment. Positive influences from the social environment have a stronger effect on food choices than negative effects have (Mollen et al, 2013). When somebody encourages (with positive phrasing) another to eat healthy for example, this would be more influential than when somebody is discouraged to eat unhealthy. This is directly related to the social norms described earlier considering that the social environment shapes the social norm. Since in this thesis unhealthy snack consumption is studied, it is important to determine what norms from the social environment are influencing the behavior. This idea of Mollen et al (2013) is supported by the study of Lally, Bartle and Wardle (2011) who found in their study regarding unhealthy food consumption that misperceptions between the actual norm and the perceived norm result in people behaving in a way that they think that others do so. The misperception led to overconsumption of unhealthy food and underconsumption of healthy food. Therefore their suggestion is to correct the misperception in order to improve people's diet and one way to do that, is through a social norm campaign. The understanding that the social environment influences behavior is needed in order to consider the possibilities to intervene in decision making processes and steer people towards healthier food choices. The just mentioned studies related to food choices show that food choices are not influenced by injunctive norms, but descriptive norms (Lally, Bartle and Wardle, 2011; Mollen et al, 2013). The fact that injunctive norms do not affect food choices as much as descriptive norms could be explained by injunctive norms not being very surprising for people; they are not changing a lot in different situations since they are '*relatively universal cultural standards on how to behave*' (Mollen et al, 2013). Therefore only already existing beliefs are made visible when injunctive norms are communicated to people (Fishbein and Cappella, 2006). Communicating an injunctive norm is therefore not an eye-opener for people since they already are aware of what other people agree upon and not. This is different from the descriptive norm since here information is provided which is new to the reader (Fishbein and Cappella, 2006). Therefore, injunctive norms may not be effective in provoking behavioral changes and are not focused on in this thesis.

2.2 Social norm campaigns

Earlier, misperception of the actual norm and the important role of perceived norms in a decision making process were discussed. The possibility of communicating descriptive norms in a message are mentioned as a way to intervene in the decision making process of people. The assumption is that correcting the misperception of social norms leads to people behaving according to the actual norm. One way of communicating descriptive norms to people is by making use of a social norm campaign. Below this method for interventions is looked closer at.

Social norm media campaigns aim to correct the misperception of norms. Social norm campaigns are for example posters in schools with photo's and text communicating social norms. For example: "*Look around you, the majority of us does not use tobacco*", "*Nine out of ten did not drive a car when they had been drinking alcohol*" and "*Most students chose not to drink alcohol when hanging out with friends*". These posters provide information about how other people are behaving and this is believed to influence the behavior of an individual as will be discussed below.

2.2.1 False consensus and pluralistic ignorance

There are two kinds of misperceptions relevant to mention in relation to social norm campaigns: *pluralistic ignorance* and *false consensus* (Thombs, Dotterer, Olds, Sharp and Raub, 2010). Pluralistic ignorance refers to a situation in which people do not perform a specific behavior or they perform this behavior lower than average because these people think that they are the only ones doing so (Miller and McFarland, 1987). For example: a study showed that students indicate that they feel less comfortable with alcohol consumption than their peer students do. They also thought that how the other students thought about alcohol consumption, would be more according to the general norms (how, in a student's perspective, all the other students behave) on the campus. As a result, their attitude towards alcohol consumption shifted and their alcohol consumption increased (Prentice and Miller, 1993). The main reason for pluralistic ignorance is believed to be 'fear of embarrassment'. This means that people do not speak up because they do not want to be different than the majority. How the opinion of the majority actually is, is less important because people adapt their behavior towards the perceived opinion of the majority which does not have to be in line with reality. Therefore the fear of breaking through pluralistic ignorance would be the possibility of not being accepted by the group when individual values are not accepted by the majority (Miller

and McFarland, 1987). This idea is underlined by Brener, Hippel, Horwitz and Hamwood (2013) who describe the cause for pluralistic ignorance not only being afraid to be different from the majority by speaking up for your opinion, but also being afraid to not live up to the liberal opinions of other's. Considering that the consumption of food takes place in social settings (Mollen et al, 2013), snack consumption might be sensitive for pluralistic ignorance. This would entail that people feel a certain pressure to meet the expectations of the group which leads to these people not reducing their unhealthy snack consumption to meet the perceived norms of peers (to eat unhealthy snacks) or, depending on the individual's idea about the group, start to reduce unhealthy snack consumption to meet this perceived norm of the group (to not eat unhealthy snacks).

The other type of misperception is false consensus. This refers to a situation in which a person overestimates how other people agree on his/her behavior or believes. One thinks that his/her ideas and behavior is normal and therefore assumes that other people share those same ideas. Graham and Hansen (1992) found that if one person thinks that everyone agrees upon him/her that drinking a lot of alcohol is the norm, and therefore feels encouraged to consume more alcohol. The same could account for snack consumption when it is believed that peers agree on frequent unhealthy snacking while in reality others might want to advise a healthier diet. If a person then has the idea that his behavior is accepted by others, he might not feel the urge to adapt his behavior towards a healthier diet.

2.2.2 Effectiveness of social norm campaigns

Despite the promising outcomes and suggestions of studies regarding the positive effect of social norm campaigns, not all researches show positive effects. Reasons for failing campaigns are not always clear since there is too little known about the ineffective social norm interventions (Thombs, Dotterer, Olds, Sharp and Raub, 2010). A failing social norm campaign on a university where the aim was to change the perceived norm into the actual norm in order to reduce alcohol consumption among college students was researched to gain insight in the causes of failure (Thombs et al, 2010). The campaign consisted of norm messages communicating descriptive norms related to alcohol consumption. The perceived norm of students was not changed by the campaign, there was no statistical evidence for campaign credibility and it turned out that the social norm messages were not understood correctly. In interviews it turned out that students did not read the messages well enough because they directly related the messages from the campaign to traditional campaigns for

zero tolerance from the government. Therefore, students did not pay close attention to the current social norm campaign. Thombs et al (2010) suggest that as an addition to only norm messages, respondents probably should be engaged in interactive activities in order to understand that social norm campaigns are positive and proactive rather than promoting a zero-tolerance policy (in the case of alcohol consumption).

Next to the question if the positive aims of social norm campaigns are always achieved, Schult, Nolan, Cialdini, Goldstein and Griskevicius (2007) describe a negative effect of social norm communication. Schultz et al. (2007) explain that it is more difficult to influence actual behavior as is suggested in the social norms theory. There would not be only a positive effect of people being motivated to live up to the actual norm, but there is also a negative side effect called *the boomerang effect*. This means that people who are already performing the undesired behavior less than average, feel the urge to start living up to the norm and therefore start to carry out undesired behavior. An example of the boomerang effect is when a descriptive norm is that on average students consume X unhealthy snacks a day, individuals who actually consumed less than this X amount of snacks, start to consume more because they feel pressured to live up to the norm. When this situation occurs, the undesired effect of the norm messages takes place that undesired behavior is provoked while this was unintended, which then means that the intervention works reverse.

Other studies on the boomerang effect did not find any evidence for this. For example Prince, Reid, Carey and Neighbors (2014) and MacKinnon and Lapin (1998) did not find proof for the boomerang effect in their studies on alcohol consumption with students.

2.3 Reference group

In the design of effective social norm campaigns, the reference group plays an important role (Neighbors et al, 2008). The reference group is the group with whom individuals feel associated with. An example of a reference group in a descriptive norm message is: ‘The average student consumes two unhealthy snacks a day’ in which ‘students’ is the reference group. The idea is that the readers of this message identify themselves with being a student and therefore adapt their own behavior to the descriptive norm: two unhealthy snacks a day. The closer the reference group is, the stronger the association between the perceived descriptive norm and the actual behavior of a person (Neighbors et al, 2008; Schoffield et al, 2001). For the injunctive norm, this association is less clear (Neighbors et al, 2008).

2.4 Theory of planned behavior

In general, *intention* describes that someone is planning or aiming to do something (Oxford dictionaries, 2015). The theory of planned behavior describes intention as a main factor to predict behavior. In short, Ajzen (1991) states in his theory of planned behavior that intention is determined by three central concepts: *attitude*, *subjective norm* and *perceived behavioral control*. *Attitude* is a way of thinking about how favorable a specific behavior is, *subjective norm* refers to the thoughts regarding the normative expectations of significant others (what you think that the important people to you perceive as ‘normal’) and *perceived behavioral control* is about being able to control your own behavior or behavior being dependant on external factors. Assuming that these three concepts predict intention, this implies that the behavior an individual performs is consciously driven by thoughts and feeling rather than that a person would act mindlessly (Ajzen, 1991). These thoughts and feelings can be influenced by different factors such as personality, life values and demographic variables. These factors influence other determinants of behavior what explains impulsive behavior and habits (Ajzen, 2011). Therefore, the theory of planned behavior is a theory by Ajzen (1991) to understand behavioral decision making and it is also used to predict the probability that an individual intends to perform a specific behavior. In this thesis is not only looked at the actual snack consumption of the respondents, but also the intention to snack is measured. Since the Theory of planned behavior appoints intention to be the most important predictor for behavior, intention is a very relevant factor to include while looking at performing (unhealthy snack) behavior.

