



Compensatory Health Beliefs -
The Development of an Eating-Specific Scale

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Samenvatting

Onderwerp: Het doel van dit onderzoek is het ontwikkelen en de evaluatie van een eet-specifieke Compensatory Health Belief (CHB) vragenlijst. CHBs zijn opvattingen dat een negatief/ ongezond gedrag compenseert kan worden door een positief, gezond gedrag, zo dat het negatief gedrag kan worden geneutraliseerd. Knäuper et al. (2004) hebben al een vragenlijst ontwikkelt die algemene CHBs meet. Maar deze vragenlijst meet specifieke gedragingen niet in detail. Daarom is het onderwerp van deze studie ongezond eetgedrag. Mensen kunnen in een staat van cognitieve dissonantie komen omdat ze de verleiding van ongezond maar lekker eten niet kunnen weerstaan en tegelijkertijd gezond en slank willen blijven. Zij kunnen proberen deze cognitieve dissonantie door eet-specifieke CHBs op te lossen.

Design: Kwalitatieve interviews zijn afgenomen om items voor de vragenlijst te genereren. Voor de evaluatie van de vragenlijst is gebruik gemaakt van cross-sectional data.

Proefpersonen: 170 proefpersonen, waarvan de meerderheid (97%) studenten waren hebben aan het onderzoek deel genomen.

Methoden: De nieuw ontwikkelde eet-specifieke CHB vragenlijst en een aantal andere meetinstrumenten zijn afgenomen om de betrouwbaarheid en validiteit van de vragenlijst te bepalen. Ook de voorspellende waarde voor het consumeren van ongezonde eten/ snacks is geëvalueerd.

Resultaten: De Cronbach's α van de vragenlijst was 0.68. De factorstructuur en de construct validiteit was goed. Verder had de vragenlijst een significante negatieve Pearson correlatie ($r=0.29$) met de aangepaste versie van de Fat List en de regressie analyse ondersteund de voorspellende waarde van de vragenlijst.

Conclusie: De eet-specifieke CHB vragenlijst kan gebruikt worden om eet-specifieke compensatie opvattingen te meten. Het is mogelijk de consumptie van ongezond eten/snacks gebaseerd op de score van de vragenlijst te voorspellen. Verder onderzoek is nodig om de betrouwbaarheid van de vragenlijst te verhogen en meer inzicht in het domein van het onderwerp te krijgen.

Abstract

Objective: The aim of the study was to develop and evaluate an eating-specific Compensatory Health Beliefs (CHBs) scale. CHBs are beliefs that a negative/unhealthy behaviour or consequences of negative behaviour can be compensated by positive, healthy behaviour, so that the negative behaviour can be neutralized. A scale that measures these general CHBs was already developed by Knäuper et al. (2004). The scale is, however, very generic and does not assess specific behaviour in detail. The subject of this study is unhealthy eating behaviour. People who eat unhealthy food/snacks might get in a state of cognitive dissonance because they want to stay healthy and thin but cannot resist the temptation of unhealthy food. They might try to resolve this cognitive dissonance by eating-specific CHBs.

Design: Qualitative interviews were used for the item generation. For the survey study cross-sectional data were used to evaluate the scale.

Subjects: The study was conducted among 170 participants whereof the majority (97%) were students.

Method: The new developed eating-specific CHB (ECHB) scale and other measures were tested in the group of participants in order to determine the reliability and construct validity of the scale. Also the predictive value for the intake of unhealthy food/or snacks was evaluated.

Results: The whole scale's Cronbach's α was 0.68, that suggests that the reliability is questionable. But the factor structure and the construct validity of the scale were good. The eating-specific CHB scale had a significant negative Pearson correlation ($r=-0.29$) with the adapted version of the Fat List and the multivariate regression analysis maintained the predictive value of the scale.

Conclusion: The ECHB scale can be used as an instrument to measure eating-specific CHBs. It is possible to predict the intake of unhealthy food/ snacks based on the score of the ECHB. Further research is needed to increase the reliability of the scale.

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1. Introduction

1.1 Background

Today we are living with food in abundance. Everyday we fight against the ‘too much’ or the ‘too bad’ consumption of food. The desire to stay healthy is crucial and healthy food and a balanced diet are, besides physical activity and avoidance of risk behaviour (smoking, consumption of alcohol etc.), an important component of it. Food is an important factor for human beings when it comes to physical and psychological well-being (Rozin, Fischler, Imada, Sarubin & Wrzesniewski, 1999). Consumption of food that is high in fat and sugar and less consumption of fruit, vegetables and fibre is related to obesity and diseases (McClain, Chappuis, Nguyen-Rodriguez, Yaroch & Spruijt-Metz, 2009). Unhealthy food (along with alcohol, tobacco and a lack of physical activity) is a major global cause of chronic disease (European Chronic Disease Alliance, 2011). This point shows the importance of the subject and the importance to do further research on it.

In the following “unhealthy eating/food” that might arouse negative feelings and concerns is defined as eating a serving of food, which is high in calorie and rich in fat and/or sugar. Examples for these foods are chips, cake, sweets, fast food etc..

Food is nowadays always and everywhere available and so the temptation to eat more than necessary or more than healthy is high. Because of this many people are unable to abstain from unhealthy eating or overeating and have difficulties to eat healthy (Cutler, Glaeser & Saphiro, 2003). Eating behaviour is influenced by many variables. One variable is the taste of food. Studies have shown that humans prefer the taste of sugar and fat over the taste of vegetables and fruits (Chadwick, Crawford & Ly, 2013). This makes the resistance to eat unhealthy food even more difficult. Another variable that influences the eating behaviour is the social context (Chadwick et al., 2013). Eating behaviours are learned by other people and are highly influenced by social circumstances. Children’s food intake is highly linked to the eating behaviour of their parents. And in young adolescents, peer support and peer pressure play an important role. Studies have also shown that especially adolescents eat higher quantities of foods which are rich in fat, sugar and salt and eat less fruit and vegetables (Institute of Medicine, 2007; Fitzgerald, Heary, Kelly, Nixon & Shevlin, 2013).

