Environmental Influences on Healthy Eating and Weight Management Strategies among Dutch University Students

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Preface

Dear reader,

About six months ago I started to work on this thesis, which is part of the master program Health and Society at Wageningen University. The first step was to search for a topic that I was willing to work on for half a year. Given my interest in health and nutrition, I was determined to combine both. However, translating these interests into a thesis topic seemed to be quite difficult for me and it took some time before I was happy to start with data collection.

Working on this thesis improved both my research and writing skills, and confirmed my interest in healthy nutrition.

Although I conducted this research mainly on my own, I was glad to have supervision and support of others. I would like to thank my supervisor Kirsten Verkooijen for all the time she has invested in this research. Her guidance and advises helped me to make decisions, solve problems and be critical on my own work. Further, I am grateful to all the students that took the time and effort to fill out the online questionnaire or participated in the focus group interview. Without their help, I would not have been able to create this thesis in its current form. Lastly, I would like to thanks everybody who supported me during this phase of my master, by expressing interest, giving advice and saying motivating words.

I hope you will enjoy reading this thesis and find or keep the motivation to eat healthy.

Charlotte Wouters

Abstract

Background: Many students suffer from overweight or obesity. To control eating behavior and reduce weight, weight management strategies can be used. These strategies help to cope with social and physical environmental influences, which are unique for students depending on their living arrangement. More information on the weight management strategies of students is needed in order to develop effective interventions. Following previous research, between group comparisons based on living arrangement, gender and BMI (Body Mass Index), would be helpful to discover differences in weight management strategies among students. To create an even more complete picture, the influence of the social and physical environment on eating behavior of students should be researched as well.

Research aims: The first aim of this study is to test and explore the difference between the perceived influence of the social and the physical environment on healthy eating behavior of students. The second aim of this study is to test and explore differences in weight management strategies among students. Both research aims take into account the variables living arrangement, gender and BMI.

Methods: To fulfill the research aims, mixed methods were used. A questionnaire has been constructed and distributed online. Within three weeks, 202 respondents filled out the questionnaire. Data analysis included a repeated measures ANOVA to test the difference between the perceived influence of the social and physical environment and a MANOVA to test differences in weight management strategies. Further, six students – selected on living arrangement and gender – participated in a focus group interview, during which the outcomes of the questionnaire were discussed and explained.

Results: The mean score on the perveived influence of the social environment was higher compared to that of the physical environment, but the outcomes of the repeated measures ANOVA showed no main effects, only a significant three-way- and four-way interaction. The focus group participants indicated the social environment to be more influential compared to the physical environment, but also stressed the complexity of the situation. The outcomes of the MANOVA showed that there were significant main effects for living arrangement, gender and BMI. However, after Bonferroni correction, only gender-based differences remained significant. The focus group participants indicated gender-based differences in interests, norms and imitation behavior, as well as different factors regardless of living arrangement to be of influence on behavior and weight management.

Conclusions: Findings suggest that there is a small difference between the perceived influence of the social and the physical environment on healthy eating among students, whereby the social environment is slightly more influential. Further, the current research showed that gender plays a more important role in student's weight management than living arrangement and BMI. It is recommended to further research the complexity of relationships between eating behavior and weight management among students, and other associated factors.

Keywords: Students; social environment; physical environment; eating behavior; self-regulation; weight management strategies.

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1. Introduction

During their studies, students experience several transitions. Most students get more responsibilities than ever before (Cluskey & Grobe, 2009; Greaney et al., 2009), especially during their first experience of living away from their parents. The challenges that accompany these transitions are partly due to a changing environment, both socially and physically. While the social environment refers to the influence of other people on the individual, the physical environment refers to the influence of the physical characteristics of places where one spends his or her time (Brug, 2007). These new environments of students require adaptation of behavior, including adaptation of eating behavior. Although underestimated for a long time (Dagevos & Munnichs, 2007), the importance of environmental influences on eating behavior has been demonstrated in several studies (Wardle, 2006; Meiselman, 2006; Dagevos & Munnichs, 2007) and its influence is nowadays fully recognized (WHO, n.d.). The environment contains both barriers and enablers for healthy eating (Greaney et al., 2009). If students do not feel stimulated or feel hindered to eat healthy, unhealthy eating habits may be the result, probably leading to overweight or even obesity. Overweight among students is well documented (among others: Lloyd-Richardson, Bailey, Fava & Wing, 2009; Gropper, Simmons, Connell & Ulrich, 2012; Kumah, Akuffo, Abaka-Cann, Affram & Osae, 2015). In the Netherlands, 34% of the university students was found to be overweight, while 9% was found to be obese (Centraal Bureau voor de Statistiek [CBS], 2014). These numbers are of great concern, since overweight and obesity among young adults may increase the risk on several health issues in later life (Cluskey & Grobe, 2009).

In multiple studies it was found that differences in eating behavior and body weight between students were associated with living arrangement and gender. Both the social and the physical environment congregate in one's living arrangements, influencing eating behavior. According to Dagevos and Munnichs (2007), the living environment influences the possibilities and difficulties of people to make healthy food choices. Students face environmental influences that are unique depending on their living arrangement. Brunt and Rhee (2008) conducted research among students and found that: 'Living arrangements influence lifestyle factors such as food choices, nutrient content of the diet, alcohol consumption, smoking, and dieting' (p. 616). These results were supported with other studies, from which it can be concluded that living away from home generally influences the diet quality of students in a negative way (Papadaki, Hondros, Scott & Kapsokefalou, 2007; Brunt & Rhee, 2008; Riddell, Ang, Keast & Hunter, 2011; Ansari, Stock & Mikolajczyk, 2012), leading to weight gain (LaCaille, Dauner, Krambeer, & Pedersen, 2011; Deliens, Clarys, De Bourdeauhuij & Deforce, 2014). Regarding gender, research outcomes suggest male students having a diet of lower quality (Chourdakis, Tzellos, Papazisis, Toulis, & Kouvelas, 2010; Ansari et al., 2012; Navarro-González, 2014) and a higher weight (Chourdakis et al., 2010; Gazibara, Tepavcevic, Popovic, & Pekmezovic, 2013).

In order to prevent or decrease overweight due to social and physical environmental influences, individuals might apply self-regulation strategies. Such strategies can be used for the successful adaptation of behavior (Mann, de Ridder & Fujita, 2013). Regarding eating behavior, self-regulation strategies are known as weight management strategies, intended to control food intake and maintain a normal body weight or reduce excess body weight (Keller & Siegrist, 2015). Previous research on weight management strategies revealed promising results. For example, Johnson, Pratt

& Wardle (2012) reviewed literature on self-regulation in eating behavior and concluded that self-regulation is essential to control food intake. Also, research among adolescents has shown that the use of weight management strategies is associated with lower intake of unhealthy foods (de Vet et al., 2013). Given these promising results on weight management strategies, it is desirable to design interventions taking into account such strategies, to help people regulate their eating behavior. However, previous research showed that self-regulation is no 'one-fits-all' solution ensuring people to achieve their health-related goals (Mann et al., 2013). Unfortunately, this also applies to self-regulation in relation to eating behavior. Gaining insight in individual factors that underlie the use of the weight management strategies is helpful to develop tailor-made interventions with increased efficacy (Keller & Siegrist, 2015).

Students could benefit from such tailer-made interventions, considering the well documented obesity rates among students and unique environmental influences that students have to deal with. However, little is known about weight management strategies among students and the research that has been done in this field is difficult to compare, due to methodological inconsistency. Keller and Siegrist (2015) described the lack of an instrument to measure weight management strategies and developed the Weight Management Strategies Inventory (WMSI), which will be used in this research. Since previous findings suggest that not all students gain (the same amount of) weight, between group comparisons would be helpful to discover possible differences in weight management strategies. To create an even more complete picture, influence of the social and physical environment on eating behavior of students has to be be researched as well. Therefore, the first aim of the current study is to test and explore the difference between the influence of the social and the physical environment on healthy eating behavior of students. The second aim of this study is to test and explore differences in weight management strategies among students, using the recently developed WMSI. Please note that although physical activity is of importance for weight management, in this research the focus is on foods and the eating behavior.

2. Theoretical framework

In this chapter, the theoretical framework is presented. First, the influence of the social and physical environment on eating behavior is explained. Thereafter, the concepts of self-regulation and weight management will be elaborated on. Next, living arrangement and gender are presented as determinants of student's eating behavior and weight[1]. Further, a conceptual model, which was created for the current research, will be presented. Lastly, the research questions are described.

2.1 The influence of the environment on eating behavior

Social as well as physical environmental influences influence eating behavior. The social environment is about one's interaction with other people, like family, friends, study mates and colleagues (Dagevos & Munnichs, 2007). Regarding eating behavior, individuals have their own social identity depending on what and how much is eaten and in which way (Koelen, 2007). One can imagine that a vegetarian has a different social identity than a meat-lover. When food is eaten in groups, which often is the case, individuals tend to adapt to the eating behavior of others. This powerful mechanism is called role modeling (Swinburn, Egger, & Raza, 1999) and can stimulate or hinder healthy eating. If a role model qualifies raw vegetables as 'food for rabbits', there is a high probability that its popularity will decrease among others. Role modeling also explains why eating with others can increase the food intake and consumption volume of individuals. This is especially true when food is eaten in large groups (Meiselman, 2006) and groups of kind and well-known people (Wansink, 2004). Hereby, the eating duration is of importance (Wansink, 2004; Meiselman, 2006). The longer a meal lasts, the more time there is to consume foods. However, people do not only influence each other when food is eaten together, even people that are not present at the moment of food choice and consumption can still have an influence (Meiselman, 2006). For example, students raised with the idea that healthy eating is important will probably make healthier food choices in further life.

The physical environment has to do with physical aspects of places where people spend time and may consume their food (Brug, 2007). The availability of foods is a significant factor within this type of environment (Swinburn et al., 1999). The amount and type of foods available are associated with the points of sale, which can be supermarkets, restaurants, canteens and vending machines. If tempting foods are available everywhere, this leads to hunger almost automatically. This type of hunger that is related to the availability of foods is called salient hunger (Wansink, 2004). Next to the availability of food itself, availability of information is of importance, including labels and logos on products that people can use for making food choices. These tools can influence choice, mostly stimulating more conscious and healthy choices. (Swinburn et al., 1999). Costs have an influence on eating behavior as well (Koelen, 2007). Also, if certain foods are inaccessible or hard to find, the effort to obtain those foods is too big, resulting in decreased choice and intake (Meiselman, 2006). On the other hand, foods are consumed rapidly if they are stockpiled or served in big portions or packages (Wansink, 2004). Further, distractions influence people's eating behavior (Wansink, 2004). For example, people who watch the television while eating tend to eat more than those who have full attention for their food. Lastly, structure and serving manner of food influence consumption rates (Wansink, 2004). This is because the size of dishes and cutlery, as well as variety and organization of food influence portion sizes.

[1] In this report, both the terms weight and BMI (Body Mass Index) are used, with BMI as indicator for an (un)healthy weight.

2.1.1 Measuring environmental influences

Although the influence of the environment on eating behavior is fully recognized nowadays (WHO, n.d.) and has been studied before, there is no golden standard for researching this influence and the differences between the social and the physical environment on eating behavior. In 2009 it was concluded that there were no valid and reliable measures of food and nutrition environments and these should be developed for future use (Glanz, 2009). Since then, steps have been made and the Food Environments Policy Index (Food-EPI) was developed in order to assess the healthiness of food environments (Swinburn et al., 2013). However, this monitoring tool is aimed at policies at the governmental level and therefore not useable for the current research. To the best knowledge of the researcher, a measurement instrument assessing the influence of the environment on healthy eating of individuals has not been designed. In this study, a first attempt is made to measure these environmental influences. Hereby, social and physical environmental influences are measured in separate questions, so that the difference between both can be determined.

2.2 Self-regulation and weight management

In order to deal with environmental food temptations and to control eating behavior, people might use self-regulation. It has been proven that self-regulation is beneficial in all kinds of health behavior, including healthy eating (among others Johnson et al., 2012; Baumeister & Vonasch, 2015). Self-regulation is a very broad concept, and can also be referred to as self-discipline, self-control, self-esteem and willpower. In this report, the term self-regulation will be maintained, defined as 'the self's capacity for altering its behaviors' (Baumeister & Vohs, 2007, p. 115). This implies that people with a high degree of self-regulation are able to adjust their behavior continuously, depending on the situation. By doing so, one's flexibility and adaptability are high (Mann et al., 2013). Self-regulation is is about goal striving and related processes. When engaged in self-regulatory behavior, individuals should overcome multiple challenges to reach their goal, like choosing the right behavior for the situation goals (Mann et al., 2013). To deal with such challenges, strategies can be applied. These strategies will help people to strive for their goals and behave as desired, with the knowledge they have. According to Mann and colleagues (2013), the strategies can be divided into four main categories: Prospection and Planning, Automating Behavior, Construal, and Effortful Inhibition.