2.5 Regression to the mean

Both the social norm theory and the theory of planned behavior relate to the possibility of provoking a behavioral change by intervening in a certain way. An intervention would then be the reason that people perform a different behavior after the intervention than before this intervention. However, there are also different explanations for behavioral change. In an experiment in which random samples are compared with each other, *regression to the mean* can appear. The statistical phenomenon regression to the mean describes how sample means shift, without being affected by an intervention (Davis, 1986). The use of a control group could avoid bias to the outcomes (Shephard, 2003). An example for a situation in which regression to the mean would occur is when the same people every day fill out the same test. Their results will differ on different days since external factors are influencing their performances, for example motivation, tiredness or just coincidence. It is important to

question the possibility that a detected behavioral change is caused by the applied intervention, or that this change is possibly due to regression to the mean in order to judge if an intervention is effective.

The importance to look at the possibility of regression to the mean can be illustrated by comparing two researches: Verkooijen, Stok and Mollen (in-press) and Schultz et al (2007). Schultz et al (2007) conducted a field experiment in which they have promoted household energy conservation in order to find out if normative messages would lead to a decrease in energy use. They found that All the households included in their research (n=290) were divided in two groups based on their energy consumption. Schultz et al (2007) expected that people do not want to differ from the standard which is provided by the descriptive norm. The conclusion of their study was that providing people with a descriptive norm message leads to a behavioral change towards the communicated norm; the above-average participants lowered their consumption and the below-average participants increased their consumption.

Verkooijen, Stok and Mollen (in-press) followed up on the study of Schultz et al (2007) with a study on fruit consumption among students. They extended the research design by including a control group of participants who did not receive a feedback message. The intervention group did receive a feedback message which mentioned whether they consumed more or less fruit than the average student. The aim of adding this control condition was to determine if the results found by Schultz et al (2007) could have been a result of the descriptive norm message or that the result can be accounted to regression to the mean. The results from the study of Verkooijen et al (in-press) showed a decline in fruit consumption for the participants who were above average in the first measurement in both the control group and the intervention group. The participants who scored below average on base-line (the first series of measurement) in both the control and the intervention group increased their fruit consumption on the follow-up measurements. There was no effect of descriptive norm messages on behavior. Therefore, the study of Verkooijen, Stok and Mollen (in-press) does not support the findings of Schultz et al (2007) who account a behavioral change of participants to the social norm messages where Verkooijen, Stok and Mollen (in-press) could not find an effect of the social norm message and therefore suggest that the change is a result of the regression to the mean.

These two studies and the differences in outcome show the need for a control group in order to be able to conclude if a change in behavior can be accounted to the intervention or that this might be due to the statistical phenomenon Regression to the mean.

In the following part the present study will be explained. There the aim of this research will be explained and the relevance of the above discussed concepts and theories will be clearer.

2.6 The present study

This thesis is concerned with consumption of unhealthy snacks by students. As described previously, the importance of a control group in an experiment can be of great influence for the interpretation of the study results. The different explanations for a comparable study by Schultz et al (2007) and Verkooijen, Stok and Mollen (in-press) illustrate this influence. In the present study the method of Verkooijen, Stok and Mollen (in-press) in which a control group was introduced will be used for a descriptive norm message experiment with the topic of unhealthy snack consumption. Therefore the aim of this thesis is to find out if providing a descriptive social norm message regarding unhealthy snack consumption among Dutch students has an effect on the snack consumption of these students.

2.6.1 Research questions

The central research question is: *Does providing a descriptive social norm message about unhealthy snack consumption among Dutch students has an effect on the snack consumption of these students?*

2.6.2 Sub questions

The central research question tests if an intervention, in which a feedback message regarding a person's snack consumption is provided, is suitable to change somebody's snack behavior. In order to understand this possible effect better, three sub questions are formulated to gain more information. The first sub question is: *Does the intention towards snack consumption influence someone's actual snack consumption?* This question is concerned with the idea that intention moves a person to perform a specific behavior. Previously it was discussed that the theory of planned behavior points out that behavior is rational and that intention is a predictor for behavior. Therefore the tested hypothesis is: higher intention to not consume snacks results in lower snack consumption. If intention is related to behavior, it is interesting to find out if this intention is subject of change when respondents are opposed to a descriptive social norm message. Therefore, the second sub question is: *Is there a difference in change of intention between the control and the intervention group?* This question is concerned with the

assumption that intention is subject to change by a descriptive social norm. With this question it is tested if the students who were provided with a descriptive social norm message changed their intention differently than the students who were not provided with this norm and the hypothesis that there is a difference. The third question is related to the descriptive norm message itself which was received by the respondents assigned to the intervention condition. Interesting is to analyze if respondents remembered the message well after the follow-up measurement in order to find out if the communication of the message itself was done sufficiently. If students would not be able to remember the feedback correctly, this might explain why effects do not occur. This third sub question is: *'Do students remember the feedback message?'* The hypothesis is that students were able to recall the feedback message. As a last sub question *'Are students from the control group able to estimate their snack consumption?'* is analyzed in order to find out if students are conscious about their snack consumption. The hypothesis is that students are able to estimate their consumption.

3. Methods

The experiment consisted of three phases: a base-line measurement (consisting of three measurements), an intervention period in which half of the respondents receives a descriptive norm message (the intervention group) and half of the respondents does not receive this message (the control group), and the follow-up measurement (consisting of three measurements). The average consumption of the intervention group was compared to the average consumption of the control group. An ANOVA-test was applied in order to find out if a change in behavior was caused by the intervention or that this could be the Regression to the mean.

3.1 Design and procedure

The study was an experiment which consisted of three phases: a base-line measurement (consisting of three measurements), an intervention period in which half of the respondents receives a descriptive norm message (the intervention group) and half of the respondents does not receive this message (the control group), and the follow-up measurement (consisting of three measurements). The average consumption of the intervention group was compared to the average consumption of the control group. An ANOVA-test was applied in order to find out if a change in behavior was caused by the intervention or that this could be the Regression to the mean.

The data was collected by eight quantitative, online questionnaires (see appendix 2) per person. Benefits of online questionnaires are that they are low cost, have no constraints in terms of geographical coverage, are generally completed with less unanswered questions than paper surveys, are also quicker returned than paper surveys and the open questions are also answered in more detail (Bryman, 2008). This last advantage might be less relevant in this study since the core questions did not consist of open questions, but still there was the opportunity for people to freely give comments or leave questions what let to valuable information regarding the interpretation of the data.

The eight questionnaires were created with and spread via Qualtrics, online survey software (Qualtrics.com, 2015). The first questionnaire was used to recruit respondents and it asked for demographic information (date of birth, gender, living situation, study level, study direction, study city), intention towards unhealthy snacking, willingness to participate in the entire study, and there was space to post questions or remarks. The second, third and fourth questionnaires were sent in three successive days, two weeks after the first questionnaire. These three questionnaires were used to calculate unhealthy snack consumption in the first

period; this is called the base-line measurement. In these three questionnaires, the respondents were asked again for demographic information, healthy and unhealthy snack consumption and respondents had again the opportunity to post questions or remarks. After this base-line measurement, the participants were divided in four groups; control group above and under average and the intervention group above and below average. The division was made on the basis of the amount of unhealthy snacks participants reported in the three questionnaires which formed the base-line measurement. The fifth questionnaire was sent one day before the three last questionnaires; this is called the follow-up measurements. This questionnaire included the intervention. The fifth questionnaire asked again for demographic information, intention regarding unhealthy snack consumption for the upcoming time, and gave space for questions or remarks. This fifth questionnaire distinguished two groups: a control group and an intervention group. The respondents from the intervention group, information was given about the average unhealthy snack consumption of the base-line measurement and the participant was told if he/she consumed more or less than the average student. Next to this message, the respondents assigned to the intervention were asked to indicate if they were surprised by the outcome that they ate more/less than average. Questionnaire six, seven and eight (follow-up measurement) asked for demographic information and asked respondents to indicate their snack consumption in the tables for unhealthy and healthy snack consumption. In the last questionnaire, the intervention and the control group had a different question in the end. The intervention group was asked to report the average snack consumption which was communicated in the feedback, and they were asked to remember if they consumed more/less/I don't remember snacks than the average student. The control group was asked what they thought the average of students would be and if they think they consumed themselves more or less.