The two most known and reliable cognitive models to analyse dietary behaviour are the Socio-Cognitive Theory by Bandura (1986) and the theory of planned behaviour by Ajzen (1985). These constructs contain the factors of self-efficacy and outcome expectations, two factors that are crucial in eating behaviour (Cerin, Barnett & Batanowski, 2009). The Socio-Cognitive Theory is a learning theory that says that people learn from watching others. The behaviour of a person is individual and interlinked with environmental factors and personal cognitive factors. One of these cognitive factors is self-efficacy. This factor affects the motivation to fulfil a particular behaviour. It's a person's assumption to what extent he/she is able to accomplish the behaviour successfully. Besides this factor the outcome expectancy is of importance. This refers to a person's supposition of the expected benefit of an action. The theory of planned behaviour says that the attitude towards a behaviour, the subjective norms and the perceived behavioural control together create a behavioural intention and therefore the behaviour. The concept of perceived behavioural control refers to self-efficacy. Within this concept, a person forms beliefs about the perceived ability of performing a particular behaviour. When it comes to dietary behaviour, self-efficacy refers to a person's perceived potential to make healthy food choices or to resist unhealthy eating (Lubans, Plotnikoff, Morgan, Dewar, Costigan & Collins, 2012). In addition to the perceived ability, people can create beliefs about compensating bad food choices.

A study from Brotons, Drenthen, Durrer and Moral (2011) shows that most people think that their eating habits are important for their health. It seems that the majority knows that 'unhealthy' eating is not good. A further negative result of unhealthy eating is that it also may result in overweight, which does not match with the current beauty ideal (Grunert, Shepard, Traill & Wold, 2012). Women and also men tend to see 'thin' as beautiful and good looking. For this reason, too much or unhealthy eating might arouse negative feelings and concerns. These concerns seem to be a bit bigger in women than in men (Rozin et al., 1999). Women seem to have bigger concerns in the areas of health control and weight (Rozin et al., 1999; Steptoe, Pollard & Wardle, 1995). Another group that might get more in touch with these concerns are adolescents. Because they have a higher intake of unhealthy food the chance that this arouses negative feelings and concerns might be higher in this group than in other population groups. So the cognitive aspects of eating behaviour are very important to identify. These aspects are necessary to develop effective nutrition strategies and understand eating behaviour in order to enhance it (McClain et al., 2009).

Many studies have shown that interventions had only little or no effect in changing the eating behaviour of the participants (Ammerman, Lindquist, Lohr & Hersey, 2002; Contento, Balch, Bronner, Lytle, Maloney, Olson & Swadener, 1995). The reason for the failure may be the incorrectness or incompleteness of recent theoretical assumptions through which unhealthy eating behaviour can be changed (Shaikh, Yaroch, Nebeling, Yeh & Resnicow, 2008; Cerin et al., 2009). So the need for more insight in this behaviour is high. One aspect may be the research on Compensatory Health Beliefs.

1.2 The CHB model

Unhealthy but pleasure giving behaviour can cause a negative aroused state of cognitive dissonance (Festinger, 1957). This cognitive dissonance (motivational conflict between desires and health goals) can start before or after engaging in a pleasurable but unhealthy activity (Rabiau, Knäuper & Miquelon, 2006). When these negative feelings arise, people try to justify their behaviour.

To minimize this state of dissonance and discomfort people can use different strategies (Rabiau et al., 2006). They can try to resist the unhealthy behaviour (1), they can re-evaluate and adapt the degree of risk of the unhealthy behaviour and the possible outcomes (2) or they can create compensatory beliefs (3) (Rabiau et al., 2006). The second and third strategies are used when desire is very high and hard to resist. Whereas the first strategy is used when the temptation is not that big and when self-efficacy is high. The first two strategies are quite exertive because they require self-control (Rabiau et al., 2006).

The third strategy is the creation or activation of Compensatory Health Beliefs (CHBs) (Knäuper, Rabiau, Cohen & Patriciu, 2004). People try to imagine compensatory behaviours that can 'neutralize' the negative effects of an unhealthy action. A good example for this is the temptation of eating a piece of cake. People know that it is unhealthy to eat cake, but they try to legitimate this by creating a compensatory behaviour. They might think that eating the cake is okay because they want to go to the gym later the day, so that the calories of the cake are burned off (Knäuper et al., 2004). Knäuper et al. (2004) define Compensatory Health Beliefs as beliefs that certain unhealthy (but pleasurable) behaviours can be compensated for by engaging in healthy behaviour. The model is illustrated in Figure 1.

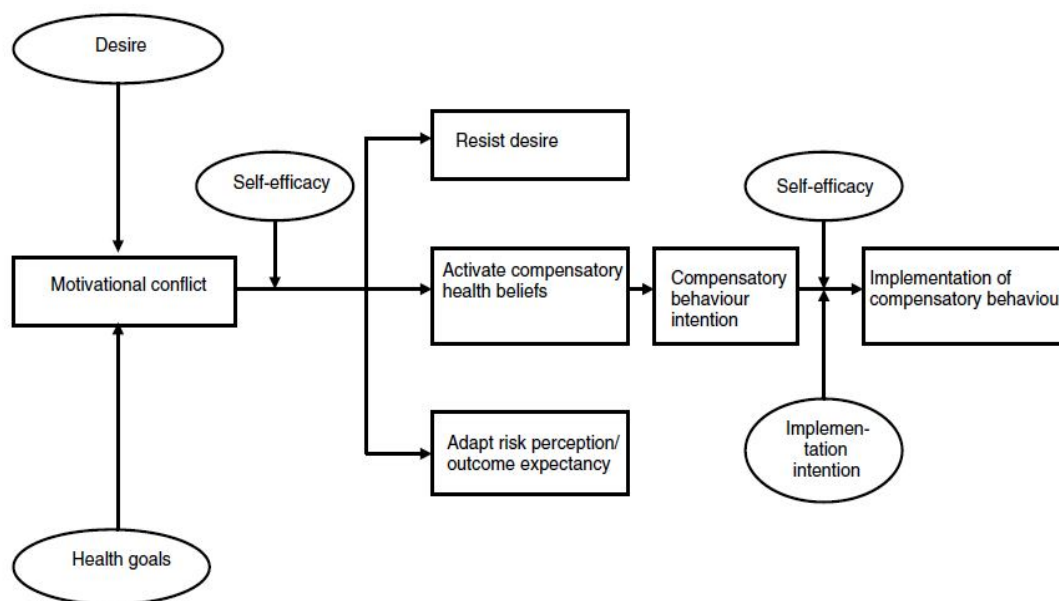


Figure 1. Compensatory Health Beliefs model. Reprinted from Rabiau et al., 2009.