2.2.1 Measuring weight management

Based on the four categories of health self-regulation strategies (Mann et al., 2013), Keller and Siegrist (2015) developed the Weight Management Strategies Inventory (WMSI), which consists of specific weight management strategies. The WMSI was developed because an instrument, to measure control on food intake and body weight of the general population, lacked. The goal of this questionnaire is 'to measure conceptually distinct, weight management strategies by means of short scales with good psychometric characteristics' (Keller & Siegrist, 2015 p. 323). Weight management strategies represent self-regulation strategies of people that are used in daily life to control eating behavior. The instrument distinguishes categories, subcategories, strategies and items. The fact that the WMSI has five broad categories instead of four the four categories divided by Mann and colleagues (2013) is because 'Goal setting and self-monitoring' is used as a first category. Within these five broad categories, nineteen specific weight management strategies can be classified that have been derived from literature review and expert interviews (Keller & Siegrist, 2015). The nineteen specific weight management strategies within these five broad categories are displayed in table 1.

Table 1: Weight management strategies within the broad categories of health self-regulation strategies

	Broad categories and weight management strategies
1.	***Goal setting and monitoring***
	(1) Setting goal of a balanced diet: Setting the goal of a balanced diet and healthy.
	(2) Calorie monitoring: Monitoring daily calorie intake.
	(3) Weight monitoring: Monitoring weight by regular weighing.
2.	***Prospection (of temptation) and planning (of goal-directed and alternative behaviors)***
2.1	Planning meals and context of meals
	(4) Planning food purchases: Planning meals and purchasing.
	(5) Focusing on eating: Concentrating on eating and doing nothing else.
	(6) Sleeping and relaxing: Taking time to relax and sleep.
2.2	Planning regular eating patterns
	(7) Regular, daily meal times: Planning a regular, daily meal rhythm.
	(8) (Ir)regular weekly meal patterns: Planning regular, weekly meal patterns and avoiding meal skipping.
2.3	Prospection of temptation and planning of alternative behaviors
	(9) Avoiding food temptations: Avoiding tempting food situations.
	(10) Distracting oneself from food temptations: Distracting oneself from tempting food situations.
3.	***Automating behavior and routines***
3.1	Replacing high-energy by low-energy food
	(11) Food substitutions: Replacing high-energy food by low-energy food in response to negative emotions by using if–then plans.
3.2	Reducing energy from fats, carbohydrates, and sugar
	(12) Low-carbohydrate diet: Reducing energy intake from carbohydrates.
	(13) Low-fat diet: Reducing energy intake from fats.
	(14) Low-calorie beverages: Reducing energy intake from beverages.
3.3	Reducing energy by eating practices
	(15) Normal portion sizes: Selecting normal portion sizes.
	(16) Eating slowly
	(17) Stopping oneself from eating: Stopping oneself from eating when full.
4.	***Construal (Reinterpretation)***
	(18) Reinterpreting food temptations: Focusing on distal goals, instead of proximal goals.
5.	***Effortful inhibition***
	(19) Inhibiting food temptations: Effortfully inhibiting oneself from eating snacks and sweets.

After the developers of the WMSI collected the nineteen strategies, they developed the scale, for which reliability analysis and exploratory factor analysis were performed (Keller & Siegrist, 2015). Scale testing was done using confirmatory factor analysis, while two existing scales for weight management were used to validate the new scale. In order to do so, data of two different samples from the general (Swiss) population had been used. In order to study the association of the WMSI with dieting success, data of dieters were selected. With a two week test-retest reliability found to be good to very high, the developers concluded the WMSI to be reliable and valid (Keller & Siegrist, 2015). Scores upon the strategies will be measured with the use of 63 statements, which represent the questionnaire items. To get some more insight in the categories, subcategories, strategies and items as distinguished in the WMSI, these will be described below. Hereby, separate paragraphs are maintained for each broad category of weight management strategies.

Goal setting and monitoring

As described before, self-regulation is about goal striving and related processes. A goal can be seen as an end state which is desired to reach. However, goals should not be confused with intentions, since an intention is less powerful and does not guide behavior like goals do (Mann et al., 2013). In order to be able to strive for a goal, this goal should first be determined, which is called goal setting. In the case of healthy eating, a goal can be to reach a balanced diet. Therefore, the first weight management strategy of the WMSI is that of Setting goal of a balanced diet, which is measured among others with the item 'It is my goal to eat sufficient fruit and vegetables every day' (Keller & Siegrist, 2015). Both goal setting and goal striving can be done very consciously or more automatically. Goal setting goes along with determining criteria to judge success, while goal striving is about actively attaining goals. Goal striving includes engaging in strategies and behaviors, but also planning and protecting goals from distraction or disruption. The weight management strategies (2) Calorie monitoring and (3) Weight monitoring represent this more active part of the first WMSI category (Keller & Siegrist, 2015).

Prospection and Planning

The second category assumes planning to be important in order to reach goals (Mann et al., 2013). The weight management strategies (4) Planning food purchases, (5) Focusing on eating and (6) Sleeping and relaxing were placed into the subcategory of Planning meals and context of meals (Keller & SIegrist, 2015). The fourth strategy – Planning food purchases – has to do with grocery shopping and the use of a grocery list, while strategy five – Focusing on eating – is aimed at separating eating from other activities. The strategy of Sleeping and relaxing may not sound related to weight management, but it was found that a lack of sleep increased food purchases (Chapman et al., 2013). Therefore, this strategy was included in the WMSI, with one of the items being: 'I relax on a regular basis'.

The weight management strategies (7) Regular daily meal times and (8) (Ir)regular weekly meal patterns are part of the second prospection and planning subcategory, named Planning regular eating patterns (Keller & Siegrist, 2015). Daily and weekly regular eating patterns were found to positively correlate with weight loss and maintenance (Elfhag & Rössner, 2005).

The third subcategory, of the Prospection and Planning category, is called Prospection of temptation and planning of alternative behaviors (Keller & Siegrist, 2015). This subcategory assumes mental anticipation, preparation and practicing of goal-directed behavior having a positive effect on goal attainment (Mann et al., 2013). In order to avoid food temptations and prevent overeating, alterations in one's personal environment can be part of prospective and planning strategies. Such changes are usually small and probably unconscious (Mann et al., 2013). For some people, the storage of tempting foods within reach automatically leads to consumption. In such a situation, the food should be placed out of sight to avoid being led into temptation (Wansink, 2004). One of the WMSI was based on this ('To avoid being led into temptation, I store certain foods beyond my reach or don't even buy them.'). This item fits within strategy (9) Avoiding food temptations. The tenth strategy is that of Distracting oneself from food temptations, with items about searching for other things to do in case one feels like eating unhealthy or eating without being hungry.

Automating Behavior and Routines

Next, strategies of Automating Behavior and Routines are classified into one general category that has three subcategories. According to Mann et al. (2013), it is important to recognize the role of

automatic processes in promoting goal-directed behavior. Constant and consciously assessing environment, situations, temptation and opportunities can lead to disruption of goal striving. Applying strategies that automate behavior make food choices easier (Sobal, Bisogni, Devine & Jastran, 2006). In recurring situations, people can use the same strategy, whereby the amount of effort and time needed to decide will be decreased. A form of automating behavior has to do with making behavioral plans and is called 'if-then' thinking (Mann et al., 2013). This means that a specific behavior is performed in a particular situation, that has been though about at forehand. The first subcategory within Automating Behavior is that of Replacing high-energy food by low-energy food and drink (Keller & Siegrist, 2015). This subcategory has only one strategy: (11) Food substitution, operationalized in four behavioral plans of which one is: 'If I feel like eating due to boredom, then I first drink water of something low in calories'.

The next subcategory is that of Reducing energy from fats, carbohydrates, and sugar, including the weight management strategies (12) Low-carbohydrate diet, (13) Low-fat diet and (14) Low-calorie beverages. Keller and Siegrist (2015) found that it was recommended to have a low-fat and low-energy diet and therefore included these strategies in the WMSI. According to Mann and colleagues (2013), linking goal related behavior, like reducing energy in foods, to a certain environment will stimulate goal striving if one gets exposed to this environment. Making such links can for example be done in a restaurant setting. The item 'When I eat out, I don't choose breaded or deep-fried foods' (Keller & Siegrist, 2015) demonstrates how this is operationalized in the WMSI.

Third, the strategies (15) Normal portion sizes, (16) Eating slowly, and (17) Stopping oneself from eating belong to the same subcategory, which is Reducing energy by eating practices (Keller & Siegrist, 2015). As the name of the subcategory tells, energy intake cannot only be reduced by adaptation of foods, but also by adaption of the way in which these foods are consumed. It was for example found that energy intake decreased when food was eaten slowly (Andrade, Greene, & Melason, 2008). Therefore, the item 'I take my time to eat' is one if the items in the WMSI to measure the reduction of energy by eating practices.

Construal

Construal is the fourth category of self-regulation strategies (Mann et al., 2013) and is about interpreting things in a certain way. A change in construal means a change in how people think about goal-directed behavior. This change can be seen as a reinterpretation and the eighteenth weight management strategy is therefore named: Reinterpreting food temptations. The 'marshmallow experiment' (Mischel, Shoda, & Rodriguez, 1989) is probably the best known example of an experiment in which this form of self-regulation is proven to be effective. In this experiment, children got one marshmallow, but could get a second one if they would wait fifteen minutes without eating the first marshmallow. By interpreting the marshmallow as an abstract (a cloud in this case), resisting the temptation became easier compared to interpreting the marshmallow emotionally (thinking about the delicious taste) (Mischel et al., 1989). In this way, goal-directed behavior is promoted by linking people's construal of health behavior to distanced and abstract construals. Goal-directed behavior like exercising and eating healthy does often sound very appealing for in the distant future, however, at the moment it should be performed it probably sound way less attractive and feelings of inconvenience and lack of time may take over. It can therefore be recommended to adopt a more distanced view in order to reach goals, which may however not always be the most consistent and spontaneous (Mann et al., 2013). With regard to eating behavior, more distanced and abstract

construals can be achieved by using the earlier strategy of behavioral planning ('if-then' thinking). One of the items of the WMSI that is used to assess the reinterpretation of food temptations is: 'If I am tempted to eat too much, then I say to myself that the pleasure of eating is of short duration, but the extra kilos of weight are of long duration' (Keller & Siegrist, 2015).

Effortful Inhibition

The last category is Effortful Inhibition, which includes the last weight management strategy: (19) inhibiting food temptations (Keller & Siegrist, 2015). This strategy is about suppressing thoughts, feeling and behaviors that are opposed to a goal (Mann et al., 2013). This is done in a conscious way, for example by fighting impulses. If tempting foods are offered, one can actively suppress thoughts, feelings and behaviors in order to regulate oneself. While conscious resources are limited, these kinds of strategies are not always as effective, increasing the chance of failure (Keller & Siegrist, 2015). It has been researched that inhibition requires cognitive capacity and resources as well as motivational resources, and application of Effortful Inhibition strategies is therefore difficult (Mann et al., 2013). However, since consciously resisting temptations can be seen as typical self-regulatory behavior, this will be used to control eating behavior by some people and has been added to the WMSI. Like construal strategies, consciously resisting temptations can be put into practice with behavioral planning ('if-then' thinking). The strategy of inhibiting food temptations had been operationalized into three items, of which one is: 'If I am tempted to eat salty and sweet snacks, then I try to resist the temptation with willpower' (Keller & Siegrist, 2015).

Since 'the WMSI assesses theoretically derived, evidence-based, and conceptually different weight management strategies with different scales that have good psychometric characteristics' (Keller & Siegrist, 2015, p. 322), this questionnaire is considered to be the best one available for researching self-regulation in eating behavior. It will therefore be used in the current research to explore weight management strategies among students, which has not been researched before in the systematically way as it is now.

2.3 Determinants of student's eating behavior and weight

So far, it has been explained that eating behavior is influenced by the social and physical environment and that weight management strategies can be helpful to strive for eating behavior as desired. To better understand and be able to research this specifically among students, more information is desirable. Therefore, determinants of student's eating behavior and weight are described in this section. These determinants are expected to influence weight management strategies among students.