In short: a first questionnaire aimed to recruit respondents, the base-line measurement consisted of questionnaire two, three and four, the intervention with a descriptive norm was done in the fifth questionnaire, and the follow-up measurement was conducted with questionnaire six, seven and eight.

3.2 Sample

3.2.1 Sampling strategy

Purposive sampling was used to reach students fitting the following criteria: Studying at a Dutch intermediate vocational education school (MBO), a Dutch university of applied sciences (HBO) or a Dutch University (WO) and mastering Dutch language. These students

have been sought contact with via social media (Facebook), e-mail (study-adviser Wageningen UR and a teacher of Eindhoven Hogeschool) and word of mouth. Via social media, the link to the online survey has been directly send to study association Pangea (BSc Tourism Wageningen), TerheijdenNetwerk (network of Terheijden, hometown; village Noord Brabant - The Netherlands), Second year sociology students Tilburg University, (former) fellow students Health and Society Wageningen, relatives, colleagues and friends. Besides, also snowball sampling has taken place via the social network when respondents were asked to look for other potential respondents in their networks.

A number of participants did not receive the e-mails sent by Qualtrics' panels in their inbox of their e-mail; instead it arrived in their junk mail. In order to give those participants the opportunity to participate in the research under the same conditions, they have reported their snack behavior a week later. No changes have been made in conditions such as the questionnaire or the time frame. Also the descriptive norm message was not changed.

A total of 263 students replied by filling out the first questionnaire, 177 respondents started with the following questionnaires, 124 respondents completed the questionnaires and after taking out the outliers (explanation follows below), the final sample consisted of 120 respondents.

	Respondents	Gender (Female %)	Age (In years)	Living situation (With parents %)	Education level (resp. MBO%, HBO%, University%)
Final sample	120	86.7%	21.62	43.3%	6.7%, 32.5%, 60.8%

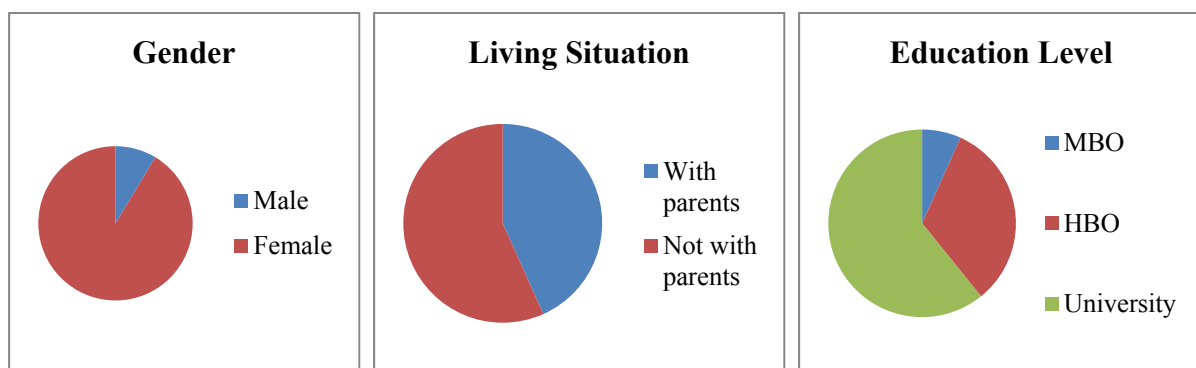


Figure 1: Descriptive statistics final sample

In the sample, the outliers were considered to be the respondents who varied more than 3 Standard Deviation from the mean. Outliers had to be taken out because it is questionable if individuals that differ this much from the group mean, are originating from the same population. On base-line (M=2.11, SD=1.66) respondents who scored higher on unhealthy snack consumption than 7.09 were considered to be outliers. In the follow-up (M=1.73, SD=1.74) respondents who scored higher on unhealthy snack consumption than 6.95 were considered to be outliers. In total four outliers were taken out of the sample.

After taking out the outliers, the final sample consisted of 120 participants. Respondents in the final sample answered at least the first questionnaire and reported their snack consumption at least once in the base-line measurement as well as in the follow-up measurement. The average age of the final sample was 21.6 (SD 3.75), 86.7 % was female and 43.3% lived with their parents. Most respondents studied in Wageningen (N=42), Tilburg (N=26) and Breda (N=19), the most frequent study sectors were Health (N=54. Amongst others: Health and Society, Nursing) and Education (N=15: Teaching degree, Didactics).

3.2.2 Drop-out

The group of students, who participated in the base-line measurement but did not participate in the follow-up measurement, is called the drop-out. These respondents are characterized by an average age of 21.56 (SD: 3.73), 80.8% female and 42.3% living with parents. Level of education is divided as follows: 53.8% University, 30.8% University of Applied Sciences and 15.4% Intermediate Vocational Education.

In order to find out if the drop-out differences from the final sample, an independent T-test was performed. This tests shows that the difference in *age* (21.46 final sample and 21.26 drop-out) was not significant (sig. 0.603, $p=0.05$) and neither were the differences in *living situation* (sig. 0.100, $p=0.05$), *level of education* (sig. 0.689, $p=0.05$) and *gender* (sig. 0.818, $p=0.05$) found significant.

3.2.3 Randomization check

After indicating if respondents were above or below the average amount of unhealthy snacks per day, the respondents were randomly assigned to the intervention or the control group. In order to find out if there was a not intended difference among the groups due to the division, independent t-tests have been used to compare means of age, gender, living situation and level of education. Regarding age, there was no significant difference in the scores for experimental

(M=21.63, SD=3.79) and control (M=21.59, SD=3.74) conditions; $t(115)=.061$, $p=.952$. Regarding gender, there was no significant difference in the scores for experimental (M=1.83, SD=.38) and control (M=1.91, SD=.29) conditions; $t(118)=-1.33$, $p=.187$. Regarding living situation, there was no significant difference in the scores for experimental (M=1.59, SD=.50) and control (M=1.54, SD=.50) conditions; $t(118)=.64$, $p=.526$. Regarding study level, there was no significant difference in the scores for experimental (M=1.83, SD=.73) and control (M=1.84, SD=.83) conditions; $t(118)=-.08$, $p=.937$. Neither of them has been found significant and therefore it is assumed that the randomization of the groups has been done properly and the respondents in both groups are on equal terms.

3.3 Measures

3.3.1 Intention

In the first and fifth questionnaire respondents were asked to answer a question related to their intention for unhealthy snack behavior. Respondents could indicate for four statements to what extent they agreed on a five point likert scale where 1 stands for '*Don't agree at all*' (original text: Helemaal oneens) and 5 stands for '*Totally agree*' (original text: Helemaal eens). On the follow-up measurement, the same statements were asked, but the five point likert scale had been accidentally adverse; 1 stands for '*Totally agree*' and 5 stands for '*Don't agree at all*'. The statements were the following: '*I would like to eat no or little unhealthy snacks the upcoming time*', '*I am planning to eat no or little unhealthy snacks the upcoming time*', '*I expect to eat no or little unhealthy snacks the upcoming time*' and '*I am going to eat no or little unhealthy snacks the upcoming time*'. In order to measure the intention change, the intention on baseline has been transformed into the same scale as on baseline by abstracting the score on follow-up by five. This resulted in M=2.52 (SD=.90) on follow-up measurement³). A reliability test for the intention measurement show on base-line Cronbach's Alpha: .889 and on follow-up measurement Cronbach's Alpha: .882.

3.3.2 Snack consumption

Snack consumption has been measured with a self-reporting diary. This diary has been developed by Aadriaanse, Oettingen, Gollwitzer, Hennes, De Ridder and De Wit (2010) who measured in their study snack intake with this food diary. This diary consisted of twelve categories of unhealthy snacks and thirteen categories of healthy snacks with in both groups – healthy and unhealthy snacks- the opportunity to fill out an 'other' category. Participants were asked to fill out how much they consumed in the portion sized provided in the food diary.

From this diary, the twelve categories of unhealthy snacks and the 13 categories of healthy snacks have been used to ask the participants in the online questionnaire to indicate their snack consumption. The original food diary of Aadriaanse et al (2010) can be found in appendix 1 and the applied table can be found in the questionnaire in appendix 2. While dividing the participants into groups, the perceived value of the snack was taken into consideration; one small candy was not valued equal as one piece of pie. For the weighted value in the calculation of the averages, the indicated kcal by Aadriaanse et al (2010) have been used as guidelines in order to compare the snacks, but this has only been an estimation for comparison of a snack among other snacks. Next to that, it was taken into account that some healthy snacks (according to the diary) were considered to be unhealthy by the respondent and therefore this snack was counted as an unhealthy snack in order to maintain the credibility of the descriptive norm message communicated to the respondent in intervention.