CHBs seem to be a very popular strategy because that strategy allows people ‘the best of both worlds’ (Rabiau et al., 2006). It is important to mention that these beliefs often do not actually result in the performance of the compensatory behaviours (de Nooijer, Puijk-Hekman & van Assema, 2009). Rabiau et al. (2006) suggest that people are motivated not to question the validity of the CHBs they hold. So the CHBs people create can be scientifically inaccurate. Moreover, although CHBs may be correct or effective to some degree, using inaccurate or too many CHBs may have negative consequences and a bad effect on health.

1.3 CHB model and eating

People want to establish a balance between the fulfilment of their desires (eating a cake) and the achievement of their goals (staying healthy) (Muraven & Baumeister, 2000). As described above, using Compensatory Health Beliefs is an easy and comfortable way to establish this balance. With the use of CHBs it may be possible to eat a piece of cake, without feeling bad or thinking that they cannot stay healthy. The conflict of fulfilling the desire of eating a delicious but unhealthy piece of food and the goal of staying healthy arises everyday anew. People are confronted with unhealthy food everyday, everywhere. One study has found that Americans link highly caloric food to tasty food (Raghunathan, Naylor & Hoyer, 2006). In this present study *unhealthy food* is defined as food that is high in calories, fat and/or sugar. From the literature is known that it might be likely that CHB are activated in

connection with unhealthy eating. However, currently no scale is available that measures this eating-specific relation in detail.

1.4 Aim of the study

Knäuper et al. (2004) have developed a psychometric scale that measures the general use of Compensatory Health Beliefs. That scale consists of 17 items, subdivided in four subscales. These subscales are: substance use, stress, weight regulation and eating/sleeping habits. The scale has been evaluated by Kaklamanou, Armitage and Jones (2013). Their study has shown some inconsistencies in the CHB scale. The first problem they found is the formulation of the items. Almost every participant had a problem with at least one item. Sometimes the participants needed explanations of what an item means. Furthermore this study confirms another study by Nooijer et al. (2009), which states that the psychometric properties within the subscale of the original version are apparently bad. The face validity seems solid, but the reliability of the four different subscales seems to be poor (Kaklamanou et al., 2013). That problem might arise from the inaccuracy of the subscales and the formulation of the items.

The domain of eating related CHBs is only handled in two items in a subscale that also measure the sleeping habits. There is no independent subscale for the subject eating behaviour. This lack of eating-specific items leads to the assumption that no specific conclusions, concerning the relation between eating behaviour and CHBs, can be made. As mentioned in the study by Kaklamanou et al. (2013), it would be useful to have items for specific behaviour. So the aim of this study is to develop a reliable and valid scale that deals with eating-specific CHBs.

The first step in developing the scale is a qualitative study. The items are generated with the help from qualitative structured interviews. Through the interviews more knowledge and insight in eating-specific CHBs should be gained. The statements of the interviewees are the base on which the prospective items rely. The second step, after the generation of the items and the developing of the scale, is to determine the factor structure and the reliability of the whole scale and the different found factors.

The next step is to analyse the construct validity. For this different other measures are integrated in the analysis. Correlations between the new developed eating-specific CHB scale and the other measures are calculated. To evaluate the amount of CHBs in relation to the intake of unhealthy food, it is chosen to take a part of the *Fat List* by van Assema, Brug,

Ronda and Steenhuis (2001). Self-efficacy, that plays a crucial role in making bad or good eating choices, is measured with the *Health-Self-Efficacy Scales* by Schwarzer and Renner (2000). To have an indicator of the generally physical condition of a respondent the *Body Mass Index* (BMI) is measured. Also items for the theory of planned behaviour (attitude, subjective norm, perceived behavioural control and intention) are integrated.

To examine the construct validity, it is hypothesized that self-efficacy will correlate significantly with the eating-specific CHBs. People with higher self-efficacy are expected to make more healthy food decision and hold less CHB. So that people who have more eating-specific CHBs show lower self-efficacy. Referring to the Fast List it is expected that people who have a higher intake of unhealthy food and snacks use more eating-specific CHBs. People with a higher BMI supposable tend to eat more (unhealthy) than people with a lower BMI. So that these people potentially become in motivational conflict between health-goals and desire more often. For that reason it is assumed that people with a high amount of eating-specific CHBs, have a higher BMI than people who have less eating-specific CHBs. It is also expected that eating-specific CHBs add value to the theory of planned behaviour. Finally to examine whether the eating-specific CHB scale can predict unhealthy eating behaviour, the predictive validity of the scale, above and beyond the different measures, will be determined.

2. Methods

For this study two different kinds of research were conducted. At the beginning of the whole study a qualitative study was performed to develop the items of the eating-specific CHB scale. The next step was to determine the validity and reliability of the new developed scale. Therefore a survey study was performed.

2.1 Scale development

2.1.1 Procedure

Before the development of the eating-specific scale started, it was chosen to do qualitative interviews to generate the items. The interviews should bring more insight in the thoughts of the participants and discover possible eating-specific CHBs. The scheme of the semi-structured interview led the interviewer through the conversation. It was important that every issue of the scheme was asked. First, it was necessary to know what the respondent understood about unhealthy eating and whether it is generally possible that unhealthy food

can be compensated. If the respondent thought that unhealthy eating cannot be compensated, the interview was not continued. That happened in one case. The other respondents were asked to imagine some ways to compensate the self-chosen unhealthy food. In the end a total of six respondents completed the interview. This qualitative study was stopped after interviewing the six respondents, because nothing new was mentioned after this. The interviewees were all students of the University of Twente, five of them were female one was male. Except one international business administration student, all of them studied psychology. So, that this group matched the final research group.

2.1.2 Results

Via the semi-structured interviews the respondents proposed examples for eating-specific compensatory beliefs. Some of these ideas were:

- “I can compensate unhealthy food by eating less the rest of the day.”
- “I do sport to compensate unhealthy food.”
- “You can compensate unhealthy food by eating healthy things.”