2.3.1 Living arrangement

Students face environmental influences that are unique depending on their living arrangement. Many studies have been conducted with the aim to compare eating behavior and body weight between students living away from home and students living with their parents. In general, living away from home appears to negatively influence the diet quality of students. For example, the fruit and vegetable consumption of students living with their parents was found higher compared to those living outside their family home (Ansari et al., 2012). With regard to the consumption of grains, a difference has been found between students living away from home and those living with their parents, with the latter group consuming a greater variety of grains (Brunt & Rhee, 2008). A study among Greek students has shown that 'students living at parental home displayed more healthy

nutrition habits' (Papadaki et al., 2007, p.169). Moreover, living away from home has shown to be an indicator for a significant higher consumption of alcoholic drinks among students of an Australian university in comparison to living at home (Riddell et al., 2011). The poorer eating habits of students living independently are also reflected in body weight; moving away from home increases the risk for weight gain for many college students (LaCaille et al., 2011; Deliens et al., 2014).

Some studies have taken their research a step further by trying to explain the differences in eating behavior and body weight between students living with their parents and student living away from home. Although the unique social and physical environmental influences on the eating behavior of students have not been researched as extensive as for the general population, several studies have been published on this topic. In 2009, Greaney and colleagues (Greaney et al., 2009) identified enablers and barriers for healthy weight management among 115 American college students who participated in online focus groups. Further, Garcia, Sykes, Matthews, Martin, and Leipert (2010) performed qualitative research among 28 students of a Canadian university. Their aim was 'to determine perceived facilitators of and barriers to healthful eating among university students' (Garcia et al., 2010, p.28) and they conducted focus groups in order to do so. Focus groups including 49 students in total were conducted by LaCaille et al. (2011) to identify determinants of healthy and unhealthy eating patterns and weight change, as perceived by American students. A more recent study is published by Deliens et al. (2014), who researched factors influencing eating behavior among 35 Belgian university students. In the following paragraphs, the unique social and environmental influences on student's eating behavior will be described based on these four studies.

With regard to the social environment, a supporting social network was found to stimulate students to eat healthier, however not related to a specific living environment (Greaney et al., 2009). Considering the influence of fellow students, previous research results were not consistent. Some findings suggested peers to influence student's food choices negatively (Garcia et al., 2010; Deliens et al., 2014). This can for example be seen at social events, but even more at student residences (Deliens et al., 2014). If housemates eat unhealthy and drink a lot of alcohol, others might engage in the same unhealthy behaviors. However, Deliens et al. (2014) also concluded that the negative influence of fellow students does not account for all students. Cooking meals together with others (in a student residence) can also lead to healthy meals, since students take the time to prepare their own foods (Deliens et al., 2014).

Although differences in eating behavior between students with different living arrangements cannot be explained by the influence of fellow students, Deliens et al. (2014) found other explanations, of which one has to do with rhythm and structure. Students that live with their parents are used to a certain structure, founded by their parents (Deliens et al., 2014). This structure will lack by most of the students living away from home, negatively influencing their eating behavior. The same goes for parental control; a lack of it influences eating behavior, mostly negatively (Deliens et al., 2014). Not only eating behavior, but also drinking behavior of students is influenced by the social environment. A decrease in parental control also effects alcohol consumption; the less parental control, the more alcohol is consumed (Deliens et al., 2014). Most likely, alcoholic drinks play a role in the weight gain of students, whether or not consumed at student societies (LaCaille, Dauner, Krambeer & Pedersen, 2011; Deliens et al., 2014).

Concerning the physical environment, availability of unhealthy foods can be overwhelming, with countless options, except for healthy ones (Deliens et al., 2014). On the other hand, availability of fresh fruits and vegetables within the living environment stimulates students to eat healthy (Deliens et al., 2014). Also, the food prices influence the food choices and eating behavior of students. Having a limited amount of money may be a reason to choose homemade food more often. Yet, some students believe that unhealthy fast foods are cheaper than preparing a healthy meal at home (Deliens et al., 2014). Therefore, findings on the influence of food prices are inconsistent. However, there is consensus about the fact that buying your own food when living away from home, makes students pay attention to food prices in relation to their own budget (Deliens et al., 2014).

When living away from home, students may feel like they always have something else to do instead of cooking, therefore making something to eat which takes little time (Deliens et al., 2014). Related to time, convenience of meals may influence eating behavior. Students who do not take the time to cook dinner are more likely to grab something unhealthy (LaCaille et al., 2011). Especially in an environment where (unhealthy) foods are available all the time, it is found that students have an increased purchase of convenience and fast foods (LaCaille et al, 2011). Further, some students living away from home are unable to cook healthy and balanced, because of lack of access to cooking equipment and limited food storage (LaCaille et al., 2011; Deliens et al., 2014). However, limited cooking equipment can also influence eating behavior positively, for example when a fryer is not available (Deliens et al., 2014). A last physical factor found to influence the eating behavior of students is the cleanness of areas. Research indicated that a student residence full of mess and dirtiness does not motivate to prepare a healthy meal; it does rather stimulate to buy an inexpensive, unhealthy (restaurant) meal (Garcia et al., 2010).

2.3.2 Gender

Research focusing on the eating behavior of students has found important gender differences. In several studies female students reported to eat more fruits and vegetables than male students do (Chourdakis et al., 2010; Ansari et al., 2012; Navarro-González, 2014). Next to this, results suggested males consuming fast food (Chourdakis et al., 2010; Ansari et al., 2012; Navarro-González, 2014), meat and fish (Ansari et al., 2012), pasta and rice (Navarro-González, 2014) and alcohol (Brunt & Rhee, 2008) more frequently than women. However, more women than men reported a frequent consumption of sweets and cakes (Ansari et al., 2012). Gazibara et al. (2013) did not find differences in fruit, vegetables and meat consumption based on gender, but found significant differences in BMI, with males having a higher BMI. Chourdakis et al. (2010) had similar results, with overweight and obesity rates being higher for males than females.

The research outcomes suggest male students having a diet of lower quality and a higher BMI. Yet, not much research has been done to explain these differences. However, Chourdakis et al. (2010) studied nutritional knowledge and dietary behaviors next to the eating behavior and BMI distributions of 390 medical students in Greece. They found that females were informed significantly better about the nutrient value of foods consumed. Further, when trying to lose weight, females indicated to use other strategies than males (Chourdakis et al., 2010). The specific strategies were, however, not reported. Cluskey and Grobe (2009) investigated changes in weight and related behaviors among 379 students. They found males to be less concerned about their weight and females to apply more weight management strategies, like building a social network for support of

healthy behaviors (Cluskey & Grobe, 2009). These weight management strategies were not further elaborated.

2.4 Conceptual model

Based on previous research results described in this theoretical framework, a conceptual model has been created. This model shows the relations between different variables and is shown in figure 1.

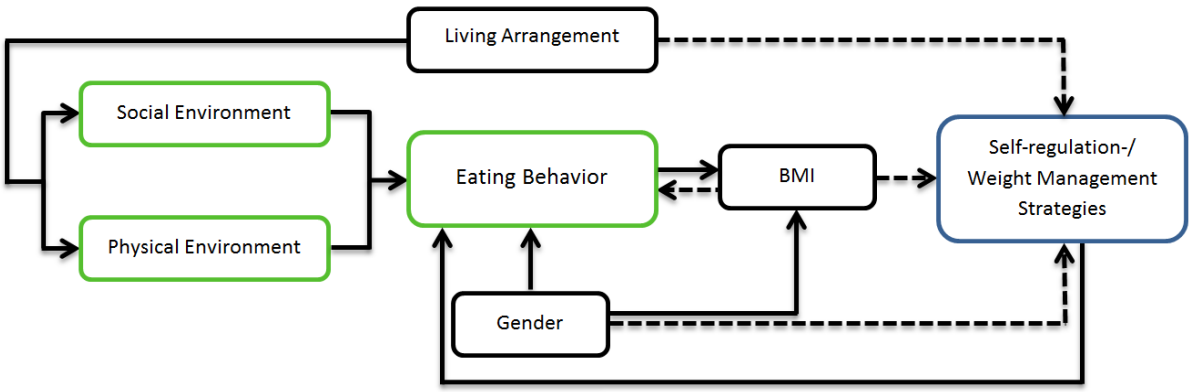

Figure 1: Conceptual model on eating behavior and weight management among students.

The different colors and different types of lines have their own meaning. The continuous lines represent relations that are supported by research, while the dotted lines represent less researched relations and expectations. In the left part of the model, the influence of the social and physical environment on eating behavior is shown, being unique for students depending on their living arrangement. Eating behavior results in a certain BMI. Although there are indications that BMI influences eating behavior, this relation is not completely clear and therefore represented with a dotted line. Gender influences both eating behavior and BMI. The green boxes represent the first aim of the current research: to test and explore the difference between the perceived influence of the social and the physical environment on healthy eating behavior of students. The associated variables living arrangement, gender and BMI will be taken into account while fulfilling this first research aim.

The blue box in the model represents the second aim of the current research: to test and explore differences in weight management strategies among students. Previous research led to the expectation that weight management strategies among students differ based on living arrangement, gender and BMI. Hence, living arrangement, gender and BMI will be included as research variables fulfilling the second research aim.

2.5 Research questions

The two goals of the current research were translated into research questions, to be answered in the discussion of the current research.

- What is the difference between the perceived influence of the social and the physical environment on healthy eating among students, taking into account differences in living arrangement, gender and BMI?
- What are differences in weight management strategies among students, taking into account differences in living arrangement, gender and BMI?

3. Methods

To answer the research questions, mixed methods were used. In the quantitative part of this study, the perceived influence of the environment on healthy eating as well as weight management strategies among students were measured with the use of an online questionnaire. After that, the outcomes of this questionnaire were discussed in a focus group interview, which represents the qualitative part. The two methods are further explained below.

3.1 Online questionnaire

For the quantitative part of this research, a questionnaire was used. According to Bowling and Ebrahim (2005), questionnaire methods, which come in many different forms, are the most common survey data collection technique. Questionnaires make it able to collect data in a relatively easy way and are therefore suitable for larger samples (Bowling & Ebrahim, 2005).

3.1.1 Participants and procedure

The questionnaire was constructed and distributed with the use of the online survey software Qualtrics. Before respondents were recruited, the questionnaire had been pre-tested among five people, of which three were university students. The others were working and had an (applied) university degree. Pre-testing was done in Qualtrics, to target both content related and technical issues. Based upon the pre-test, some questions were adapted and the questionnaire was prepared for distribution. The questionnaire, as used for this research, can be found in Appendix I (in Dutch). Quantitative data collection lasted nearly three weeks, from October 20 till November 9, 2015. The target group consisted of Dutch university and applied university students, further to be called university students or students. To recruit respondents, students from different (applied) universities in the Netherlands have been approached personally, via internet and telephone. The network of the researcher has been used to reach as many students as possible. Thereby, living arrangement and gender of students were taking into account, making this a non-random quota sampling strategy (Bowling & Ebrahim, 2005). To promote filling out the questionnaire, three gift vouchers with a value of €15 were raffled among the respondents. Within the sampling period, 255 people started the questionnaire, of which 202 completed it. Hence, the dropout rate was 20.8%.

3.1.2 Measures

Background variables

The questionnaire started with some general questions, in order to obtain insight in the background of the respondents. This included questions about gender, age, body height, body weight, educational institution, city of study and year of study. Self-assessed body height and weight were used to calculate BMI. This study was aimed at environmental influences and weight management strategies used on weekdays, to avoid 'weekend eating' effects (Rhodes, Cleveland, Murayi, & Moshfegh, 2007). Therefore, more specific questions were asked on weekday living situation, weekday grocery expenses and perceived influence on groceries of respondents during weekdays.

BMI was calculated using body height and body weight. The variables BMI and living arrangement were dichotomized**,** so that these variables could be added to the models in a similar way as gender. All students living away from home were taken together, like Ansari et al. (2012) and Navarro-González et al. (2014) did in research with a study design similar to this research' design. This group of students will be further referred to as students living away from home or independently living

students. The cutting point for a BMI was 25, whereby students with a BMI under 25 are referred to as normal weight students and those with a BMI of 25 or more are overweight. The same classification was used by Navarro-González et al. (2014) and Lloyd-Richardson, Bailey, Fava and Wing (2009), with the latter study focusing on weight gain among students.