Healthy snack consumption was measured also with the snack diary of Aadriaanse et al (2010), but these answers were not analyzed. This data is used as a frame of reference when the answers of respondents could be doubted. One respondent for example distinguished healthy and unhealthy snacks by the criteria if the snack could be assigned to bread. Therefore 'a pita bread with houmous', 'sausage roll' and 'bread with tapenades' have been kept in the healthy snacks, because it seemed that this was his/her perception. Other times it was also needed to compare answers between respondents to understand and interpret the data.

3.3.4 Evaluation of the feedback message

After the base-line measurement, feedback was provided about the average snack consumption and the respondent's consumption as described earlier. Respondents were asked in a multiple choice question if they were surprised by consuming more/less than average. These multiple choice options consisted of five possible answers: 'Yes, very surprised', 'Yes, a bit surprised', 'Neutral', 'No, not really surprised' and 'No, not surprised at all'. The intervention group was asked in the last questionnaire to remember which feedback message was given to them after the base-line measurements. An open question asked the average unhealthy snack consumption. A closed question asked about the respondent's consumption with three categories: *more/less/I don't remember*. The control group was asked with two open questions to estimate the average of unhealthy snacks and if the respondent consumed more or less than average.

3.4 Data analysis

The analysis of the data was done with SPSS. In order to work with the retrieved data, all data of the eight questionnaires have been put together in one data file. To prepare the data file for the analyses, the variables representing the snacks with their values have been computed into new variables per questionnaire (for base-line and follow-up) separately. For the ‘Other’ category, every answer has been looked at and calculated per response as described above. Per day (three days during base-line and three days during follow-up) a day total has been computed for the overview of the base-line and the follow-up measurement.

A General Linear Model for repeated measures has been used to analyze the data. The dependent variable was the average consumption at follow-up. The Between-Subject factors were Average on baseline (under or above) and Condition (intervention or control group). With the Graph Builder of SPSS, the results of the within-subjects effects from the GLM could be made visible by plotting the average on base-line and average on follow-up in one graph together with the four conditions: intervention above average, intervention under average, control above average and control under average.

4. Results

In this chapter, the results of the data analysis are presented.

4.1 Sub questions

‘Does the intention towards snack consumption influence someone’s actual snack consumption?’ tested if higher intention to not consume unhealthy snacks at base-line results in lower snack consumption at follow-up. Pearson correlation shows a correlation of $-.411$ ($p=.00$). The Pearson correlation value of $-.411$ shows that there is a moderate negative correlation (Bryman, 2008) between intention and unhealthy snack consumption and thus the hypothesis is supported. Thus, when the intention to not eat unhealthy snacks goes up, the actual consumption of unhealthy snacks goes down.

		Intention	Behavior
Intention	Pearson Correlation	1	-.411
	Sig.		.000
Behavior	Pearson Correlation	-.411	1
	Sig.	.000	

Figure 2: Descriptives Intention on base-line

‘Is there a difference in change of intention between the control and the intervention group?’ was tested with a General Linear Model for repeated measures if the hypothesis that students who were provided with a descriptive social norm message changed their intention differently than the students who were not provided with this norm is tested here, could not be supported. The within-Subject variables were the intention measured on base-line and the intention measured on follow-up. The Between-Subjects factor was the assignment to the control or the intervention group. Intention scores differed not significantly as a function of descriptive norm messages, $F(1,113)=2.04$, $p=.16$. On average, the intention of the respondents on base-line was valued 3.50 (SD 0.89).

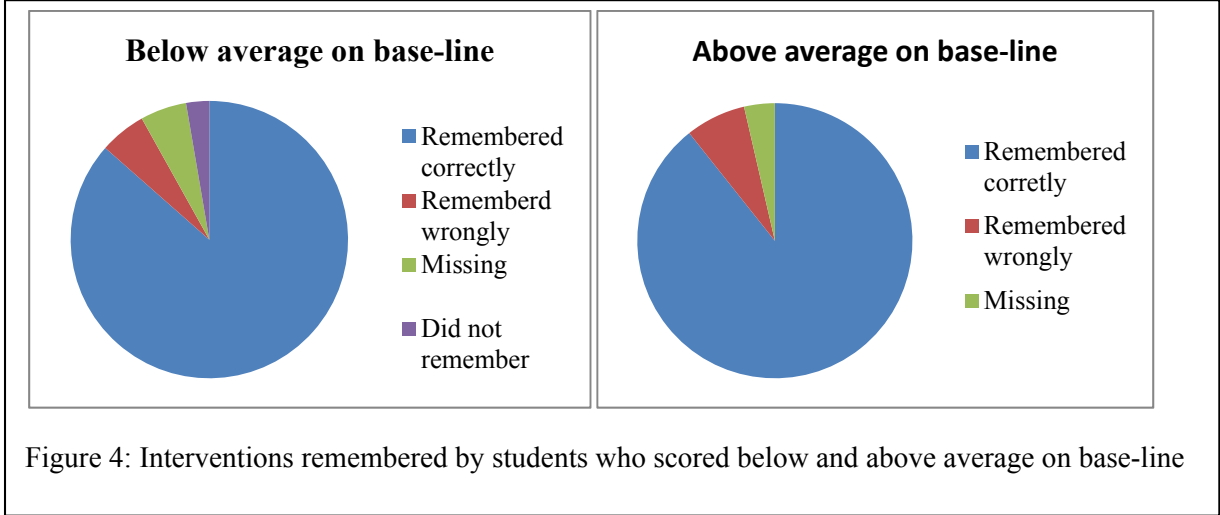
	<i>Df</i>	<i>F</i>	<i>Sig</i>
Time *	1	2.037	.156
Intervention/control			
Error	113		

	N	Min	Max	Mean	SD
Intention Base-line	120	1,00	5,00	3,50	,89
Intention Follow-up	115	,50	4,00	2,52	,90

N Intervention = 64, N Control = 51

Figure 3: Descriptives Intention change

‘To what extent are the intervention messages remembered well by the respondents assigned to the intervention group?’ was answered by the students assigned to the intervention group. The intervention group consisted of 37 respondents who scored below average on base-line and 28 who scored above average on base-line. From the respondents who scored below average, two people (5.4%) remembered the feedback message wrongly; they filled out that they scored above average on base-line. One respondent (2.7%) indicated that he/she didn’t remember the feedback message and two respondents (5.4%) did not fill in the question. The other 32 respondents (86.5%) remembered the feedback correctly. From the respondents who scored above average, two people (7.1%) remembered the feedback message wrongly; they filled out that they scored below average on base-line. One respondent (3.6%) did not fill in the question and all other 25 respondents (89.3%) remembered the feedback message correctly.



‘Are respondents from the control group able to estimate their snack consumption?’. From the respondents who scored below average, twenty respondents (64.5%) estimated correctly that they consume below the average. Five respondents (16.1%) said that they think they consumed more than average (which is incorrect), and three respondents (9.7%) answered that they think to consume on average (which is also incorrect). Three respondents did not answer the question. From the respondents who scored above average, eleven people (42.3%) estimated correctly that they consumed more than average. Sixteen respondents (61.5%) thought incorrectly they would have consumed less than average and one respondent (3.8%) indicated that he/she would consume on average. Two people (7.7%) did not answer the question.