Many other similar variations of these statements were made. They all referred to compensating unhealthy food or/of snacks by exercising a lot, eating fruits or vegetable, or just eat nothing or less. On the basis of these suggestions and with a review from a health psychology professional a total of 10 items for the scale was created. These items contained different aspects of eating-specific Compensatory Health Beliefs, such as compensating by doing sport, eating less or eating healthy. The wording of the items was easy to understand, to minimize confusion.

2.2 Eating-specific CHB scale

The final version of the eating-specific CHB scale (Table 1) consisted of 10 items that were subdivided into three different types of compensating behaviour.

The first part contained three items and referred to *eating-less/nothing* to compensate unhealthy food. Here was assumed that eating nothing or less before or after eating unhealthy food can compensate unhealthy food. The second part contained items that refer to *doing sport* to compensate unhealthy food. The third part of the scale is related to beliefs about *eating healthy* to compensate unhealthy food. The items referred to the belief that, as long as one eats healthy during the day, it is okay to eat unhealthy once in a while.

Table 1. *The Eating-specific CHB Scale*

Part	Items	Original item in Dutch
Eating less/nothing	1. It is okay to eat unhealthy as long as I eat nothing the rest of the day.	Het is oké eens ongezond te eten als ik de rest van de dag niets meer ga eten.
	2. It is okay to eat sweets and/or chips in the evening, when I didn't eat much during the day.	Als ik de hele dag bijna niets heb gegeten mag ik s 'avonds wel snoepjes en/of chips eten.
	5. Eating nothing the rest of the day can compensate for eating unhealthy.	De rest van de dag niets meer eten kan ongezond eten compenseren.
Doing sport	3. It is okay to eat snacks or unhealthy things as long as I exercise during the day.	Als ik in loop van de dag ga sporten mag ik ook snacks of ongezond dingen eten.
	4. I can do sport today to compensate unhealthy eating from yesterday.	Als ik gisteren ongezond heb gegeten kan ik dit compenseren door vandaag te sporten.
	8. Doing sport can compensate for eating unhealthy.	Sporten kan ongezond eten compenseren.
Eating healthy	6. I can neutralize an unhealthy meal by eating a healthy meal (vegetables, fruits etc.).	Met een gezonde maaltijd (groente, fruit etc.) kan ik een ongezonde maaltijd neutraliseren.
	7. When I eat healthy during the entire day, I am allowed to eat one or two unhealthy things.	Als ik de hele dag gezond eet, mag ik ook één keer of twee iets ongezonds eten.
	9. When I eat unhealthy today I can compensate this by	Als ik vandaag ongezond heb gegeten kan ik dit

eating only low-calorie food tomorrow.	compenseren door morgen alleen calorieënarm eten.
10. Low-calorie/ healthy food can compensate an unhealthy meal.	Calorieënarm/gezond eten kan een ongezond maaltijd compenseren.

As in the original CHB scale from Knäuper et al. (2004) each item was scored on a five-point scale ranged from ‘Totally agree’ (1) to ‘Totally disagree’ (5). At the end a sum score was calculated. So items were coded in the way that a high score therefore meant that the respondent did not have much eating-specific CHBs and a low score meant that the respondent tends to think that unhealthy food can be compensated.

2.3 Survey study

To evaluate the reliability and validity of the eating-specific CHB scale a survey study was performed.

2.3.1 Procedure

For recruiting the participants for the survey study, convenience sampling was used. The participants were recruited through Sona-Systems and through the researcher self via social medias and personal contact. Sona System is an online pool for students from the University of Twente in Enschede (Netherlands), to participate in research projects. The respondents from Sona-Systems gained credits for their participation. The participation was anonymous. The participants had to complete the questionnaires online, via a received link from www.thesistools.com that led to the study. Specific introductions for every scale guided the participants through the different questionnaires. Together with the eating-specific CHB scale and the associated questionnaires, two other behaviour-specific Compensatory Health Beliefs were tested. One part dealt with alcohol drinking and the other part dealt with physical exercising. For these parts, new behaviour-specific CHB scales were developed as well, and associated questionnaires were used, too. At the beginning of the study participants were ask about their age, gender and education. The total number of questions the participants had to answer in the online questionnaire was 93. At the end of the questionnaire the participants had the chance to fill in the Sona-Identification student number, so that they

could earn their credits. Furthermore participants were given the possibility to fill in their email-address, if they wanted to be informed over the study results.

2.3.2 Measures

Several other instruments were used to analyse the construct and predictive validity of the developed eating-specific CHB- scale.

Snack consumption

To evaluate the consumption of ‘unhealthy food’ or snacks, an adapted version of the Fat List by van Assema, Brug, Ronda and Steenhuis (2001) was used. The original scale contains 35 items. For this study, only those items that dealt with snacks (8 items) were selected. This part of the scale contained items concerning candy, chocolate, fried snack and other unhealthy food. Participants were asked how often they consumed different kinds of food. A typical item was: “How often do you eat snacks like nuts and peanuts in between meals? ”. It was asked how often they eat the different kinds of food on average each week (‘less than once in a week’ (1) till ‘seven days a week’ (5)). In the adapted version the scoring system was changed. Instead of a scale ranging from 0 to 5, the version for this present study only consisted of a scale ranging from 1 to 5. The sum score provided information about the frequency of eating unhealthy food and/or snacks per week. The original version from Assema et al. (2001) calculated an individual fat score instead. The Pearson correlations between the original Fat List scale from Assema et al. and the real total fat intake was about 0.7 for adults and 0.6 for adolescents.

Self-efficacy

To evaluate eating-specific self-efficacy, the items from the nutrition subscale from the Schwarzer and Renner Health-Self-Efficacy Scale (2000) were used. That subscale contained 5 items. These items were statements referring to the perceived ability to manage to eat healthy foods. An example of these statements was, ‘I can manage to stick to healthy food, even if I need a long time to develop the necessary routines’. The participants had to answer on a four-point scale if they are rather ‘very certain’ (1) or rather ‘very uncertain’ (4) that they are able to eat healthy in different cases. Items were translated into Dutch. The Cronbach’s α for the original nutrition self-efficacy scale was good ($\alpha= 0.87$).