Environmental influences

To determine the perceived influence of the social and the physical environment on healthy eating, the following question was asked for both types of environment: 'To what extent are you being stimulated to eat healthy by your [social/physical] environment?' The social environment was described as 'the people with whom you interact' and the physical environment was described as 'the places in which you spend your time'. These questions measured the influence of the environment as perceived by respondents. The questions were answered for the weekday situation. Respondents could answer on a 5-point likert scale ranging from 'certainly not' to 'certainly'.

Weight management strategies

Weight management strategies were measured using the recently developed WMSI (Keller & Siegrist, 2015) that is tested and validated in German and was translated into English. However, a Dutch version did not exist yet and was created for this study. This was done by both the first researcher and an English speaking senior researcher. All translated items were compared and the best translation was chosen by mutual agreement, or a combination of both translations was made. After translation of the existing items, the item 'I limit my alcohol intake to consume as less calories as possible' was added to the strategy 'Low-calorie beverages'. This was done, because it is expected that more alcohol is consumed by students than in the general population, for which the WMSI is designed. Since there is a difference in alcohol consumption between students living away from home compared to students living with their parents (Brunt & Rhee, 2008; Riddell, Ang, Keast & Hunter, 2011), there might also be a difference in the degree to which the two groups of students restrict their alcohol intake, in order to consume as little as possible calories. After translation of the existing items and adding the new item, Cronbach's alpha reliability coefficients were calculated for the new version of the Dutch WMSI, to assess the correlation between the different items that form strategies together. Most strategies scored above 0.70, reflecting moderately to excellent reliability. Two out of the 19 strategies, strategy 1 and 6, had Cronbach's alpha between 0.65 and 0.70, which is still acceptable (DeVellis, 2012). Details are shown in the result section (table 4). The items of the WMSI were all assessed on a 7-point likert scale ranging from 'totally not applicable' to 'totally applicable'.

Final questions

At the end of the questionnaire, respondents had the possibility to add their own strategies and leave questions and comments. Respondents also had the opportunity to show interest in winning a gift voucher and/or participating in further research. If so, they were asked to fill in a contact form.

3.1.3 Data analysis

Quantitative data were analyzed with the use of Statistical Package for the Social Sciences (SPSS), version 22.0. Only completely filled in questionnaires were analyzed. Strategy scores were determined by calculating the averages of items that belonged to the strategies. In order to test if students perceive that they are stimulated to eat healthy differently by their social environment than by their physical environment a repeated measures ANOVA has been performed. The perceived

influence of the social environment and the perceived influence of the physical environment have been added as within subject variables. Living arrangement, BMI and gender were used as between subject variables. Further, a MANOVA has been performed in order to test differences in weight management strategies. Living arrangement, gender and BMI were used as independent variables in the model. All three have been added as fixed factors. The dependent variables consisted of the scores of the nineteen strategies of the WMSI. By using MANOVA, differences between groups classified by living arrangement, gender and BMI have been tested while controlling for these variables simultaneously. Since many strategies were tested at the same time, which increased the chance of false positive outcomes (type 1 error), Bonferroni correction has been applied.

3.2 Focus group interview

On January 11, 2016, a focus group interview took place. This research method is used to gather rich data in a very efficient manner, which cannot be done using other methods (Bowling & Ebrahim, 2005). The aim of a focus group interview is to explore similarities and differences that exist within a group. In contrast to normal group interviews, interaction between participants is of great importance during a focus group interview, while this is the source of research data (Bowling & Ebrahim, 2005). During the focus group interview, the researcher took on a moderating role. Focus group interviews have been used before by a range of researchers, to conduct research with aims similar to the current research (Cluskey & Grobe, 2009; Greaney et al., 2009; Deliens et al., 2014).

3.2.1 Participants

Six students participated in the focus group interview that lasted one hour. Recruitment happened via the online questionnaire, in which the respondents could indicate interest in participation in further research. The approached students all lived in or near Wageningen, to make it easy for both the students and the researcher to meet. Further, the students were selected on gender and living arrangement, so a balanced group was created. There were no male students living with their parents in Wageningen or surrounding areas who showed interest in further research. Therefore, this group was not represented during the focus group interview. All female students living with their parents in Wageningen or surroundings who showed interest in further research, five in total, were approached. Two of them wanted to join the interview. Next to this, all male students interested in further research and living away from home, six in total, were approached. Again, two of them wanted to join the interview. Of the females living away from home that filled in the online questionnaire, 36 lived in Wageningen or surroundings and showed interest in further research. A pre-selection of this group was made by the researcher, based upon year of study. Thereafter, random selection determined seven female students, who were approached until two of them committed to join the interview. Eventually, six students participated in the interview, of which the gender, age and living arrangement can be found in the table below.

Table 2: Focus group participants' characteristics

	Gender	Age	Living arrangement
1	Female	17	With parents
2	Female	23	With parents
3	Female	22	Away from home
4	Female	22	Away from home
5	Male	22	Away from home
6	Male	23	Away from home

3.2.2 Procedure

Topics for the focus group were determined by the researcher in advance, based on the results of the quantitative part of this research. First, the influence of the social and the physical environment on eating behavior was chosen as a topic, based on the interaction effects that were found. The second topic was living arrangement, in relation to weight management strategies. The aim of discussing this topic was to explain why the questionnaire outcomes showed no differences in weight management strategies between students living with their parents and students living away from home. The third and last focus group topic covered gender differences in weight management strategies, since these were found with the online questionnaire. BMI was not discussed during the focus group interview, because the quantitative outcomes of living arrangement and gender in relation to weight management strategies were more interesting to further explore, according to the researcher. Also, BMI can be seen as a sensitive topic to talk about. The researcher did not want to select possible participants on their BMI to discuss the differences in weight management strategies between overweighed and normal weighed students with them. The topics that were selected for the focus group interview had been prepared and described in an interview guide, which can be found in Appendix II (in Dutch). For the participants of the focus group interview, a name sign indicated where they could sit. This was done so participants would know each other's name. Also, the researcher had made a map with the names, complemented with the living arrangement and gender of the participants, making it easier to write notes during the interview.

At the start of the focus group interview, the researcher gave a short introduction, in which the participants were welcomed and the aim of the interview, as well as rules and procedures were told. Also, the definition on weight management strategies was given, to refresh memory. Next, participants were asked for permission to record the interview, on which everybody agreed. After asking if there were any questions or uncertainties among the participants, the topics living arrangement, gender and environment were discussed. For all three topics the same procedure was used. The researcher started and, if needed, redirected the conversation, but steered the conversation as less as possible. At the start of every new topic, the researched asked a more general question. For example, when living arrangement was discussed in relation to weight management strategies, the question 'Has there been a change in the use of weight management strategies, since you live away from your parents?' was asked to the participants living away from home. The other participants reacted on the given answer, resulting in a discussion. If the researcher felt a particular person of group of persons was not represented enough in the discussion, he or she was specifically asked to comment. Later on, the researcher explained the participants the outcomes of the online questionnaire and asked the participants if they could explain this. Again, this let to discussion among the participants, with the researcher only joining the conversation if needed. As much as possible that was said by the participants, was written down by the researcher.

At the end of the focus group, the participants were asked if they wanted to add anything to what was already said or comment on the focus group, questionnaire or research in general. Thereafter, the researcher summarized and checked the key points that were discussed. Lastly, the participants were thanked for their contribution to this research and the researcher provided them all with a small gift.

3.2.3 Data analysis

Immediately after the interview took place, a Dutch summary was written based upon notes, with the audio recording to refresh memory. The topics of the focus group interview were maintained to write this summary. Within each topic, subtopics were marked the same color. When this was done for the whole summary, paragraphs and sentences with the same color were put together. Next, the summary has been rewritten and translated into English. Thereafter, the researcher listened to the audiotape, while at the same time reading the written text. Whenever needed, the audiotape was stopped to adapt the text in a way that better reflected what was said during the focus group interview. The audiotape was used to obtain quotes as well. In case the researcher heard a potential quote, the audiotaped text was played again, until the exact text had been written down (in Dutch). Thereafter, all potential quotes had been translated into English as precise as possible. The quotes that fitted in the English summary best stayed in, while the others were deleted. Attention was paid to the readability and understandability of the quotes within the English summary.

3.3 Ethics

The code of Conduct for Social Science Research has been considered. The respondents of the online questionnaire were informed that participation was voluntary and responses would be handled anonymous and confidential. Respondents needed to confirm that they had read this before they could start the questionnaire. The focus group participants were verbally informed with regard to anonymity, privacy and permission for audio recording the interview. The researcher gave the participants the opportunity to comment or object. However, all participants agreed with the conditions.

4. Results

In this chapter, the results will be presented. First, the quantitative results are described, consisting of the outcomes of the online questionnaire. Thereafter, qualitative results are described, as obtained from the focus group interview.

4.1 Online questionnaire

In total, 255 people started the online questionnaire, of which 202 completed it. The sample characteristics are shown in table 3. The outcomes showed a high percentage of female students (77.2%), a high percentage of Wageningen as city of study (65.8%) and a low percentage of students living with their parents (18.3%).

Table 3: Sample characteristics

Variables	Percentage or mean (M) and standard deviation (SD)
Gender	
➢ Male	22.8%
➢ Female	77.2%
Age	M=21.6 (SD=2.4)
BMI	M=22.2 (SD=2.8)
Year of study	M=3.8 (SD=2.0)
Educational institution	
➢ Applied university	15.8%
➢ University (Bachelor)	41.1%
➢ University (Master)	43.1%
City of study	
➢ Amsterdam	2.0%
➢ Enschede	16.8%
➢ Groningen	2.0%
➢ Nijmegen	2.0%
➢ Utrecht	4.5%
➢ Wageningen	65.8%
➢ Zwolle	1.5%
➢ Other	5.4%
Living arrangement	
➢ With parents/caretakers	18.3%
➢ Independently – alone	18.8%
➢ Independently – with housemates	54.0%
➢ Independently – with partner	8.9%
Grocery expenses per week	
➢ Less than €20.00	29.2%
➢ €20.00-€39.99	56.4%
➢ €40.00-€60.00	13.4%
➢ More than €60.00	1.0%
Influence on groceries	
➢ None	1.5%
➢ A bit	9.4%
➢ Neutral	11.9%
➢ A lot	37.1%
➢ Complete	40.1%

There were some differences between students living away from home and living with their parents. Male students lived with their parents more often compared to female students (32.6% versus 14.1%), and the largest proportion of students living with their parents (56.8%) were enrolled in applied university, while most students living away from home studied at a university (93.3%). Of the students who lived independently 74.5% studied in Wageningen, while 27.0% of the students living with their parents studied in Wageningen. Further, students living away from home were significantly older and there was a significant difference in mean study year compared to students who lived with their parents (age: M=20.8 versus M=21.8, p=.021; study year: M=2.92 versus M=4.04, p=.002). Also, of the students living with their parents 78.4% indicated to spend less than €20 per week on groceries, while this is 18.2% for independently living students. Lastly, the perceived influence on groceries differed significantly, whereby students living with their parents reported to have less influence on groceries compared to students living away from home (perceived influence on groceries, measured on a 5-point likert scale: M=2.86 versus M=4.32, p<.001).

Next to differences in living arrangement, differences were found with respect to gender and BMI. As 75.0% of the female respondents studied in Wageningen, 34.5% of the males did. Also, females and males differed significantly on age, influence on groceries and perceived influence of the physical environment on healthy eating. Females were younger on average, had more influence on groceries and perceived the influence of the physical environment on healthy eating to be greater compared to males (age: M=21.4 versus M=22.2, p=.049; perceived influence on groceries, measured on a 5-point likert scale: M=4.18 versus M=3.61, p=.001; perceived influence of the physical environment, measured on a 5-point likert scale: M=3.12 versus M=2.80, p=.030). Compared to students with a low to normal weight, students with overweight were significantly older on average (M=21.44 versus M=22.68, p=.017) and had a significantly higher mean study year (M=3.17 versus M=4.72, p=.020).

4.1.1 Repeated measures ANOVA

A repeated measures ANOVA was done to assess if there was a significant difference between the perceived influence of the social and the physical environment on healthy eating. Although the mean score on the perveived influence of the social environment was higher compared to that of the physical environment (M=3.41 versus M=3.04), the outcomes showed no main effects, only a significant three-way- and four-way interaction. The three-way interaction was found for the combination of the environment and the between subject variables gender and living arrangement (F(1, 194)=7.61, p=.006). Male students, regardless of living arrangement, and female students living away from home perceived the social environment to have a greater influence on their eating behavior, compared to the physical environment. Hereby, the independently living females scored higher on both environments than the males did. Female students living at home showed opposite results, they scored higher on the perceived influence of the physical environment on healthy eating relative to that of the social environment.