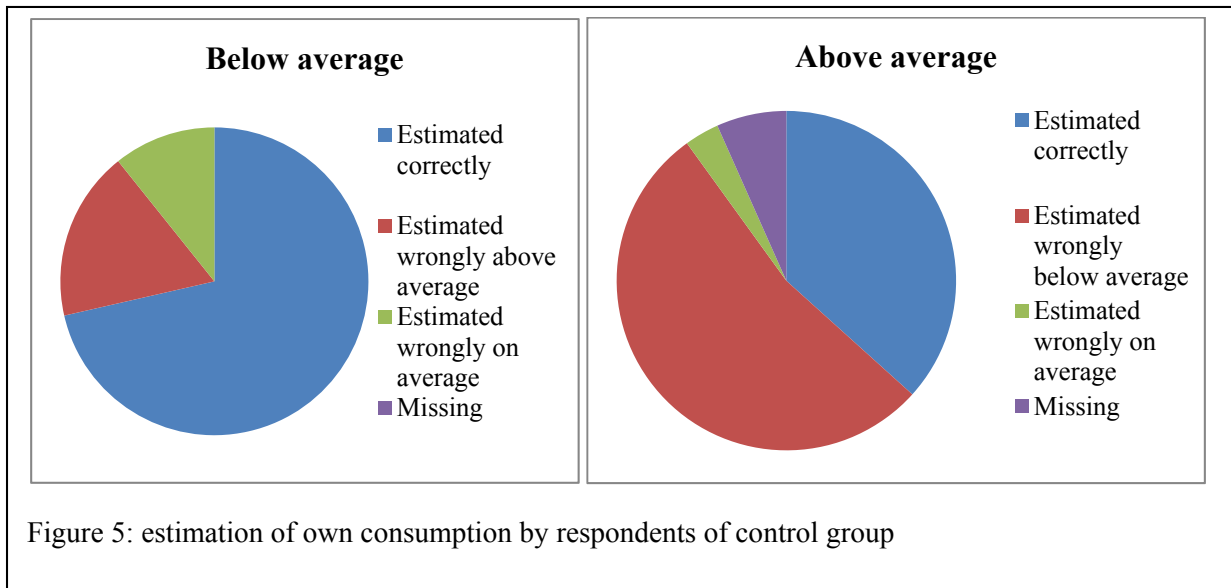


Figure 5: estimation of own consumption by respondents of control group

4.2 Main research question

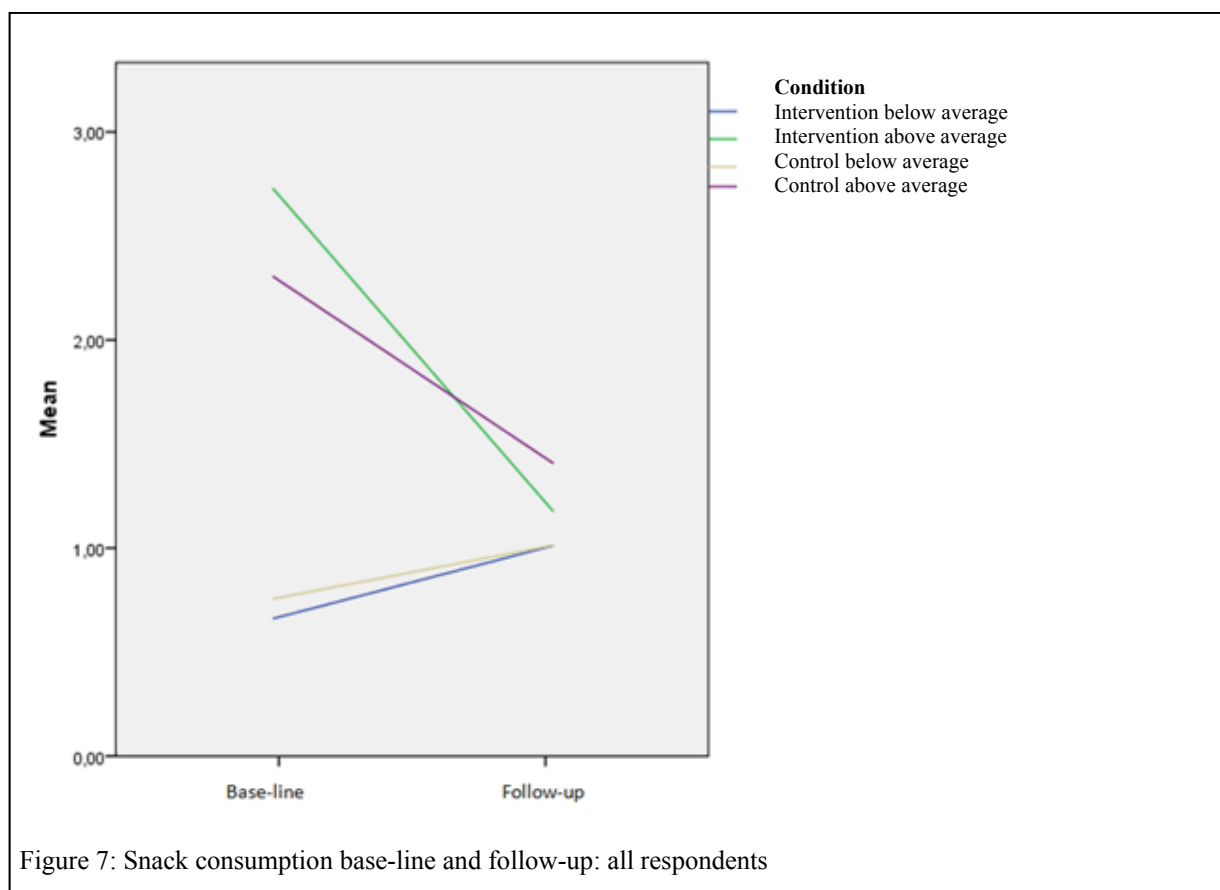
The General Linear Model for repeated measures has been used to test the hypothesis *Providing a descriptive social norm message about unhealthy snack consumption among Dutch students has an effect on the snack consumption of these students* was run with Within-Subject Factors represent the dependent variables: the average score on the pre-test and the average score on the post-test. The Between-Subject Factors are consumption on base-line (above or below) and condition (intervention or control). The General linear model tested the effect of Time, Time in combination with both Between-Subject Factors only and Time in combination with both Between-Subject Factors. The effect of Time $F(1,116)=18.69$, $\eta^2=.14$, $p<.01$ and the effect of Time in combination with consumption above/below average on pre-test only $F(1,116)=51.56$, $\eta^2=.31$, $p<.01$ were significant. Time in combination with being assigned to the intervention or the control group only $F(1,116)=1.74$, $\eta^2=.02$, $p=.19$, and Time in combination with both Between-Subject Factors $F(1,116)=3.08$, $\eta^2=.03$, $p=.08$ did not show a significant effect.

	Df	Par. η^2	F	Sig
Time	1	.139	18,694	,000
Time *	1	.015	1,736	,190
Intervention/Controle				
Time * Consumption Base-line	1	.308	51,558	,000
Time *	1	.026	3,076	,082
Intervention/Controle *				
Consumption Base-line				
Error	116	1,067		

N Intervention = 64, N Control = 56
N Consumption Base-line above average = 69, N Consumption Base-line below average = 51

Figure 6: Descriptives social norm message effect

In order to understand what this means, the following clarifies.



From the graph, the effects described above from the general linear model can be understood better. First of all, the significance of *time* and *time* in combination with *being above or below the average* can be understood by comparing the line for each group of people on the base-line and follow-up: the means differ. This indicates that people consumed differently

(more/less) in the follow-up than they did on the base-line (time-factor) and that it also made a difference if they were in the group of respondents who scored above the mean on the base-line, or below. This is an indication for the regression to the mean effect: people who scored higher than average on base-line naturally declined in their snacking behavior and respondents who scored lower than average on base-line, increased their snacking behavior.

The effect of *time* in relation to *being assigned to a specific group* is not significant. This means that being assigned to the control group or being assigned to the intervention group did not make a difference for respondents to consume differently in the follow-up than that they did in the base-line measurement; both groups have changed their unhealthy snack consumption. The interaction between *Time*, *being assigned to a specific group* and *consumption on base-line* was also not significant. This means that there is not an interaction between the factors which would lead to an effect of the behavior of the respondents; the change in behavior cannot be assign as an effect of the descriptive norm message.

5. Discussion

In this thesis, the aim was to find out if providing students with a descriptive social norm message affects their unhealthy snack consumption. The design of the study included a control group what means that half of the respondents received an intervention with a descriptive norm message and the other half of the respondents did not receive this message. An ANOVA test did not show a significant relation between receiving a descriptive social norm message and a behavioral change. Both the respondents who were assigned to the intervention as well the respondents who were assigned to the control condition changed their behavior. Respondents who scored above average on base-line (intervention and control condition) lowered their consumption on follow-up and respondents who scored below average on base-line (intervention and control condition) increased their consumption on follow-up. This means that respondent moved towards the mean regardless the condition they were assigned to: the descriptive social norm message did not affect their behavioral change. The study of Verkooijen et al (in-press) found that a control group can be crucial for a right interpretation of the results. The researchers emphasize that the results of Schultz et al (2007) can be interpret differently by assigning the behavioral change to the statistical phenomenon Regression to the mean rather than to the intervention with a norm message. Since the design of the study of Schultz et al (2007) did not include a control group, the observed behavioral change could be unjustly explained as an effect of the descriptive norm message. Stok, de Ridder, de Vet and de Wit (2014) also showed the need for a control group in their study, which compared the effect of injunctive and descriptive norms on fruit consumption compared to a control group. They did not find an effect of the descriptive norm message since the behavior of the respondents who received a descriptive norm message was similar to the behavior of the control group.

If the descriptive norm message did not change the actual behavior of the respondents, other external factors might have influenced the behavior since there was a change in behavior as is also suggested by Ajzen (2012), Cialdini et al, (1990) and Mollen et al, (2013). In this thesis, answers of respondents indicated the external factors by writing down a remark such as: *'Funny to participate, sometimes it is unpleasant but on the same time an eye opener to discover that despite the good intentions I still consume unhealthy delights'*. This quote shows that there was for this participant an external factor that despite the good intentions he/she had, that had an influence on his/her consumption behavior. As the regression towards the

mean theory states, there are factors that cause fluctuations in one's behavior which make one sometimes perform differently than on other times.