Theory of Planned Behaviour

Four single-item measures were developed to measure the components of the theory of planned behaviour. The items were generated to analyse the attitude, social influence (which consisted of subjective and descriptive norm) and perceived behavioural. To measure the subjective norm the following item was generated: “My friends think that I should eat less unhealthy food/snacks”. Participants had to say in how far this applies to them (“Surely not” (1) till “Surely” (5)). Additional one item referred to the descriptive norm (“How many of your friends eat unhealthy food and/of snacks regularly?”) was scored with “Almost no one” (1) till “Almost everybody” (5). One item that referred to the attitude (“To reduce the intake of unhealthy food and/of snacks by myself is...”) had to be completed on a five-point scale from “good” (1) to “bad” (5). Intention was measured with the statement “I am going to reduce my intake of unhealthy food and/of snacks in the following 12 months”. As with subjective norm, participants had to say in how far this applies to them “Surely not” (1) till “Surely” (5)).

Body-Mass-Index

In the beginning of the study participants were asked to provide their length and their actual weight. With these data the individual Body-Mass-Index (BMI) was computed. The formula to calculate the BMI is kg/m^2 . In general, the BMI is an indicator for overweight/healthy weight, which might be related to unhealthy eating behaviour.

2.3.3 Data analysis

The analysis of the data was done with Statistical Package for the Social Sciences (SPSS 20.0 for Windows). The significance level was set at 0.05 for all analyses.

First, the distribution of gender, the age and the education level were analysed to get information about the demographic and descriptive data of the sample. The next step was to examine the internal construct validity of the eating-specific CHB scale. For this a factor analysis with principle components with varimax rotation was done to determine the number of factors or rather the number of dimensions of the scale. The criterion that was used was that an item had to have at least a factor loading of 0.40 to belong to a factor. Next the Cronbach's α was calculated to measure the internal consistency of the whole scale and for

any subscales/factors. A minimum Cronbach's α of 0.70 was defined as adequate reliable. A scale with a Cronbach's $\alpha < 0.70$ is questionable but not unusual by scales with short length (Schmitt, 1966). To examine the external validity of the new scale Pearson correlations with the health self-efficacy scale, the Fat List, the BMI and the items of the theory of planned behaviour were done. To determine the predictive validity of the eating-specific CHB scale, a stepwise multivariate regression analysis was performed in which the score of the Fat List was the dependent variable. In the first step, all the variables that had a significant correlation with the Fat-List (except the score of the CHB-scale) were entered in the regression analysis. In the second step the score of CHB-scale was entered to test if the scale has an additional value. To explore the difference in use of CHBs between women and men, a t-test for independent-samples was made.

3. Results

For the analysis the results were examined for missing values and extreme outliers.

3.1 Participants

From the total of 185 people who participated, 170 completed the study. From these 170 participants the majority were students (Table 3). The age of the participants ranged between 18 and 52 years of age. The majority of the sample consisted of women. A total of 81,2% was women and 18,8% was men. The high amount of women in this sample was representative for the program of study (psychology) at the University of Twente.

Table 2. *Demographic information*

		Minimum	Maximum
Total amount	170		
Percentage women	81.2 (n=138)		
Percentage men	18.8 (n=32)		
Mean age (SD)	21.27 (3,26)	18.00	52.00

Table 3. *Current activity*

	Percentage
Study	97.1
Work	7.1

Other	3.5
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Note. Multiple answers were possible.

3.2 Factor analysis

To measure the internal consistency of the 10 items of the eating-specific CHB scale an exploratory principal components factor analysis with varimax rotation was used. Three factors that conformed the criteria were found. The factor structure is shown in Table 4. The third factor contained two items. It was chosen to exclude this factor because of the small amount of items and the low Cronbach's α .

The two other factors were selected for the further analysis. The first factor contained items that referred to behaviours like sport and eating healthy. Participants, who scored high on the five items of this factor, thought that doing sport and eating healthy things can compensate for unhealthy eating behaviour. This factor accounted for 40.61% of the variance of all items. The second factor contained two items that referred to the compensation method of eating nothing and/or eating less. A high score on this scale implied that the participant thought that eating nothing could compensate the consequences of unhealthy eating. The two factors accounted for cumulative 57.06% of the variance of the total.

Table 4. *Factor loadings, Cronbach's α values, mean scores (M) and standard deviations (SD) of the eating-specific CHB Scale*

Factor	Item	Cronbach's α	1	2	3	M	SD
Factor 1		0.62				15.73	3.11
	I can do sport today to compensate unhealthy eating from yesterday.		.669	.030	.011		
	I can neutralize an unhealthy meal by eating a healthy meal (vegetables, fruits etc.).		.485	-.053	.270		
	Doing sport can compensate can compensate for eating unhealthy.		.461	.258	.207		
	When I eat unhealthy today I can compensate this by eating only low-calorie food tomorrow.		.640	.232	-.197		
	Low-calorie/ healthy food can compensate an unhealthy meal		.794	.133	-.026		
Factor 2		0.62				11.44	2.35
	It is okay to eat unhealthy as long as I eat nothing the rest of the day.		.057	.785	.002		
	It is okay to eat sweets and/or chips in the evening, when I didn't eat much during the day.		.131	.687	.318		
	To eat nothing the rest of the day can compensate for eating unhealthy.		.198	.695	-.210		
Factor 3		0.44				5.12	1.39
	As I do sport during the day I might eat unhealthy things.		-.041	.288	.770		
	When I eat healthy during the entire day I am allowed to eat one or two unhealthy things.		.099	-.194	.740		

Note. Factor loading above .45 are bold; M, mean of the total score of the factor

3.3 Reliability

The Cronbach's α of the whole scale was $\alpha=0.66$ ($n=10$). The alpha coefficients for the first factor was $\alpha=0.62$, and for the second factor $\alpha=0.62$ (see Table 5). The corrected item-total correlation supported the decision to remove the two items from the third factor from the scale. The correlations of these two items ($r= 0.23, 0.07$) were below the average of the other items ($r= 0.36$). The correlations of the other items ranged between $r= 0.24$ and $r= 0.470$. The total scale's Cronbach's α , if these two items were deleted, increased to $\alpha=0.68$. So the third factor was excluded and the subsequent analysis was done with the two factors and the total score of the eating-specific CHB scale.

3.4 Validity

The correlations and characteristics of the eating-specific CHB scale and the other measures are shown in Table 4. To determine the construct validity of the scale the Pearson correlations were calculated between the eating-specific CHB scale and the other measures. To determine the predictive validity a multivariate regression analysis was done.