A four-way interaction was found for the interaction of the environment with all between subject variables (F(1, 194)=10.61, p=.001). Here, all students with a low to normal BMI, regardless of gender and living situation, perceived the social environment to have more influence on their eating behavior than the physical environment. Females scored higher on the influence of both the social and the physical environment than males did. For students with a BMI above 25, the combination of gender and living arrangement caused a difference in scores. Like students with a low to normal BMI, male students living with their parents and female students living away from home scored higher on

the perceived influence of the social environment on eating behavior compared to the perceived influence of the physical environment. As with the lower BMI, females scored higher than males. In contrast, male students living away from home and female students living with their parents indicated the physical environment to have a greater influence on healthy eating.

4.1.2 MANOVA

The outcomes of the MANOVA showed that there were significant main effects for all three independent variables: gender (Λ=0.82, F(20, 175)=1.98, p=.010), living arrangement (Λ=0.84, F(20, 175)=1.65, p=.046) and BMI (Λ=0.80, F(20, 175)=2.20, p=.004). This suggested that there were significant differences in the use of the weight management strategies between students living at and away from home, males and females and the two BMI groups. No interaction effects were found. Univariate tests were used to find out which of the scores on the nineteen strategies of the WMSI significantly differed between students living at or away from home, between male and female students, and between students with and without overweight. Please see table 4 for means, including standard deviation, F-values and p-values.

The largest differences were found for gender. Males scored lower on almost every weight management strategy. Males and females differed on six of the twenty dependent variables (p<.05). After Bonferroni correction, only scores on the strategies of setting goals for a balanced diet and eating normal portions sizes (WMSI strategies one and fifteen) remained significantly different based on gender. With regard to living arrangement, there was only one strategy score that was significantly different for students living away from home compared with students living with their parents. This is the strategy of focusing on eating (WMSI strategy five), on which students living with their parents scored higher than students living away from home. However, after Bonferroni correction, the p-value exceeded the significance level. Further, overweight respondents scored lower on balanced diet goal setting and eating slowly in comparison to low to normal weighted students. This was the other way around for consuming low caloric beverages. Also here, the studied differences based on BMI did not remain significant after Bonferroni correction.

4.1.3 Other weight management strategies

The respondents of the online questionnaire were asked if they used weight management strategies that had not been addressed in the questionnaire. Of the 202 respondents, 52 filled in this question. However, most strategies mentioned were part of the WMSI, like eating normal portion sizes and avoiding food temptations. Five respondents mentioned to use no weight management strategies at all. With nineteen respondents indicating to use exercising and/or sporting for weight management, this was the most mentioned strategy that is not in the WMSI. Four respondents indicated to eat as many fresh, unprocessed and natural products as possible. Three respondents ate a lot of vegetables during dinner, in order to manage their weight. Next to this, eating foods high in protein was used as weight management strategy by two of the respondents. Also, two different strategies were mentioned with regard to snacking. Three respondents indicated to avoid snacking by eating enough bread, while six others used healthy snacking as a weight management strategy. There were two more specific strategies mentioned by only one of the respondents, of which the first one is using social media to receive hints and tips on healthy eating and sporting behavior. The second strategy mentioned by one of the respondents is to go grocery shopping once a week, instead of going to the supermarket multiple times.

Table 4: Outcomes of univariate tests[a]

	Total sample N=202	Living with parents N=37	Living away from home N=165	F	*p*	Male N=46	Female N=156	F	*p*	BMI < 25 N=177	BMI ≥ 25 N=25	F	*p*
1. Setting goal of a balanced diet (α=.66)	5.71 (0.93)	5.48 (1.10)	5.77 (0.89)	0.05	.825	4.96 (1.12)	5.94 (0.74)	17.97	.000**	5.76 (0.89)	5.36 (1.15)	7.39	.007*
2. Calorie monitoring (α=.93)	2.12 (1.50)	2.12 (1.71)	2.12 (1.45)	2.40	.123	1.41 (0.73)	2.32 (1.60)	4.84	.029*	2.07 (1.48)	2.44 (1.60)	2.69	.103
3. Weight monitoring (α=.88)	3.65 (1.78)	3.95 (1.79)	3.58 (1.78)	1.11	.293	3.41 (1.80)	3.72 (1.78)	0.30	.585	3.54 (1.76)	4.43 (1.77)	2.08	.151
4. Planning food purchase (α=.72)	4.28 (1.30)	4.22 (1.35)	4.29 (1.29)	0.16	.691	3.55 (1.29)	4.49 (1.23)	3.81	.053	4.33 (1.28)	3.91 (1.38)	1.31	.254
5. Focusing on eating (α=.81)	4.07 (1.38)	4.18 (1.51)	4.05 (1.36)	5.38	.021*	3.76 (1.63)	4.16 (1.29)	0.71	.401	4.09 (1.40)	3.93 (1.32)	0.55	.458
6. Sleeping and relaxing (α=.67)	4.72 (1.10)	4.26 (1.36)	4.82 (1.01)	0.13	.716	4.24 (1.21)	4.86 (1.03)	1.96	.163	4.74 (1.13)	4.55 (0.91)	0.20	.654
7. Regular, daily meal times (α=.82)	4.24 (1.38)	3.80 (1.53)	4.34 (1.33)	0.09	.763	3.54 (1.48)	4.45 (1.29)	3.53	.062	4.27 (1.39)	4.09 (1.34)	0.43	.512
8. (Ir)regular weekly meal patterns (α=.72)	2.04 (1.06)	2.07 (1.08)	2.04 (1.06)	0.49	.486	2.26 (1.12)	1.98 (1.04)	2.93	.089	2.02 (1.07)	2.23 (1.03)	0.00	.949
9. Avoiding food temptations (α=.88)	3.83 (1.65)	3.07 (1.63)	4.00 (1.61)	3.02	.084	2.78 (1.59)	4.14 (1.54)	6.94	.009*	3.83 (1.66)	3.87 (1.60)	0.12	.727
10. Distracting oneself from food temptations (α=.91)	3.17 (1.39)	3.20 (1.47)	3.16 (1.37)	0.13	.724	2.41 (1.13)	3.39 (1.38)	2.71	.102	3.14 (1.40)	3.36 (1.27)	0.69	.407
11. Food substitutions (α=.86)	3.38 (1.44)	3.39 (1.47)	3.38 (1.44)	0.82	.367	2.73 (1.24)	3.57 (1.44)	5.56	.019*	3.39 (1.45)	3.31 (1.41)	0.34	.561
12. Low-carbohydrate diet (α=.91)	2.48 (1.40)	2.65 (1.43)	2.44 (1.39)	2.62	.107	2.16 (1.30)	2.57 (1.42)	0.75	.389	2.40 (1.34)	2.97 (1.68)	2.67	.104
13. Low-fat diet (α=.81)	2.96 (1.29)	2.99 (1.19)	2.95 (1.32)	2.64	.106	2.34 (1.03)	3.14 (1.31)	1.85	.176	2.94 (1.30)	3.08 (1.23)	0.58	.449
14. Low-calorie beverages (α=.85)	5.01 (1.70)	4.61 (1.87)	5.10 (1.65)	1.98	.161	3.80 (1.60)	5.37 (1.56)	8.14	.005*	4.97 (1.69)	5.31 (1.71)	4.02	.046*
15. Normal portion sizes (α=.81)	3.91 (1.41)	4.15 (1.42)	3.86 (1.41)	2.11	.148	2.87 (1.21)	4.22 (1.32)	11.50	.001**	3.88 (1.39)	4.12 (1.53)	0.02	.877
16. Eating slowly (α=.86)	3.99 (1.47)	4.04 (1.50)	3.98 (1.46)	0.66	.417	3.62 (1.35)	4.10 (1.48)	1.09	.297	4.14 (1.46)	2.97 (1.06)	5.87	.016*
17. Stopping oneself from eating (α=.85)	3.69 (1.40)	3.50 (1.28)	3.74 (1.43)	0.02	.893	3.22 (1.39)	3.83 (1.38)	1.12	.291	3.70 (1.39)	3.65 (1.48)	0.54	.462
18. Reinterpreting food temptations (α=.91)	3.62 (1.61)	3.39 (1.59)	3.67 (1.61)	1.05	.307	2.64 (1.44)	3.91 (1.54)	3.75	.054	3.61 (1.62)	3.66 (1.58)	0.05	.823
19. Inhibiting food temptations (α=.90)	3.68 (1.48)	3.58 (1.58)	3.70 (1.46)	1.01	.315	2.86 (1.49)	3.92 (1.39)	1.41	.236	3.68 (1.47)	3.69 (1.58)	0.31	.579

[a]All outcomes were controlled for the variables living arrangement, gender and BMI.

* = Significant without Bonferroni correction (.003≤*p*<.050)

** Significant with Bonferroni correction (*p*<.003)

4.2 Focus group interview

The focus group interview was aimed at exploring and explaining the results of the online questionnaire. Results related to environmental influences, living arrangement and gender will each be discussed in a separate paragraph.

4.2.1 The influence of the environment on eating behavior

The social and physical environment were discussed, in order to determine its influence on eating behavior of students. Also, differences between the two types of environment and strategies to deal with environmental influences were covered. The participants recognized that both the physical and the social environment influence eating behavior. With regard to the physical environment, an example was given by students living with their parents having access to more luxury kitchen equipment, making it more fun to prepare healthy meals. One of the males agreed and said:

'You pay more attention to it, if you have the opportunities.'
Male, 22, living away from home

However, one of the other participants disagreed, arguing that she does not need much or luxury kitchen equipment to cook. Another physical aspect that came forward while discussing environment influences was place of residence. It was said that the absence of McDonald's or other big fast food restaurants in Wageningen, discourage to go there. As a reaction to this, a participant mentioned that people living in Wageningen still eat pizza and can have food delivered at home. However, the experience of all the participants was that ordering unhealthy foods, like pizza or fries, is not often suggested by people when having dinner together. This made the participants realize that the social environment plays a role here. Comparing the physical environment with the social environment, the participants thought the physical environment can be adjusted to the social environment more easily than vice versa, making the social environment of greater influence. Also, the social environmental influences are present very often.

'You just eat together with others very often.'
Female, 17, living with her parents

One of the male participants indicated that sometimes people eat unhealthy because they adjust to others. He mentioned an example of eating fries, because others want to. Thereafter, it was said by someone else that adjusting to others can also work positively.

'If the rest cooks healthy, you cook healthy as well.'
Male, 22, living away from home

Since a lot of students in Wageningen are interested in health, the participants thought, the social environment in Wageningen has mainly a positive influence.

A female participant thought people can always find a way to eat healthy and apply strategies, if they want to. The others disagreed and reacted that there are always environmental factors having influence. However, the influences cannot be generalized, because individual situations differ. Different individuals have norms and standards, meet different people, hear different information and so on. Also, people are not always aware of environmental influences, argued one of the female students, which makes such influences hard to cope with. Therefore, it makes sense searching for

people around with same ideas about food, indicated a male participant. Such a strategy can help to cope with environmental influences in an unconscious way and stresses the importance of the social environment was stressed again.

Other strategies for handling environmental influences that were used by female participants in order to deal with environmental influences are having a goal and having a planning regarding healthy eating.

'If you know in advance that a situation occurs where you are going to eat something unhealthy, then you will compensate for it on other days.'

Female, 22, living away from home

By saying so, this participant demonstrated having a behavioral plan to continue eating healthy during certain situations. As a reaction to this, it was mentioned that special occasions like holidays make it even harder to eat healthy, because snacks are eaten all day long. One of the female participants said:

'I think healthy eating is doomed to fail such days. I even have snacks for breakfast then.'

Female, 23, living with her parents

Although two latter quotes might seem to contain an opposite message, they both stress the importance of routine and structure to deal with the environmental influences on eating behavior. When there is a lack of structure and routine, some are able to create this structure themselves, while others cannot and give up on healthy eating.

Taking everything into account, the participants thought both the social and the physical environment influence eating behavior of students. Place of residence contains both social and physical environmental influences. However, the social environment was assessed more influential compared to the influence of the physical environment. Since environmental influences are not always that obvious, it might be easy to have people around with shared ideas on food. Also, behavioral plans can be very useful in case structure and routine lack.