In line with the results of this thesis, Thombs, Dotterer, Olds, Sharp and Raub (2010) carried out an intervention study regarding student's alcohol consumption in which they could neither find an effect of their intervention. They found three reasons why social norms campaigns did not reduce student drinking. Those reasons could also be considered while reflecting on this study. As a first reason, they mention '*distal target groups*' what means that the respondent might not feel close enough to the target group to let the social norm influence their behavior. For example: it could be that eating snacks is more related to 'friends' rather than to 'students'. If this is the case, the feedback might not be personally relevant and therefore not affecting. The second reason is the '*reliance on self-reported data*' which is possibly not perceived as a valid measurement and therefore the feedback not perceived as credible. The third reason is '*understanding of the purpose of the intervention*'. In the study of Thombs et al (2010), some students related the intervention of the study to campaigns done by the government earlier in which the aim was to hold students from drinking any alcoholic consumption. This caused that their target group was not open to participate in the study intervention and their intervention was not effective. In this thesis there are no signs that respondents did not understand the purpose. There has no test been carried out to look for possible misunderstandings, but the answers to open questions did not suggest any misunderstandings. After the follow-up measurement, most respondents were able to recall the feedback message that was given to them after the base-line measurement. This means that the communication of the descriptive norm message was done in a way that the respondents understood what was told to them. This is important to know because if people would not be able to understand the message correctly in the first place, they also would not be able to shape their intentions and behavior in line with the described norm.

The referent group does not only play an important role regarding the impact of the entire target group in relation to the descriptive norm message. The referent group also affects the formulation of the feedback message itself. The feedback given to the respondents in this thesis was personally tailored; it was based on the individual respondent being above or below the average unhealthy snack consumption. According to Collins and Spelman (2013), personalized normative feedback makes the intervention more effective: the closer the referents are to the target group, the stronger norms are positively correlated to behavior (Collins and Spelman, 2013). The notion that formulation of the feedback message is very

relevant is in line with the finding of Mollen et al (2013) who mention that exposure of the norm message towards the respondents is a key factor for a successful intervention. In their research, only twenty percent of the participants in their research was exposed to the message and therefore the majority was not affected by the intervention (Mollen et al, 2013). This highlights the relevance of testing if the social descriptive norm message was received and understood well by the respondents. In this thesis, 86% of the final sample was able to recall the feedback message what suggests that the descriptive norm message communicated well enough and comprehensive.

Another interesting result was found while analyzing the question in which respondents assigned to the control group were asked to estimate their consumption. The majority of the respondents from the control group estimated that they consumed below average. From the people who actually were above the average, still the majority thought they would have consumed below average. There was not a convincing amount of respondents that indicated their own unhealthy snack consumption correctly which suggests that respondents were not very conscious about the amount of snacks they consume or that they actually think the average snack consumption would be higher than it actually is. It is remarkable that this is in line with the majority of the intervention group who scored above average on base-line since they were also convinced to score actually below average.

Earlier in the literature section, two different interventions with the aim to influence people behavior were discussed: health messages and norm messages. The health messages were described as a communication medium (for example posters) to generate knowledge about the health benefits of performing a specific behavior. Norm messages were described as communication of a social norm in order to correct a possible misperception of how peers behave and to encourage the reader to behave according to an actual norm. The effectiveness of both ways of intervening is studied by Robinson, Fleming and Higgs (2014) and they conclude that descriptive norm messages are more effective in the case of healthy food choices. Even though the total calorie intake of their participants did not change, effect was shown on food choice where respondents chose for more vegetables after the intervention with descriptive norm messages and also took less high calorie snacks. However, in this study there was not made use of a control group. Verkooijen et al (in-press) found in their study the need for a control group in order to find reliable results in an intervention study. They state that this is needed to ensure a found result can be accounted to the intervention. This indicates

that the findings of other studies which mention descriptive norm messages as an intervention method but did not make use of a control group should be looked at carefully in examining the results and be put into perspective.

Another explanation for the outcome of the results not showing a causal relation between the descriptive health message and the actual unhealthy snack consumption could also be looked for in the target behavior. Negative effects of unhealthy behavior such as heavy drinking directly affect the drinkers and the society. For example with injury due to accidents and falls, sexual assault and problems with authorities are problems that drinkers face, and examples of problems for the community are property damage, sleep disruption and violence (Collins and Spelman, 2013). In the case of unhealthy snack behavior, the consequences as overweight and obesity occur not immediately. Possibly it is therefore easier to think that it is less relevant on the short term to change eating patterns and effects of interventions might therefore differ. This could lead to a different perception of the descriptive norm since it might seem less urgent to meet the expectations of society immediately when it is less obvious if you do not meet those (perceived) norms.

Looking to the overall questionnaire, it is interesting to see how respondents on an individual basis differ in their answers. To every questionnaire, the opportunity was added for respondents to write down their questions or remarks. This opportunity has been used often in different ways. Some respondents gave feedback on their own behavior, such as: *“I perform fitness five times a week and therefore my eating pattern is reasonably good...”*, *“I did not have much time to eat three meals, therefore I also did not eat snacks”* and *“I often have a cup of tea in between my meals rather than a snack”*. Other respondents used this opportunity to explain what they exactly ate, for example: *“The bread I ate was an aperitif in a restaurant: it was small slices of bread, comparable to a baguette”*. Respondents also often explained why their consumption could have been different than it was before. For example: *“It was my birthday, thus one eats more snacks than normal”*, *“Celebrated a birthday”* and *“I ate two small candies because I went shopping and went out for dinner...”*. This indicates that for some respondents there was apparently a need to give more details in the questions than only giving the requested information.

Limitations

In this study was aimed to stay close to the study of Verkooijen, Stok and Mollen (in-press) in order to filter the effect of the intervention on the type of behavior; the healthy fruit

consumption and the unhealthy snack consumption. Nevertheless there have been some slight changes in the design of the questionnaire. In the first questionnaire sent, the first message was included to recruit people. The message used for this thesis has been in accordance to the message from the fruit study, but remarkable is that there has been a much bigger drop-out in the snack study than in the fruit study. Possibly this could be due to other factors like a different background of the people who were addressed to participate in the research. Another difference in the study is a difference in the measures; for snack consumption the division between unhealthy and healthy snacks could be made which was not the case for fruits. In order to give participants the opportunity to express themselves completely, they were asked to fill out their healthy snacks as well even though this information has not been used in the analyses of unhealthy snack consumption. Nevertheless, during the analyses of the unhealthy snack consumption, there were some answers ambiguous. Respondents gave answers in which they argued that their snack like a sausage roll would be a healthy snack, and other respondents who attributed gingerbread to unhealthy snacks due to the sugar consistency. These argumentations were not in line with the used snack diary of Adriaansen et al (2010) which was used as a guideline. In the cases where those ambiguous answers were given, the respondent's perception has been taken into account when calculating their scores. There has been chosen for this (as described in the method section) since this would be in line with their own experiences which is important for the effect of a descriptive norm message.

Another limitation is the self reporting method used in this study. This method enables participants to write down their snack intake at a moment in time that fits best for them which makes it very user friendly. However, the self reporting method might not be the most reliable method since there is lots of space for bias: respondents might have remembered their consumption wrongly, gave socially desirable answers or not understood the snack consumption tables correctly (even though respondents said in the open questions that it was very easy to understand and to fill out). A slight indication of respondents struggling with filling out the tables is that there have been respondents who noted that it was not possible to deselect a consumed snack once it was selected, even though this was a possibility. Also respondents explained that they only saw after three questionnaires that they were asked to only mention their snacks consumed besides breakfast, lunch and meal. While designing the questionnaire there has been paid a lot of attention to wordings and the lay-out by underlining words, putting sentences in italics or making important words bold. The remarks of respondents have all been incorporated. For example: taking out answers in the data when the respondent indicated that he/she wrongly clicked an answer or answering their questions

regarding the questionnaire. Their remarks show that it might be possible that extending the method by for example in-depth interviews would lead to a better mutual understanding of the method and thus the outcomes. This will be discussed further in the recommendation section below. Since there is not made use of interviews, it can be considered as a limitation that the understanding of certain used concepts such as '*snack consumption*' and '*intention*' is dependent on the context. As noted by Smith (1998), cultural and social factors from people's background shaped the way they see their world. And therefore it is important to realize that the same expressions don't have to mean the same for different people. Language is hereby also recognized as an important influence of the production of meaning (Smith, 1998). Even though respondents in the research were native Dutch speakers, this should be taken into account by the meaning given to their values and interpretations. The same words could be used, but the meaning can be slightly different or has a different meaning.