3.4.1 Construct validity

The expectation, that people who eat generally more unhealthy food and snacks hold more eating-specific CHB, was found to be right. The score on The Fat List correlated negatively with the eating-specific CHB score ($r=-0.29$). As predicted, the nutrition subscale of the health specific self-efficacy scale also correlated significantly with eating-specific CHBs scales ($r=0.24, r=0.17, r=0.22$). That means that higher nutrition specific self-efficacy is associated with lower use of eating-specific CHBs. Against expectations, no significant correlation between the BMI and the use of eating-specific CHBs was found ($r=0.07$). So there is no evidence that people who have a higher BMI tend to have more eating-specific CHBs. Results also showed that there was nearly no correlation between the items of the theory of planned behaviour and the eating-specific CHB scale found. The only item that correlated significantly was the item that measured the subjective norm ($r=-0.17$). That means that more eating-specific CHBs are associated with the thought of the participants that their friends think that they should eat less unhealthy food and snacks.

Table 5. Characteristics (mean, standard deviation, Cronbach's α) and correlations of the scale and the other measurements

Scale	M	SD	Range	Alpha	ECHB	ECHBf1	ECHf1	BMI	Fat List	SE	TPBi	TPBsn	TPBdn	TPBa
ECHB	32.29	4.86	1-5	.66	-	.83**	.73**	-.07	-.29**	.24**	-.07	-.17*	-.05	-.04
ECHBf1	15.73	3.11	1-5	.62		-	.34**	-.04	-.20**	.17*	-.05	-.06	.00	-.02
ECHBf2	11.44	2.35	1-5	.62			-	-.08	-.20**	.22**	-.05	-.22**	.04	-.06
BMI	22.00	2.82	0-100	-				-	-.03	.03	.10	.02	.07	-.05
Fat List	12.35	3.90	1-5	.73					-	-.24**	-.03	.32**	.11	.12
SE	14.65	3.41	1-4	.82						-	-.17	-.36**	-.14	-.08
TPBi	3.44	1.23	1-5	-							-	.16*	.14	-.46**
TPBsn	1.72	0.98	1-5	-								-	.05	.02
TPBdn	3.16	1.00	1-5	-									-	-.05
TPBa	1.49	0.75	1-5	-										-

Note. ECHB, eating-specific CHBs; ECHBf1, factor 1 eating-specific CHBs; ECHBf2, factor 2 eating-specific CHBs ; BMI, Body Mass Index (kg/m^2); SE, health-specific self-efficacy nutrition subscale; TPBi, theory of planned behaviour (ToPB) intention component; TPBsn, ToPB subjective norm component; TPBdn, ToPB descriptive norm component; TPBa, ToPB attitude component.

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

3.4.2 Predictive validity

To determine if the eating-specific CHB scale could predict eating behaviour, a regression analysis was done. Based on the correlation analysis, the four variables (score of the Fat List, the ECHB, the self-efficacy nutrition subscale and of the subjective norm) were included in a hierarchical regression analysis, with the score of the adapted Fat List as dependent variable. It was measured whether the scores of the self-efficacy subscale, the subjective norm and the eating-specific CHB scale were able to predict the score of the Fat List/ the intake of unhealthy food/ snacks. The findings of the regression analysis are shown in Table 6. In the first model, the scores of the self-efficacy and the subjective norm were regressed on the Fat List. As seen in Table 6 the subjective norm is a significant predictor of the Fat List score. The health-specific nutrition self-efficacy added no additional value in predicting unhealthy food intake significant predictive value. In the second model the score of the eating-specific CHB scale was added. The beta for ECHB and R^2 -change was significant. That implied that the score of the eating-specific CHB scale had an additional value in predicting the intake of unhealthy food/snacks.

Table 6. *Regression analyses with Fat List as dependent variable*

	df's	Beta for ECHB	t-value for ECHB	p-value	F	R^2	Sig. F Chang e
Model 1:	(2, 167)				11.39	.12	.000
Self-efficacy,		-.14	-1.78	.077			
TPBsn		.27*	3.51	.001			
Model 2:	(1, 166)				11.43	.17	.002
Self-efficacy,		-.09	-1.18	.240			
TPBsn,		.25*	3.27	.001			
ECHB		-.23*	-3.20	.002			

Note. ECHB, eating-specific CHBs; TPBsn, theory of planned behaviour subjective norm component ; * $p < .05$

3.5 The use of eating-specific CHBs in men and women

To explore whether there is a differences in use of eating-specific CHBS between men and women, an independent-samples t-test was carried.

Table 7. *Gender differences*

Scale	Mean (SD) Total	Mean women (SD) (n= 138)	Mean men (SD) (n= 32)	p-value
ECHB	32.29 (4.86)	31.93 (4.97)	33.84 (4.06)	0.045
ECHBf1	15.73 (3.11)	15.62 (3.26)	16.19 (2.33)	0.356
ECHBf2	11.44 (2.35)	11.20 (2.39)	12.03 (2.12)	0.115
Fat List	12.35 (3.90)	12.60 (4.10)	11.25 (2.78)	0.078
Self-efficacy	14.65 (3.41)	14.54 (3.42)	15.13 (3.38)	0.386
BMI	22.00 (2.82)	21.65 (2.73)	23.53 (2.75)	0.001

Note. ECHB, eating-specific CHBs; ECHBf1, factor 1 eating-specific CHBs; ECHBf2, factor 2 eating-specific CHBs

As seen in Table 7 women hold significant more eating-specific CHBs. That finding applies only for the whole scale and not for the separated two factors. The other significant difference between women and men was found in the BMI. Men had significant higher BMI than women.

4. Discussion

The aim of this study was to develop a scale that measures eating-specific Compensatory Health Beliefs. Based on the results of the study, it appeared that the new developed scale has a good factor structure, good construct validity and a predictive value.

An eating-specific CHB (ECHB) scale that initially consisted of 10 items was developed. In contrast to the original established parts “Eating less/nothing” “Doing sport” and “Eating healthy” of the eating-specific CHB scale, the factor analysis found out two main factors. These two factors consisted of 8 items of the scale. The second factor was consistent with the original developed part of the scale “Nothing”. That subscale refers to the possibility to compensate unhealthy food/ snacks by eating nothing the rest of the day. The second factor was a combination of items of the two subscales “Eating healthy” and “Doing Sport”. People who score high on this factor

think, that doing sport and/or eating healthy can compensate for eating unhealthy food/snacks. The factor analysis also extracted a third factor. But this factor was excluded by the further analysis, because of its small number of items ($n=2$) and its low internal consistency. The internal consistency of the total eating-specific CHB scale was $\alpha=0.68$. That means that internal consistency of the scale is questionable. That applied also for the two subscales/factors ($\alpha=0.62$). But the low internal consistency may be influenced by the short length of the test (Schmitt, 1996).