4.2.2 Effects of living arrangement on eating behavior and weight management strategies

Effects of living arrangement on weight management strategies were discussed with the aim to explain why no differences were found in weight management strategies based upon living arrangement during the first part of this research. However, before possible explanations were mentioned, the participants started with discussing differences in eating behavior that exist between students living with their parents and students living away from home. One of the differences the participants came up with is that students living with their parents have to deal with more food temptations, bought by their parents.

'The problem of living with your parents is resisting all that is in the house. If you live away from home you do not have that problem because you just do not buy it.'

Female, 23, living with her parents

'Indeed, I think it matters what is stored at home. If I am with my parents, there are cookies and other tasty snacks that I do not buy for myself, because it costs money and it is just not necessary. I think dinner does not differ much, it is more about snacks.'

Female, 22, living away from home

One of the participants living with her parents indicated she has difficulties resisting such temptations, while the other has not. Another difference based on living arrangement is that the application of certain weight management strategies was considered to be more difficult for students living with their parents, since they are more dependent on their parents than the degree to which students living away from home depend on their housemates.

'You are more dependent on what your parents buy. You think less about it if you live with your parents, I think you also apply fewer strategies then.'

Female, 22, living away from home

The participants agreed that students often gain weight when they move from their parents, because eating behavior and the use of weight management strategies are influenced. It was mentioned that moving away from home comes with more responsibilities, like buying groceries, and less supervision and comments. The participants thought that especially students, who just moved out, experience that they can eat what they want and whenever they want. Also, if a lot of things are going on simultaneously – new study, new home, new people – the whole process of settling down may stimulate choosing easy and unhealthy meals, said one of the male participants. The others agreed and thought that settling down hinders the application of weight management strategies. It was also though that if strategies are applied by students just living independently, this will probably be more unhealthy strategies like skipping meals.

However, the situation in Wageningen is different according to the participants, because a lot of students in Wageningen are interested and engaged in healthy eating and a relatively high percentage of people living in Wageningen is vegetarian. Both male participants mentioned that there is being cooked healthy in their student house.

'Here in Wageningen, there is no real culture of ordering pizza.'

Male, 22, living away from home

All the participants living away from home indicated to be more aware of their eating habits since moving away from their parents to Wageningen. One of the male participants said he, and others as well, began to eat healthier since living in Wageningen.

'I have heard from several people that they have been eating better since they live in Wageningen'

Male, 23, living away from home

As was the case while discussing the environment, place of residence was seen as a factor related to living arrangement, influencing eating behavior and the use of weight management strategies.

Besides place of residence, there were other factors mentioned influencing weight management strategies, even regardless of living arrangement. It was thought that age is of great importance. According to the participants, getting older comes with increased confidence, experience and routine, making it easier to eat healthy. Independently living students who celebrated their freedom of food choice with unhealthy foods in the beginning were thought to change to more healthy food after a while.

'After a while you notice that you feel better when you eat better.'

Male, 23, living away from home

The other male participant reacted by mentioning he could eat whatever he liked when he was a teenager. When this changed, he started to think more consciously about his food choices. One of the independently living females indicated age as a factor to cook more often.

'As people get older, they have more influence on what is bought and what is being cooked. If I lived with my parents now, I would shop groceries and cook quite often. That is an opportunity to apply strategies.'

Female, 22, living away from home

A female participant living with her parents confirmed this, by telling she cooks a lot at home in comparison to a few years ago. This indicates an increased influence of students on what they eat driven by age, regardless of their living arrangement.

With regard to preparing healthy meals, the participants mentioned that this is easier for a group of people. The participants experienced difficulties if they have to prepare a meal just for themselves, because of grocery quantities and costs.

'I always eat a lot more when I cook for myself.'

Male, 23, living away from home

One of the participants living with her parents thought grocery difficulties might explain why preparing healthy meals is easier for her compared to students living away from home, since she cooks for a minimum of six persons mostly. This was partly rejected by other participants, who saw differences in the amount of people to cook for within students living away from home as well. It is therefore concluded by the participants that the amount of people to cook for influences eating behavior and use of strategies for all students, regardless of living situation.

Next to the factors described above, the participants came up with some other explanations for the fact that no differences were found in weight management strategies, based on living arrangement. One of these is having new people around, with whom you eat together. One of the female participants experienced an adaptation of her weight management strategies, based upon the people she mixed with in the past and present. Also, the participants thought that choice of study influences the use of weight management strategies among students. Hereby, the combination of meeting new people and obtaining new information during the study program is of importance, according to a female participant living away from home.

Further, a female participant mentioned that nowadays it is a general trend to eat healthy, again affecting students regardless of their living arrangement. A change in sporting behavior can also lead to changed eating behavior and weight management strategies, another female participant said. Next to this, intrinsic motivation and child rearing style of student's parents influence students regardless of their living arrangement.

'If you are from a family that eats healthy, you will eat healthy yourself, no matter if you eat with your parents or not.'

Female, 22, living away from home

As a last argument to explain why no differences were found in weight management strategies, a student living with her parents thought students of both living arrangements use simple strategies instead of more complex ones.

'If you live with your parents, you can only choose to apply simple strategies, because otherwise the whole family has to adapt. If you cook for yourself, you could adjust your cooking habits and choose to apply more complex strategies, but that is complicated, students do not do that. So basically, hardly anyone chooses strategies that have a lot of impact.'

Female, 17, living with her parents

Eating fewer cookies was mentioned as an example of a simple strategy that can easily be applied in both living arrangements.

Considering the different arguments and examples described in this paragraph, it can be said that the participants were able to explain the lack of difference in weight management strategies between students living with their parents and independently living students. The participants thought factors, like age, choice of study, intrinsic motivation and child rearing style of parents influence students' eating behavior and weight management strategies regardless of living situation. Although circumstances might differ based on living arrangement, like students living with their parents being tempted more often and students living away from home having more responsibilities, the participants thought the application of weight management strategies is difficult for both types of students. This probably results in students of both living arrangements applying similar strategies that cost minimal effort.

4.2.3 Effects of gender on eating behavior and weight management strategies

Gender was discussed in order to explain the differences in weight management strategies between male and female students. The participants agreed that women are more engaged in healthy eating and apply weight management strategies more often than males.

'I think in general women are busier with it than men, especially during their student days.'

Female, 22, living away from home

When trying to lose weight, women focus on their eating behavior and men on their sporting behavior, the participants thought. Also, women will be focused on planning and goals more than men, was mentioned by three of the participants. One of them said:

'Women think ahead much further.'

Male, 23, living away from home

One of the female participants said that women are more specific in their goals, which is reflected in 30-day challenges and the desire to be fit when summer starts. On the other hand, men have long-term goals and it is taboo for them to diet, was her view. Another female participant had a different opinion and thought that men can have specific goals as well, stimulated through the society.

'If men have a plan, they go for it.'

Female, 23, living with her parents

Also, the same female participant mentioned that women may fail in achieving their goals more often than men, because women get influenced by the opinions of others more easily. A male participant said that males are more performance driven instead of focused on physical appearance.

In the quantitative part of this study specific gender differences were found on the WMSI strategies (1) Setting goal of a balanced diet and (15) Normal portion sizes, which was recognizable for both the

male participants. They stated to eat as much they like, whenever they like. However, one of them consciously decreased his sugar intake, since living away from home and shopping own groceries. Of the four female participants, two recognized themselves in the results and the other two did not. A female agreed with the males and stated to eat as much she likes, whenever she likes, while another female indicated to pay attention to healthy eating as well as portion sizes. Yet another female participant indicated to pay attention to having a balanced diet with enough vegetables and vitamins, without banishing relatively unhealthy and fatty foods like cookies.

'Eating cookies is fine, as long as I eat enough vegetables as well.'
Female, 22, living away from home

Despite the varying views on the strategies discussed above, the participants concluded that gender differences regarding healthy eating and weight management can be explained by differences in interests, which are reflected in study choice.

'Your interests and study choice matter a lot.'
Female, 17, living with her parents

Nutrition and Health students, mostly women, are for example more concerned with healthy eating and weight management in comparison to other students, according to the participants. Also, females get in touch with information on healthy eating and weight management more frequently than males, for example via magazines. One of the female participants indicated that such information stimulates women to apply weight management strategies, for example making small environmental changes or eating more fruit. Next to this, it was said that males and females have their own norms with regard to healthy eating and weight management. Further, imitation behavior was regarded by the participants as more common in women. As an example, a female participant mentioned:

'Everyone takes cake, so I take cake as well.'
Female, 23, living with her parents

This quote relates to what was mentioned before, namely that women get influenced by the opinions of others more easily, possibly leading to goal failure with regard to healthy eating.

Lastly, factors like social network and rearing style of student's parents were named, while discussing gender differences in weight management strategies. These factors were mentioned before and have and influence on the weight management strategies of students regardless of gender, thought the focus group participants.

In summary, the participants did not completely agree on gender differences with regard to having a balanced diet as a goal, reasoning from their own experiences. However, taking a more distant view, it was concluded that gender differences in healthy eating and weight management can be explained mainly by differences in interests.

5. Discussion

The current research had two aims, namely to test and explore the difference between the perceived influence of the social and the physical environment on healthy eating behavior of students, as well as to test and explore differences in weight management strategies among students. These research aims were translated into research questions, which will be answered in the paragraphs below.

The first research question was: What is the difference between the perceived influence of the social and the physical environment on healthy eating among students, taking into account differences in living arrangement, gender and BMI? In order to answer this question, two survey items were used, of which the mean scores indicated that students feel stimulated to eat healthy more by the social environment than by the physical environment. This finding was confirmed by qualitative data of the current research, retrieved in a focus group interview. Focus group participants indicated the social environment to be more influential compared to the physical environment. However, both quantitative and qualitative data were not conclusive on the difference between the perceived influence of the social and the physical environment on healthy eating among students. The outcome of the subsequent data analysis reflects the complexity of the situation, in which the influence of the social and the physical environment on healthy eating depends upon a combination of different factors. According to the focus group participants, environmental influences are not always perceived consciously and individual situations should be taken into account, thereby supporting the conclusion that the influence of the environment on eating behavior of students is complex and a clear distinction between the social and physical environment is hard to make. Similar results have been found in previous research. LaCaille et al. concluded that 'eating (…) behaviors are determined by a complex interplay between motivations and self-regulatory skills as well as the unique social and physical environment comprising collegelife' (LaCaille et al., 2011, p. 537). However, it cannot be ignored that mean scores on the survey items indicated the social environment to be more influential regarding healthy eating, and that during the focus group the social environment was assessed as more influential as well. Therefore, it can be concluded that there is a small difference between the perceived influence of the social and the physical environment on healthy eating among students, whereby the social environment is slightly more influential. The importance of the social environment regarding student's eating behavior has earlier been underscored by Larson, Wall, Story, and Neumark-Sztainer (2013), and Çekiç, Özkamali, and Buğa (2014).

The second research question was: What are differences in weight management strategies among students, taking into account differences in living arrangement, gender and BMI? In order to measure weight management strategies, the WMSI (Keller & Siegrist, 2015) has been used. Examination of the quantitative data revealed main effects for living arrangement, gender and BMI. However, for the factors living arrangement and BMI univariate outcomes did not remain significant after Bonferroni correction, suggesting there were no salient differences in the use of weight management strategies between students living with their parents and students living away from home and between normal weight and overweight students. Regarding BMI, Navarro-González et al. (2014) found a direct relationship between students with a BMI above 25 and the habit of not having breakfast usually. Further, Keller and Siegrist (2015) investigated the association between the WMSI scales and BMI. Their results suggested that individuals with a high BMI use more weight management strategies,

since they try to regulate their weight more intensively compared to individuals with a healthy BMI. The fact that the current research did not find differences in weight management strategies based on BMI was therefore inconsistent to outcomes of earlier research, but can probably be explained by the underrepresentation of overweight students in the sample. During the focus group interview, eating behavior and weight management among students were not discussed in relation to BMI.

Based on the living arrangement of students, previous research indicated differences in eating behavior (Papadaki et al., 2007; Brunt & Rhee, 2008; Riddell et al., 2011; Ansari et al., 2012), and weight (LaCaille et al., 2011; Deliens et al., 2014). These differences were seen as indicators for differences in weight management strategies between students living with their parents and students living away from home, but the current research could not confirm that expectation. During the focus group interview, participants were able to explain this finding. Before doing so, the focus group participants concluded that students living away from home face different environmental influences on eating behavior than students living with their parents, consistent with previous research. Part of the explanation of the focus group participants for not finding differences in weight management strategies based in living arrangement, is that students of both living arrangements probably prefer to use strategies that cost minimal effort. Also, according to the focus group participants, various factors that are independent of living situation play a role, like: place of residence, age, amount of people to cook for, having new people around, study choice, sporting behavior, intrinsic motivation, rearing style of student's parents and the general trend to eat healthy.