The literature suggests that there are external factors influencing the behavior of an individual over time. Respondents in this thesis already indicate in the open questions some of the possible external factors. For example: one respondent became more conscious of his/her behavior during the time that she was filling out the questionnaire (Hawthorne effect). Another respondent sent later a message in which she told that she thought it was very funny how she changed her snack consumption after the study, because now she ate all the unhealthy things she had missed for two weeks to compensate. This indicates that also for her, same as the prior respondent described, the fact that she knew she was participating in a study influenced her behavior. This could be seen as a limitation to experiments in general since it shows that at least these respondents have possibly changed their behavior during the time of the study.

Recommendations

This research was carried out with a positivist approach which entails a focus on quantitative data and uses value free measures for retrieving this data. The aim of a study within the positivist approach is to find pre-existing patterns which are neither context nor time-bounded, therefore the results can be generalized (Bryman, 2008). Possibly, in order to have a better understanding of the individual's considerations and arguments regarding their behavior, a more interpretivist approach could be on the basis of a similar study. Interpretivism assumes that the world is ever changing and understanding of the world is fully dependent on interactions of people and these people make sense of the world with their own

opinions. The aim of this interpretivism approach is to understand a phenomenon (Bryman, 2008). The usefulness of an interpretivist approach is underlined by the study of Fishbein and Cappella (2006). They found that regarding avoiding misperceptions of the results in the research, researchers cannot fully understand or explain beliefs about performing behaviors without asking members of a population to explain their own beliefs. This explanation by insiders is needed in order to understand the behavior from an emic (insider's) point of view. Fishbein and Cappella (2006) explain that these beliefs can be a basis for the intervention to increase the impact. The idea of applying an insider's view to increase the effectiveness of interventions is also underlined by Rhodes and Courneya (2003). They state that descriptive and injunctive norms were the best predictors for intention towards a behavior. However, in order to use this knowledge about beliefs for interventions, the population and the specific behavior have to be considered; there is not one universal method of communicating norms to apply in all cases. These assumptions combined with the suggestion of Verkooijen, Stok and Mollen (in-press) that social norms and consumption are time and context bound, could make a mixed method design for a study an interesting approach. The mixed method design would combine the quantitative data with qualitative data which for example could be gathered with in-depth interviews. The mixed method suggestion is also underlined by Smith (1998) who states that variables are not caused by another, but rather that the entire theory is shaped by the social and cultural context. Even though it will be time consuming, in-depth interviews with and observations of respondents could be therefore very valuable for future studies in order to discover underlying reasons for behavior related decision making processes other than the social norms which are focused on in this study. It would be possible by these methods to discover more about one's social and cultural context and interpret this correctly. Difficulties of the interpretivist approach have been noted by Smith (1998) as the fact that the researcher is embedded within the object of study and that things we consider things as being true since we are familiar with them (Smith, 1998). This could especially for the participant observations lead to problems in trying to get a detailed overview.

It would also be very interesting to find out if and how people keep track of their consumption or that they are fully depending on their memory the day after the consumption. Research in another population could also provide different insights. It would be valuable to have a study prior to this to find out in what context unhealthy snack consumption takes place. In the fruit study and the snack study the target population consisted of students. As discussed above,

social norms messages might not have an impact on the respondent if he/she has the idea that unhealthy snacking does not take place in the context of being a student, but rather in another environment, for example among friends (Neighbors et al, 2008; Schoffield et al, 2001). Then it would make more sense to conduct a study in which a norm message communicates the snack consumption of your friends rather than a target group the respondent does not identify him/herself with in this context.

6. Conclusion

The main research question in this study is: *Does providing a descriptive social norm message about unhealthy snack consumption among Dutch students has an effect on the snack consumption of these students?* To answer this question, the fruit study conducted by Verkooijen, Stok and Mollen (in-press) has been used as a frame work to set up this experiment in which the topic has been changed to unhealthy snack consumption. In their study, Verkooijen, Stok and Mollen (in-press) elaborated on the study of Schultz et al (2007) who found that descriptive social norms messages can change human behavior. Verkooijen, Stok and Mollen (in-press) added to their study a control group which was not in the design of Schultz et al (2007). In this control group the respondents did not receive a descriptive norm message. Verkooijen, Stok and Mollen (In-Press) found in their study that behavioral change would not be totally depending on the descriptive norm message but rather be influenced by external factors. The behavioral change observed in their study and possibly the study of Schultz et al (2007) would be caused by the regression to the mean effect. Therefore, the study of Verkooijen et al (in-press) illustrates the importance of a control group in the design of an experiment.

The results in thesis are in line the findings of Verkooijen, Stok and Mollen (In-Press). Both the control group and the intervention group show a change in behavior; respondents who scored on base-line above the mean decrease in score and respondents who scored on base-line under the mean have increased their score in the follow-up.

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Appendix

1 Food diary

Aadraanse et al (2010)

Dag: **Tijd:**

Gezonde tussendoortjes	aantal	Ongezonde snacks	aantal
<input type="checkbox"/> Fruit, namelijk .....	..... stuks	<input type="checkbox"/> Klein koekje	..... stuks
<input type="checkbox"/> Fruit, namelijk .....	..... stuks	<input type="checkbox"/> Cake of grote koek	..... stuks
<input type="checkbox"/> Fruit, namelijk .....	..... stuks	<input type="checkbox"/> Taart of gebak	..... stuks
<input type="checkbox"/> Fruit, namelijk .....	..... stuks	<input type="checkbox"/> Bonbon of stukje chocolade	..... stuks
<input type="checkbox"/> Groente, namelijk .....	..... stuks	<input type="checkbox"/> Candybar (bijv. reep, Twix, M&M's, Mars, Snickers)	..... stuks
<input type="checkbox"/> Groente, namelijk .....	..... stuks	<input type="checkbox"/> Snoepje	..... stuks
<input type="checkbox"/> Rijstwafel	..... stuks	<input type="checkbox"/> Waterijs	..... stuks
<input type="checkbox"/> Cracker/cracotte	..... stuks	<input type="checkbox"/> Roomijs	..... stuks
<input type="checkbox"/> Bruine boterham	..... stuks	<input type="checkbox"/> Warme hartige snack, namelijk .....	..... stuks
<input type="checkbox"/> Ontbijtkoek	..... stuks	<input type="checkbox"/> Slaatje	..... stuks
<input type="checkbox"/> Krentenbol/mueslibol	..... stuks	<input type="checkbox"/> Chips/zoutjes/noten (per handje)	..... handjes
<input type="checkbox"/> Beschuitje	..... stuks	<input type="checkbox"/> Popcorn (per handje)	..... handjes
<input type="checkbox"/> Volkoren biscuit	..... stuks	<input type="checkbox"/> Toastjes met .....	..... stuks
<input type="checkbox"/> Bakje magere yoghurt (evt. met muesli)	..... bakjes	<input type="checkbox"/> Anders, namelijk .....	.....
<input type="checkbox"/> Kopje bouillon/heldere soep	..... kopjes	<input type="checkbox"/> Anders, namelijk .....	.....
<input type="checkbox"/> Magere drinkyoghurt	..... glazen	<input type="checkbox"/> Anders, namelijk .....	.....
<input type="checkbox"/> Anders, namelijk	<input type="checkbox"/> Anders, namelijk .....	.....
<input type="checkbox"/> Anders, namelijk .....	.....	
<input type="checkbox"/> Anders, namelijk .....	.....	

Eventuele opmerkingen:

.....

<u>Snack</u>	<u>Original text in Dutch</u>	<u>Estimation kcal</u>
Small cookie	Klein koekje	60
Cake or big cookie	Cake of grote koek	140
Piece of pie	Taart	270
Bonbon	Bonbon	65
Candybar	Candybar	240
Candy	Snoepje	20
Water ice cream	Waterijs	75
Dairy ice cream	Roomijs	100
Warm, hearty snack	Warme, hartige snack	300
Russian Salat	Slaatje	200
Crisps	Chips	120
Popcorn	Popcorn	40
Toast with...	Toastje met...	55

1.1 Values assigned to snacks of the snack diary.

The following is an overview in which the snacks are mentioned with the value given to the consumed snack. All snacks are valued as one piece with the exception of crisps and popcorn which have been measured not per piece but per ‘hand full of...’. The values are based upon the estimated average amount of calories with regard to the perception of the respondent. This has been done in order to make the intervention message credible to the receiver.