The negative correlation between the score of the CHB scale and the Fat List supported its construct validity. It was shown that people who eat more unhealthy food/snacks use more eating-specific CHBs. That was in accordance with the hypothesis that people who eat more unhealthy food, are getting more often in a state of cognitive dissonance, and may hold more eating-specific CHBs to resolve that conflict. Also a positive correlation between the nutrition subscale of the health-specific self-efficacy scale and the eating-specific CHB scale was found. That confirmed the assumption that people who have a higher self-efficacy, tend to have less eating-specific CHBs. People with a higher self-efficacy are more motivated to fulfil a particular behaviour. So in this case people with a higher self-efficacy do not need to hold eating-specific CHBs, because they may not get in the state of cognitive dissonance as they are more able to resist the temptation to eat unhealthy food/snacks. That finding is consistent with what is known from literature (Lubans et al., 2012).

The assumption that this result is also reflected in the BMI was not confirmed. Against the expectations, and in contrast to the original study from Knäuper et al. (2004), no significant correlation between the CHB scale and the BMI was found. One possible reason that no correlation was found is that people might tend to provide a weight that is lower than their real weight. That might be the case because participants tend to answer social desirable. And a lower weight is generally seen as socially more accepted (Pesa, Syre & Jones, 2000).

Contrary to the expectation, that the eating-specific CHBs correlate significant with the components of the theory of planned behaviour, it was only the case for one item. This item measured the subjective norm of the participant. That says that people with more eating-specific CHBs when they think that they friends/family think they should eat less/healthier. The pressure to be socially accepted and eat unhealthy food at once may lead to the state of cognitive dissonance and a higher amount of eating-specific CHBs. There is no indication that the eating-specific CHBs generally add value

to the theory of planned behaviour or that it have the specific ability to modify the intention to fulfil an eating-specific behaviour. A reason why the expectation could not be confirmed might be the small number of items for measuring the components. Another point may be the formulation of the items. For example, the item for intention “I am going to reduce my intake of unhealthy food and/of snacks in the following 12 months”. Someone who already eats healthy and wants to continue that behaviour may negate this question, although the intention to eat less unhealthy food is present. In future research a higher amount of items per component and a rewording of the different items would be recommendable.

It was chosen to take the score of the whole scale for the regression analysis because the correlations with the other measures were higher. The regression analysis found that the item that measured the subjective norm has an additional value in predicting the score of the Fat List. But the most important outcome from the regression analysis is that the eating-specific CHB scale is able to predict the intake of unhealthy food/ the score of the Fat List above and beyond self-efficacy and subjective norm. So predictions about the intake of unhealthy food/snacks can be made, based on the score of the eating-specific CHB scale.

The women in the sample hold significantly more eating-specific CHBs than the men. Surprisingly, they also have a lower BMI than the men. Literature suggests that women stand under high pressure to fulfil the current standard of attractiveness (Rozin et al., 1999; Steptoe, Pollard & Wardle, 1995). Discrimination on the basis of their body weight is well known under women (Ali Rizzo & Heiland, 2013; Ali, Fang & Rizzo, 2010). So this suggests that women may get quicker in a state of cognitive dissonance when they are confronted with the seduction of tasty but unhealthy (weight-gaining) food.

Overall this study showed that it is difficult to develop a sufficiently reliable scale that measured eating-specific CHBs. As mentioned in the study from Poelman, Vermeer, Vyth and Steenhuis (2012) eating unhealthy snacks might be associated with a different type of behaviour, a more affective type that might not be related to healthy eating or compensation behaviour at all. Poelman et al. (2012) developed a scale that measured diet-related CHBs. In their study the only subscale that had a lower internal consistency, was the one that contained only snack related items. A study from Kaklamanou et al. (2013) also showed that the eating-/sleeping- subscale of the original CHB scale had a poor Cronbach's α ($\alpha=0.33$). During their think aloud study,

participants had many problems in understanding the meaning of items. The wording of the items might be a point in this present study, too.

A further limitation of this study might be the homogeneity of the sample, for example, the high percentage of women. As already mentioned, women stand under big pressure to fulfil the beauty ideal and maybe have a different attitude towards unhealthy food than men. Because of the low percentage of men in the study it limits the generalizability and also the external validity. It would be interesting to see in how far the results would differ when the percentage of men in the sample increase. Furthermore, the majority of respondents (97%) were students and what also was surprising was the quite healthy BMI of the respondents ($M=22.00$). Therefore, for a next study it is suggested to look for a better-balanced sample, with a higher percentage men and people from different backgrounds.

The next thing that could be improved for a follow-up study is the number of items. From 10 original developed items only 8 were retained after by factor analysis. A scale that consists of only 8 items may lack of reliability. So for a future study the pool of items should be expanded, too. Another point that refers to the improving of the items, is the generation of it. In the qualitative interviews that were done to generate them, only one interviewee was male. It may be the case that relevant CHB-items that are typically for males are missing. Also were the interviewees all from one age-group. For the next time a higher diversity of gender and age in the qualitative 'pre-study' would be advisable.

Another important point for a future study is the case that eating unhealthy snacks might be associated with a more affective type of behaviour (Poelman et al., 2012). It may be useful and reasonable to do further research on that subject and formulate items in a more affective than cognitive way.

Whether there were some challenges in creating a reliable eating-specific CHB scale, it was shown that the use of the eating-specific CHB correlates with the intake of unhealthy food and that the score of the eating-specific CHB scale is able to predict that intake. Future research is necessary to gain more insight of the use of CHBs in generally and eating-specific CHB in this special case to improve reliability.

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- Stel dat je bent uitgenodigd voor de verjaardag van een goede vriend/verwante. Je weet dat er steeds lekker maar veel te veel en ongezond eten (taart, zoetjes etc.) op tafel komt. Vermoedelijk ga je veel daarvan eten. Wat denk je kun je doen om zonder slecht geweten daarvan te genieten?