Significant gender differences were found in the current research. Outcomes suggested male students to use weight management strategies fewer and less frequently than female students. This result is consistent with previous research that indicated males to use fewer weight management strategies compared to females (Cluskey & Grobe, 2009). Further, it was concluded during the focus group interview that women are more focused on their eating behavior and weight management compared to men. According to the focus group participants, gender-based differences in interest, norms and imitation behavior underlie the focus of women on eating behavior and weight management, explaining the differences found in weight management strategies between males and females. In response to the second research question, it can be concluded that differences in weight management were found between male and female students, indicating that gender plays an important role in weight management. No differences in weight management strategies were found based on living arrangement or BMI, indicating different other factors to play a role and reflecting the complexity of relationships.

Given the recent development of the WMSI (Keller & Siegrist, 2015), this study was the first one to use this inventory among students, as far as known by the researcher. It is therefore appropriate to make a few comments on this questionnaire. Of course it should be taken into account that the online questionnaire, as used in this research, included a Dutch translation of the original WMSI. While translating the inventory, some items appeared to be less clear than others. Most items described active behaviors, but some concerned caring about, or trying to perform, certain behavior (Keller & Siegrist, 2015). It is believed that the inconsistency in descriptions of behaviors made the assessment of statements more difficult. Also, some items contained ambiguous words like normal, usually, low and high. Respondents, who had the change to comment on the online questionnaire after filling it out, indicated to have troubles assessing items that consist of two parts, like 'I skip breakfast if I ate a lot the evening before'. Individuals might use skipping breakfast as a weight

management strategy, but not (only) if they ate a lot the evening before. One of the respondents thought the questionnaire would therefore not represent weight management behavior correctly. Other comments of respondents included that the WMSI items were too negative and that there was too much repetition in the items. Also, the WMSI was focused too much on losing weight, according to multiple respondents. Individuals might not have struggles maintaining a healthy weight and some even need to gain weight. These people may have the feeling this questionnaire is not applicable to them. Lastly, the lack of items about physical exercising and sporting behavior was seen as a shortcoming of the WMSI by both the researcher and respondents. Recommendations for the improvement of the WMSI include making the existing items more consistent and generally applicable, and less ambiguous. Also, items on physical activity should be added. Further, it is recommended to ask for missing weight management strategies. Despite that there is room for improvement, the WMSI is still considered as the right instrument for the quantitative part of this research. The questionnaire as such was however not considered to provide enough information about students' weight management strategies, but could perfectly be used prior to qualitative research. The mixed methods gave meaning to the quantitative outcomes, and guidance for the qualitative part of the research.

Interpreting results and conclusions of the current research, several limitations should be taken into account. First of all, for the quantitative part of this study, students living away from home, females and normal weighed students were over-represented in the sample. To gather data on the influence of the social and physical environment on healthy eating, two items were used that have been designed for this research. The fact that only two items were used, which measured the influence of the environment on healthy eating in a subjective way, is a major limitation, but can be explained by the lack of a proper existing measurement instrument. To gather data on weight management strategies, a translated version of the WMSI was used. This questionnaire had not been translated to Dutch, so it was not validated in the form as used for this research. Since the online questionnaire consisted of 64 items to measure weight management, next to multiple background questions, the length of the online questionnaire may explain the dropout rate of 20.8%. Although it was described that the questionnaire was meant for students and should be filled in for the weekday situation, this could not be checked. Using self-reported data may have led to errors, accidentally or intentionally. For the qualitative part of this research, the focus group interview was held with participants studying at Wageningen University and living in or near to Wageningen. Students of Wageningen University probably have an interest in healthy eating above average, being not representative for Dutch university students. Since participants were aware of this and were asked to reason for students in general, results can still be assessed as representative.

Strengths of the current research include the high amount of respondents that filled out the questionnaire within three weeks, the use of an up-to-date and carefully constructed questionnaire and the variety of focus group participant's backgrounds. As a first study to use the WMSI (Keller & Siegrist, 2015) among students, the current study revealed points of improvement that should be considered by the developers of the WMSI. Further, combining quantitative and qualitative data is a major strength of this research, resulting in rich and valuable findings regarding the influence of the social and physical environment on healthy eating, and weight management strategies among university students.

The results of the current research can be translated into practice. In the process of designing interventions aimed at decreasing students' overweight and obesity rates through self-regulation, it is recommended to pay extra attention to the social environment. Also, it might be effective to keep in mind gender differences, for example by approaching male and female students differently. Not only can the results of this research be translated into practice, they may also stimulate further research on healthy eating and the use of weight management strategies among students. Since these topics showed to be very complex, with many factors having an influence, it is recommended to clarify the relationships regarding eating behavior and weight management among students. Ideally, this is done conducting longitudinal research. The present findings suggest focusing on gender differences and factors independently of living arrangement. Also, it can be recommended to include physical activity in research regarding weight management.

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Appendix I Questionnaire (in Dutch)

Welkom

Beste student,

Hartelijk dank voor je deelname aan dit onderzoek naar gewichtsbeheersing en (di)eetgedrag onder studenten. De vragenlijst zal 10 tot 15 minuten van je tijd in beslag nemen.

Als vervolg op deze vragenlijst zou ik graag een aantal studenten willen interviewen (telefonisch of face-to-face) om dieper in te kunnen gaan op de gegeven antwoorden. Na afloop van de vragenlijst is er daarom de mogelijkheid om je contactgegevens in te vullen wanneer je benaderd wilt worden voor een interview. Ook kun je meedingen naar één van de drie Bol.com cadeaubonnen ter waarde van €15,-, die worden verloot onder de respondenten.

Deelname aan dit onderzoek is vrijwillig. Alle antwoorden zullen anoniem en vertrouwelijk behandeld worden en zijn uitsluitend bedoeld voor wetenschappelijke doeleinden.

Indien je nog vragen hebt over dit onderzoek, kun je contact opnemen met Charlotte Wouters.

E-mailadres: charlotte.wouters@wur.nl Telefoonnummer: 0611141341

- ☐ Ik heb bovenstaande informatie gelezen en ga hiermee akkoord.

Achtergrondvragen

Wat is je geslacht?

- ○ Man
- ○ Vrouw

Wat is je leeftijd in jaren?

[ ]

Wat is je lengte in centimeters?

[ ]

Wat is je gewicht in kilogrammen?

[ ]

Ik studeer aan een...

- ○ Hogeschool
- ○ Universiteit (bachelor)
- ○ Universiteit (master)

In welke stad studeer je?

[ ]

In welk jaar van je studie bevind je je momenteel (hogeschool/bachelor/master samengenomen en inclusief eventuele vertraging)?

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6
- ○ 7
- ○ 8 of hoger

In dit onderzoek zijn we geïnteresseerd in strategieën die studenten DOORDEWEEKS toepassen om op gewicht te blijven of om af te vallen. Het is daarom belangrijk dat je bij de vragen die hierna komen een doordeweekse situatie in gedachten neemt. Dus op maandag t/m vrijdag (NIET in het weekend).

Hoeveel geld geef je per week uit aan eten en drinken (doordeweeks, exclusief drank tijdens het uitgaan)?

- ○ Minder dan €20,00
- ○ €20,00 - €39,99
- ○ €40,00 - €60,00
- ○ Meer dan €60,00

Wat is je (doordeweekse) woonsituatie?

- ○ Op kamers – zelfstandig
- ○ Op kamers – met huisgeno(o)t(en)
- ○ Met ouder(s)/verzorger(s)
- ○ Anders

Beschrijf alsjeblieft je (doordeweekse) woonsituatie: (Vraag enkel weergegeven indien bij bovenstaande vraag 'Anders' geantwoord is)

In hoeverre heb je invloed op de boodschappen die (doordeweeks) in huis gehaald worden?

Geen invloed	Een beetje invloed	Neutraal	Veel invloed	Volledige invloed
○	○	○	○	○

In hoeverre word je door je sociale omgeving (de mensen waarmee je omgaat) gestimuleerd om gezond te eten?

Zeker niet	Meestal niet	Neutraal	Meestal wel	Zeker wel
○	○	○	○	○

In hoeverre word je door je fysieke omgeving (de ruimtes waarin je tijd doorbrengt) gestimuleerd om gezond te eten?

Zeker niet	Meestal niet	Neutraal	Meestal wel	Zeker wel
○	○	○	○	○

Start vragenlijst

Onderstaande stellingen zijn strategieën met betrekking tot het stellen en monitoren van doelen. Geef bij elk van de volgende stellingen aan in hoeverre deze op jou van toepassing is.

Reminder: Ga hierbij uit van de situatie zoals deze DOORDEWEEKS is.

	Totaal niet van toepassing	Niet van toepassing	Niet echt van toepassing	Neutraal	Een beetje van toepassing	Wel van toepassing	Volledig van toepassing
Ik heb als doel om iedere dag voldoende groente en fruit te eten.	○	○	○	○	○	○	○
Ik heb als doel om er een gebalanceerd voedingspatroon op na te houden.	○	○	○	○	○	○	○
Ik heb als doel om een normaal en gezond gewicht te behouden of te bereiken.	○	○	○	○	○	○	○
Ik tel dagelijks de calorieën van de voeding die ik eet.	○	○	○	○	○	○	○
In gedachten houd ik bij hoeveel calorieën ik dagelijks binnenkrijg.	○	○	○	○	○	○	○
Ik weet altijd de hoeveelheid calorieën die ik op een dag binnenkrijg.	○	○	○	○	○	○	○
Ik sta regelmatig op de weegschaal.	○	○	○	○	○	○	○
Ik weeg mezelf regelmatig en houd mijn gewicht bij.	○	○	○	○	○	○	○
Ik heb voor mezelf een gewicht vastgesteld, dat ik probeer na te streven.	○	○	○	○	○	○	○

Onderstaande stellingen gaan over planning en strategieën om verleidingen te voorkomen. Geef bij elk van de volgende stellingen aan in hoeverre deze op jou van toepassing is.

Reminder: Ga hierbij uit van de situatie zoals deze DOORDEWEEKS is.

	Totaal niet van toepassing	Niet van toepassing	Niet echt van toepassing	Neutraal	Een beetje van toepassing	Wel van toepassing	Volledig van toepassing
Ik besluit in de supermarkt wat ik ga kopen.	○	○	○	○	○	○	○
Ik maak een boodschappenlijstje voordat ik naar de supermarkt ga.	○	○	○	○	○	○	○
Wanneer ik een boodschappenlijstje maak, koop ik alleen wat op het lijstje staat.	○	○	○	○	○	○	○
Ik eet mijn maaltijden in alle rust aan tafel.	○	○	○	○	○	○	○
Wanneer ik aan het eten ben, doe ik tegelijkertijd niets anders.	○	○	○	○	○	○	○
Ik probeer eten van andere activiteiten te scheiden.	○	○	○	○	○	○	○
Ik zorg ervoor dat ik op een dag genoeg rustpauzes heb.	○	○	○	○	○	○	○
Ik zorg ervoor dat ik altijd genoeg slaap krijg.	○	○	○	○	○	○	○
Ik ontspan me regelmatig.	○	○	○	○	○	○	○
Ik eet op regelmatige tijden.	○	○	○	○	○	○	○
Ik plan regelmatige maaltijden in, om te voorkomen dat ik opeens hongerig wordt.	○	○	○	○	○	○	○
Ik eet altijd op vaste tijdstippen op een dag.	○	○	○	○	○	○	○

	Totaal niet van toepassing	Niet van toepassing	Niet echt van toepassing	Neutraal	Een beetje van toepassing	Wel van toepassing	Volledig van toepassing
Ik sla bepaalde maaltijden over.	○	○	○	○	○	○	○
Ik sla mijn ontbijt (of een andere maaltijd) over wanneer ik de avond ervoor veel gegeten heb.	○	○	○	○	○	○	○
Eén tot twee dagen per week eet ik heel weinig.	○	○	○	○	○	○	○
Om niet in de verleiding te komen, berg ik bepaalde voedingsmiddelen op buiten mijn bereik of ik koop ze helemaal niet.	○	○	○	○	○	○	○
Ik blijf uit de buurt van voedingsmiddelen die me in verleiding brengen om er teveel van te eten.	○	○	○	○	○	○	○
Ik probeer situaties te vermijden waarbij ik in de verleiding kom om teveel te eten.	○	○	○	○	○	○	○
Wanneer ik in de verleiding kom om teveel snoep of snacks te eten, leid ik mezelf af door iets anders te gaan doen.	○	○	○	○	○	○	○
Wanneer ik zin heb in snoep of snacks, leid ik mezelf af door te lezen, TV te kijken of iets op de computer of in het huishouden te doen.	○	○	○	○	○	○	○
Wanneer ik zin heb om iets te eten, zonder dat ik honger heb, zoek ik afleiding.	○	○	○	○	○	○	○

De onderstaande stellingen zijn strategieën met betrekking tot routines en het automatisch gedrag. Geef bij elk van de volgende stellingen aan in hoeverre deze op jou van toepassing is.