<u>Snack</u>	<u>Original text in Dutch</u>	<u>Value</u>
Small cookie	Klein koekje	0.5
Cake or big cookie	Cake of grote koek	1
Piece of pie	Taart	1
Bonbon	Bonbon	0.5
Candybar	Candybar	1
Candy	Snoepje	0.2
Water ice cream	Waterijs	0.5
Dairy ice cream	Roomijs	1
Warm, hearty snack	Warme, hartige snack	1
Russian Salat	Slaatje	1
Crisps	Chips	0.5
Popcorn	Popcorn	0.5
Toast with...	Toastje met...	0.5

There had to be made some decisions about snacks that were not included in the snack diary which has been the basis of the questionnaire. Pepernoten (spiced shortbread cookies) were often consumed in the research period which was prior to Sinterklaas. 1 pepernoot has been counted as 0.2 (like a candy). Other snacks which were not represented in the snack diary have been compared on the basis of kcal to other snacks.

Some respondents did use other amounts in the table, for example a bag of crisps or a small cup. A bag has been measured as 2 and a cup has been measured as 1.

2 Online questionnaires - Dutch

Recruitment message

Beste student,

Bedankt voor jouw interesse in dit onderzoek van de Leerstoelgroep Gezondheid en Maatschappij van Wageningen University. Met dit onderzoek proberen we meer te weten te komen over snackconsumptie van Nederlandse studenten. Om deel te kunnen nemen, moet je de Nederlandse taal beheersen en studeren aan een Nederlandse MBO, HBO of universiteit. **Of je veel of weinig snacks eet, maakt niet uit.**

Als je meedoet aan het onderzoek, krijg je binnenkort naast deze, nog zeven zeer korte vragenlijsten via de e-mail toegestuurd. Het invullen zal maximaal vijf minuten duren, in veel gevallen zelfs korter. De meeste vragenlijsten (zes van de acht) vragen je om kort aan te geven hoeveel en wat voor snacks je de vorige dag hebt gegeten. Vul de vragenlijsten daarom zo snel mogelijk na ontvangst in.

Deelname aan het onderzoek is geheel vrijwillig. Je kan je op ieder moment terugtrekken van deelname zonder dat dit enige consequenties voor jou heeft. De antwoorden worden anoniem verwerkt en alleen voor onderzoeksdoeleinden gebruikt. In de eerste vragenlijst vragen we je om je e-mailadres in te vullen zodat we de resterende vragenlijsten naar jou toe kunnen sturen. Onder diegenen die alle vragenlijsten hebben ingevuld, worden tien VVV-bonnen van vijftien euro verloot. De winnaars zullen per e-mail op de hoogte worden gesteld.

Bij eventuele vragen kun je contact opnemen met Anne.vantetering@wur.nl

Alvast bedankt voor jouw tijd.

Anne

Intention measurement on base line

Geef hier per stelling aan in welke mate je het er mee eens bent door het bijpassende bolletje aan te klikken.

	Helemaal oneens	Beetje oneens	Neutraal	Beetje eens	helemaal eens
Ik wil de komende tijd weinig of geen ongezonde snacks eten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ben van plan om de komende tijd weinig of geen ongezonde snacks te eten	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik verwacht de komende tijd weinig of geen ongezonde snacks te eten.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ik ga de komende tijd weinig of geen ongezonde snacks eten.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Snack consumptie

In de volgende twee tabellen kun je jouw snack consumptie van gisteren aangeven (dinsdag/woensdag/donderdag). In de eerste tabel staat een overzicht van gezonde snacks, in de tweede tabel staat een overzicht van ongezonde snacks.

In de eerste kolom zijn de snacks weergegeven, in de tweede kolom kun je het aangeven als je deze snack gegeten hebt. VUL DIT ALLEEN IN ALS JE DAADWERKELIJK DEZE SNACK GEGETEN HEBT.

In de derde kolom kun je de hoeveelheid aangeven die je gegeten hebt. Dit wordt gemeten in stuks, tenzij anders aangegeven.

Vul de vraag zo zorgvuldig mogelijk in!

Tabel 2 Gezonde snacks

Vul hier in welke gezonde snacks je op 14/16/17 oktober 2014 gegeten hebt. SNACKS ZIJN TUSSENDOORTJES DIE NIET ONDER ONTBIJT, LUNCH OF DINER VALLEN.

Indien je ze niet gegeten hebt, hoef je ze niet aan te klikken.

	Ja, heb ik gegeten	Hoeveelheid
		Stuks
Rijstwafel	<input type="checkbox"/>	<input type="text"/>
Cracker/Cracotte	<input type="checkbox"/>	<input type="text"/>
Bruine boterham	<input type="checkbox"/>	<input type="text"/>
Ontbijtkoek	<input type="checkbox"/>	<input type="text"/>
Krentenbol/mueslibol	<input type="checkbox"/>	<input type="text"/>
Beschuitje	<input type="checkbox"/>	<input type="text"/>
Volkoren biscuit	<input type="checkbox"/>	<input type="text"/>
Bakje magere yoghurt (evt met muesli) (hoeveelheid in bakjes)	<input type="checkbox"/>	<input type="text"/>
Kopje bouillon/heldere soep (hoeveelheid in kopjes)	<input type="checkbox"/>	<input type="text"/>
Magere drinkyoghurt (hoeveelheid in glazen)	<input type="checkbox"/>	<input type="text"/>
Anders, namelijk: <input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Anders, namelijk: <input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Anders, namelijk: <input type="text"/>	<input type="checkbox"/>	<input type="text"/>

Tabel 2 Ongezonde snacks

Vul hier in welke ongezonde snacks je op 14/15/16 oktober 2014 gegeten hebt. SNACKS ZIJN TUSSENDORTJES DIE NIET ONDER ONTBIJT, LUNCH OF DINER VALLEN. Indien je ze niet gegeten hebt, hoef je ze niet aan te klikken.

	Ja, heb ik gegeten	Hoeveelheid Stuks
Klein koekje	<input type="checkbox"/>	<input type="text"/>
Cake of grote koek	<input type="checkbox"/>	<input type="text"/>
Taart of gebak	<input type="checkbox"/>	<input type="text"/>
Bonbon of stukje chocolade	<input type="text"/>	<input type="checkbox"/>
Candybar (bijv. chocoladereep, Twix, Mars, Snickers, M&M's)	<input type="text"/>	<input type="text"/>
Snoepje	<input type="checkbox"/>	<input type="text"/>
Waterijs	<input type="text"/>	<input type="checkbox"/>
Roomijs	<input type="text"/>	<input type="checkbox"/>
Warme hartige snack, namelijk: <input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Slaatje	<input type="checkbox"/>	<input type="text"/>
Chips/zoutjes/noten (hoeveelheid per handje)	<input type="checkbox"/>	<input type="text"/>
Popcorn (hoeveelheid per handje)	<input type="checkbox"/>	<input type="text"/>
Toastjes met: <input type="checkbox"/>	<input type="text"/>	<input type="checkbox"/>
Anders, namelijk: <input type="text"/>	<input type="checkbox"/>	<input type="text"/>
Anders, namelijk: <input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Anders, namelijk: <input type="text"/>	<input type="checkbox"/>	<input type="text"/>

Bedankt voor het invullen van de tweede/derde/vierde vragenlijst, morgen zul je de volgende ontvangen. Door aan alle vragenlijsten deel te nemen, maak je kans op één van de tien VVV-bonnen.

Als je nog vragen of opmerkingen hebt, kun je deze hier kwijt.

Klik op verder om de antwoorden op te slaan en de vragenlijst af te sluiten.

Intervention message

De ervaring leert dat deelnemers aan enquêtes het vaak interessant vinden om hun 'scores' te vergelijken met die van anderen. Daarom willen wij hier wat meer informatie over geven.

Uit de resultaten van vorige week blijkt dat *studenten gemiddeld 2,05 stuks ongezonde snacks per dag* consumeren.

Bij de berekening is rekening gehouden met het type snack (kleine snacks tellen minder zwaar dan grote snacks)

Op basis van jouw antwoorden blijkt dat jij **MEER/MINDER** ongezonde snacks eet dan de gemiddelde student.

Vind je het verrassend dat je meer/minder ongezonde snacks eet dan de gemiddelde student?

- Ja, heel erg verrassend
- Ja, een beetje verrassend
- Neutraal
- Nee, niet echt verrassend
- Nee, helemaal niet verrassend

Intervention group: remembered feedback message

Halverwege dit onderzoek heb je feedback gekregen over de gemiddelde ongezonde snackconsumptie onder studenten en jouw eigen consumptie. We zijn benieuwd wat jij van deze feedback onthouden hebt.

Wat was het gemiddelde?

At jij meer of minder ongezonde snacks dan de gemiddelde student?

- meer
- minder
- weet ik niet meer

Control group: remembered feedback message

Wat denk jij dat de gemiddelde consumptie van ongezonde snacks is?

Denk je dat jij meer of minder hebt geconsumeerd?