5. Doorvragen

- Als het nodig is een ander voorbeeld noemen (chips, patat...)
- Uitleg van gedrag

6. Samenvatten en afronden

- Korte samenvatting geven over het gezegde
 - Uitleggen in welk samenhang deze vraag werd gesteld
 - o CHB-model
 - o in hoeverre deel van bacheloropdracht
-

Compensatory Health Beliefs met betrekking tot eetgedrag

Instructie: Mensen hebben verschillende ideeën over hun eetgedrag. Hieronder staat een lijst van ideeën die iemand kan hebben over gezond eten. Lees elke zin zorgvuldig en geef aan in hoeverre u het eens of oneens bent met de zin door het meest passende antwoorden aan te vinken. Onthoudt dat er geen goede of foute antwoorden zijn omdat iedereen andere ideeën heeft.

1. Het is oké eens ongezond te eten als ik de rest van de dag niets meer ga eten.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

2. Als ik de hele dag bijna niets heb gegeten mag ik s 'avonds wel snoepjes en/of chips eten.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

3. Als ik in loop van de dag ga sporten mag ik ook snacks of ongezond dingen eten.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

4. Als ik gisteren ongezond heb gegeten kan ik dit compenseren door vandaag te sporten.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

5. De rest van de dag niets meer eten kan ongezond eten compenseren.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

6. Met een gezonde maaltijd (groente, fruit etc.) kan ik een ongezonde maaltijd neutraliseren.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

7. Als ik de hele dag gezond eet, mag ik ook één keer of twee iets ongezonds eten.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

8. Sporten kan ongezond eten compenseren.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

9. Als ik vandaag ongezond heb gegeten kan ik dit compenseren door morgen alleen calorieënarm eten.

- Helemaal eens
 - Eens
 - Neutral
 - Oneens
 - Helemaal oneens
-

10. Calorieënarm/ gezond eten kan een ongezond maaltijd compenseren.

- Helemaal eens
- Eens
- Neutral

- Oneens
 - Helemaal oneens
-

Adapted version of The Fat List (van Assema, et al., 2001)

Instructie: In de volgende gedeelte staan vragen met betrekking tot je eetgedrag in de afgelopen zes maanden. Geef a.u.b. aan hoe vaak je het genoemde eten gemiddeld per week consumeert.

Probeer altijd een antwoord in te vullen. Als je twijfelt, vul dan het antwoord in dat het beste bij jou past.

1. Hoe vaak per week eet je tussendoor, naast een warme hoofdmaaltijd, frituurde snacks zoals patat?

- minder dan 1 keer per week
 - 1 of 2 keer per week
 - 3 of 4 keer per week
 - 5- 6 keer per week
 - 7 dagen per week
-

2. Hoe vaak per week eet je snacks zoals noten en pinda's tussen de maaltijden?

- minder dan 1 keer per week
 - 1 of 2 keer per week
 - 3 of 4 keer per week
 - 5- 6 keer per week
 - 7 dagen per week
-

3. Hoe vaak per week eet je snacks zoals chips, stukjes kaas of worst?

- minder dan 1 keer per week
 - 1 of 2 keer per week
 - 3 of 4 keer per week
 - 5- 6 keer per week
 - 7 dagen per week
-

4. Hoe vaak per week eet je gebak, taart of grote koekjes?

- minder dan 1 keer per week
 - 1 of 2 keer per week
 - 3 of 4 keer per week
 - 5- 6 keer per week
 - 7 dagen per week
-

5. Hoe vaak per week eet je snacks zoals chocola?

- minder dan 1 keer per week

- 1 of 2 keer per week
 - 3 of 4 keer per week
 - 5- 6 keer per week
 - 7 dagen per week
-

6. Hoe vaak per week eet je snacks zoals snoeprepen?

- minder dan 1 keer per week
 - 1 of 2 keer per week
 - 3 of 4 keer per week
 - 5- 6 keer per week
 - 7 dagen per week
-

7. Hoe vaak per week eet je gewoonlijk koekjes?

- minder dan 1 keer per week
 - 1 of 2 keer per week
 - 3 of 4 keer per week
 - 5- 6 keer per week
 - 7 dagen per week
-

Health-specific self-efficacy scale, Nutrition Subscale (Schwarzer& Renner, 2010)

Introductie: In dit gedeelte staan een aantal uitspraken met betrekking tot het in staat zijn om gezond voedsel te eten.

Hoe zeker bent u ervan dat u de volgende belemmeringen zou kunnen overwinnen?

Ik kan me eraan houden om gezond voedsel te eten, zelfs als ik een lange tijd nodig heb om de nodige routines te ontwikkelen.

- Helemaal onzeker
 - Beetje onzeker
 - Beetje zeker
 - Helemaal zeker
-

Ik kan me eraan houden om gezond voedsel te eten, zelfs als ik het eerst een paar keer moet proberen voordat het werkt.

- Helemaal onzeker
 - Beetje onzeker
 - Beetje zeker
 - Helemaal zeker
-

Ik kan me eraan houden om gezond voedsel te eten, zelfs als ik niet veel steun ontvang van andere mensen wanneer ik mijn eerste pogingen waag.

- Helemaal onzeker
 - Beetje onzeker
 - Beetje zeker
 - Helemaal zeker
-

Ik kan me eraan houden om gezond voedsel te eten, zelfs als ik een gedetailleerd plan moet maken.

- Helemaal onzeker
 - Beetje onzeker
 - Beetje zeker
 - Helemaal zeker
-

Theory of Planned Behaviour

Instructie: Geef ook bij de volgende items aan in hoeverre deze van toepassing zijn.

Ik ben van plan de komende 12 maanden het eten van ongezond voedsel en/of snacks te verminderen.

- Zeker niet
-
-
-
- Zeker

Mijn vrienden/vriendinnen vinden dat ik minder ongezond voedsel en/of snacks moet eten.

- Zeker niet
-
-
-
- Zeker

Hoeveel van je vrienden/vriendinnen eten regelmatig ongezond voedsel en/of snacks?

- (Bijna) geen
- Sommige
- De helft
- De meesten
- (Bijna) allen

Zelf het eten van ongezond voedsel en/of snacks te verminderen vind ik...

- goed
 -
 -
 -
 - slecht
-