Reminder: Ga hierbij uit van de situatie zoals deze DOORDEWEEKS is.

	Totaal niet van toepassing	Niet van toepassing	Niet echt van toepassing	Neutraal	Een beetje van toepassing	Wel van toepassing	Volledig van toepassing
Als ik door frustraties of stress wil eten, dan eet ik geen snoep of zoute snacks maar iets met weinig calorieën zoals groente of fruit.	○	○	○	○	○	○	○
Als ik door frustraties of stress wil eten, dan drink ik water of een ander caloriearm drankje.	○	○	○	○	○	○	○
Als ik uit verveling iets zoets of zouts wil eten, dan eet ik iets met weinig calorieën zoals groente of fruit.	○	○	○	○	○	○	○
Als ik uit verveling wil eten, dan drink ik eerst water of een ander caloriearm drankje.	○	○	○	○	○	○	○
Ik eet zo weinig mogelijk koolhydraten.	○	○	○	○	○	○	○
Ik zorg ervoor dat het aandeel koolhydraten in mijn voeding laag is.	○	○	○	○	○	○	○
Of mijn voeding veel of weinig koolhydraten bevat, is voor mij belangrijk.	○	○	○	○	○	○	○
Wanneer ik uit eten ga, probeer ik zo weinig mogelijk saus te nemen.	○	○	○	○	○	○	○

	Totaal niet van toepassing	Niet van toepassing	Niet echt van toepassing	Neutraal	Een beetje van toepassing	Wel van toepassing	Volledig van toepassing
Ik zorg ervoor dat het aandeel vet in mijn voeding laag is.	○	○	○	○	○	○	○
Wanneer ik uit eten ga, kies ik niet voor gepaneerd of gefrituurd voedsel.	○	○	○	○	○	○	○
Indien mogelijk, kies ik voor gegrild, geblancheerd of gestoomd voedsel.	○	○	○	○	○	○	○
Om mijn gewicht onder controle te houden, eet ik geen (vette) vleeswaren en geen worst.	○	○	○	○	○	○	○
Ik drink voornamelijk water of suikervrije drankjes.	○	○	○	○	○	○	○
Ik zorg ervoor dat ik met mijn drankjes zo min mogelijk calorieën binnenkrijg.	○	○	○	○	○	○	○
Ik voeg geen suiker toe aan koffie of andere drankjes.	○	○	○	○	○	○	○
Ik drink voornamelijk caloriearme drankjes.	○	○	○	○	○	○	○
	Totaal niet van toepassing	Niet van toepassing	Niet echt van toepassing	Neutraal	Een beetje van toepassing	Wel van toepassing	Volledig van toepassing
Ik beperk mijn alcoholinname om zo min mogelijk calorieën binnen te krijgen.	○	○	○	○	○	○	○
Tijdens maaltijden schep ik doorgaans geen tweede keer op.	○	○	○	○	○	○	○
Wanneer ik tijdens een maaltijd een tweede keer opschep, neem ik alleen groenten of salade.	○	○	○	○	○	○	○

Tijdens een maaltijd ik eet doorgaans één portie.	○	○	○	○	○	○	○
Ik zorg ervoor dat ik normale portiegroottes eet wat betreft maaltijden en tussendoortjes.	○	○	○	○	○	○	○
Ik eet mijn maaltijden doorgaans snel.	○	○	○	○	○	○	○
Ik ben een snelle eter.	○	○	○	○	○	○	○
Ik neem de tijd om te eten.	○	○	○	○	○	○	○
	Totaal niet van toepassing	Niet van toepassing	Niet echt van toepassing	Neutraal	Een beetje van toepassing	Wel van toepassing	Volledig van toepassing
Wanneer ik vol ben stop ik met eten, ook als ik mijn bord nog niet leeg heb.	○	○	○	○	○	○	○
Ik stop met eten op het moment dat ik geen honger meer heb.	○	○	○	○	○	○	○
Ik eet altijd mijn bord leeg, ook als ik al vol zit.	○	○	○	○	○	○	○

De onderstaande stellingen zijn strategieën voor het omgaan met verleidingen. Geef bij elk van de volgende stellingen aan in hoeverre deze op jou van toepassing is.

Reminder: Ga hierbij uit van de situatie zoals deze DOORDEWEEKS is.

	Totaal niet van toepassing	Niet van toepassing	Niet echt van toepassing	Neutraal	Een beetje van toepassing	Wel van toepassing	Volledig van toepassing
Als ik in de verleiding kom om teveel te eten, dan denk ik eraan dat ik gezond en aantrekkelijk wil zijn.	○	○	○	○	○	○	○
Als ik in de verleiding kom om teveel te eten, dan zeg ik tegen mezelf dat het plezier om te eten van korte duur is en dat de extra kilo's lichaamsgewicht van lange duur zijn.	○	○	○	○	○	○	○
Als ik in de verleiding kom om teveel te eten, dan bedenk ik me dat teveel eten me dik maakt.	○	○	○	○	○	○	○
Als ik in de verleiding kom om teveel te eten, dan denk ik aan het verlangen om mijn gewicht onder controle te houden.	○	○	○	○	○	○	○
Als ik in de verleiding kom om zoete of zoute snacks te eten, dan probeer ik de verleiding te weerstaan met wilskracht.	○	○	○	○	○	○	○
Als ik in de verleiding kom om zoete of zoute snacks te eten, dan verbied ik mezelf om aan deze verleiding toe te geven.	○	○	○	○	○	○	○
Als ik in de verleiding kom om zoete of zoute snacks te eten, dan onderdruk ik dit verlangen.	○	○	○	○	○	○	○

Afsluiting

Deze vragenlijst ging over strategieën die studenten doordeweeks gebruiken om op gewicht te blijven/komen en om eetgedrag te reguleren.

Zijn er nog strategieën die je zelf doordeweeks toepast, die **niet** in deze vragenlijst aan bod zijn gekomen?

Heb je nog vragen of opmerkingen naar aanleiding van deze vragenlijst?

Wil je je gegevens invullen om mee te dingen naar een van de waardebonnen en/of vrijblijvend benaderd te worden voor een interview (meerdere antwoorden mogelijk)? Contactgegevens worden nergens anders voor gebruikt, dan voor het versturen van de cadeaubonnen en/of het uitnodigen voor een interview.

- ○ Ja, ik sta open voor vervolgonderzoek
- ○ Ja, ik wil meedingen naar een van de cadeaubonnen
- ○ Nee

Vul alsjeblieft de volgende informatie in: (Vraag enkel weergegeven indien bij bovenstaande vraag 'Ja, (…)' geantwoord is)

Voor- en achternaam	
Telefoonnummer/e-mailadres	
Woonplaats (doordeweeks)	

Appendix II Interview guide (in Dutch)

Deelnemers
2 uitwonende mannen, 2 uitwonende vrouwen, 2 thuiswonende vrouwen.

Onderzoeksvragen
1. Hoe zijn de geslachtsverschillen in het gebruik van 'weight management strategies' te verklaren?
2. Waarom zijn er geen verschillen gevonden tussen studenten die thuis wonen en studenten die op kamers wonen in het gebruik van 'weight management strategies'?
3. Wat zijn de verschillen in invloed tussen de sociale en fysieke omgeving?
4. (Hoe verhouden 'weight management strategies' zich ten opzichte van eetgedrag volgens respondenten?)

Inleiding (10 minuten: 10.35-10.45)
- Iedereen verwelkomen en bedanken voor de medewerking.
- Introductie inclusief zelf voorstellen en korte uitleg/doel van het onderzoek.
- Uitleggen dat deze (kwalitatieve) focus groep een vervolg is op de eerder ingevulde (kwantitatieve) vragenlijst.
- Werkwijze van deze focusgroep vertellen en definitie geven 'weight management strategies'.
    - 'Weight management strategies can be used to control food intake and maintain a normal body weight or to reduce excess body weight. These strategies work on both a mental and behavioral level and can differ per individual'.
- Vragen om toestemming voor het opnemen van het interview.
- Voorstelrondje deelnemers (inclusief studie en woonsituatie).

Te bespreken onderwerpen

Geslacht (10 minuten: 10.45-10.55)
Algemeen: Over het algemeen zijn vrouwen gemotiveerder om gezonder te eten.
- In hoeverre denk je dat je zelf verschilt in het gebruik van strategieën ten opzichte van het andere geslacht? En waarom?
- Zijn er specifieke strategieën waarvan je verwacht dat verschillen in geslacht zijn? En waarom?

Resultaten vragenlijst: Uit de kwantitatieve data is gebleken dat mannen en vrouwen van elkaar verschillen op de WMSI, specifiek op de strategieën 'Setting goal of a balanced diet' en 'Normal portion sizes'. Dit betekent dat vrouwen hoger scoorden op het als doel hebben van een gebalanceerd dieet en een gezond gewicht. Ook scoorden vrouwen hoger op het selecteren van normale portie groottes.
- Hoe denk je hierover als man/vrouw? Herken je jezelf hierin?
    - *Hoe belangrijk vind je een gebalanceerd dieet en normale portiegroottes?*
    - *In hoeverre pas je deze strategieën toe/let je op het hebben van een gebalanceerd dieet en de groottes van je porties?*
    - Hoe zouden deze specifieke verschillen verklaard kunnen worden?

Woonsituatie (10 minuten: 10.55-11.05)

Algemeen: Op kamers gaan kan eetgedrag beinvloeden.

- Is er sinds je bent gaan studeren(/op kamers bent gaan wonen) een verandering opgetreden in je eetgedrag?
- Is er sinds je bent gaan studeren(/op kamers bent gaan wonen) een verandering opgetreden in strategieën die je toepast?
- Is er een ander moment dat je aan kan wijzen waarop je eetgedrag en/of het gebruik van strategieën zijn veranderd?
- In hoeverre denk je dat je zelf verschilt in het gebruik van strategieën ten opzichte van de andere woonsituatie? En waarom?

Resultaten vragenlijst: Uit de kwantitatieve data is gebleken dat er geen verschillen zijn tussen uit- en thuiswonende studenten in het gebruik van strategieën.

- Hoe denk je hierover als uit-/thuiswonende student? Is het herkenbaar?
    - Wat zou een verklaring kunnen zijn?

Omgeving (10 minuten: 11.05-11.15)

Algemeen: De omgeving heeft op verschillende manieren invloed op het (eet)gedrag van individuen.

- In hoeverre heb je het gevoel dat eetgedrag (van jezelf/studenten) door de omgeving beïnvloed wordt (zowel positief als negatief)?
    - Is hierbij een onderscheid te maken tussen de fysieke en sociale omgeving? Wat zijn de verschillen en hoe zijn ze te verklaren?
    - In hoeverre weet/kun je je als individu (te) wapenen tegen de invloeden van de omgeving?
        - Op welke manieren probeer je dit? Gebruik je, naast het toepassen van strategieën, nog andere manieren?

Indien genoeg tijd: WMSI (5 minuten: 11.15-11.20)

Algemeen: Eetgedrag en strategieën overlappen elkaar, waardoor het lastig kan zijn vergelijkingen te maken.

- Hoe denk je dat deze strategieën zich verhouden ten opzichte van eetgedrag?
    - Denk je dat het toepassen van de strategieën leiden tot gezond eetgedrag? Of zal ongezond eetgedrag leiden tot het toepassen van strategieën?

Overig/opmerkingen (5 minuten: 11.20-11.25)

- Welke factoren denk je dat van invloed zijn op 'weight management strategies' van studenten?
- Zijn er dingen niet aan bod gekomen die je nog wilt delen over de vragenlijst/deze focusgroep/het gehele onderzoek?

Afsluiting (5 minuten: 11.25-11.30)

- Kernpunten van deze focusgroep kort samenvatten.

Deelnemers nogmaals bedanken voor de aanwezigheid en ze een kleinigheidje schenken.