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Students and home-cooking: A Nutritional Content Analysis of a Student-Centered Social Media Cooking Programme

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Preface

The dissertation that you will start to read, is created as a part of my Master's program at the University of Antwerp. This thesis aimed to examine the healthiness of meals prepared in a Belgian social media cooking show, that focusses on students.

I could not have finished my dissertation without the help of several persons. At first, I would like to thank professor De Backer for her dedication to mentor all students that applied for her topics and for organising weekly gatherings so we could get the best possible support. Further, she helped me with finding the right direction for my thesis and advised on organising the dissertation.
Also, I want to thank my co-promotor Drs Decock and Drs Ngqangashe for providing all information on how a nutritional content analysis is performed and answering all questions concerning this analysis.
Lastly, I thank my friends and family for their support throughout the year.

I hope you enjoy reading this dissertation!

Gudrun Caelen
Antwerp, 13th of August 2019

Abstract

Studenten wijken regelmatig af van een gezond dieet. Hun voedingspatroon wordt beïnvloed door verscheidene factoren. Eén hiervan zijn de media. Wanneer studenten op zoek gaan naar inspiratie om te koken, vormen sociale media een belangrijke bron aan informatie. Uit onderzoek blijkt dat net de recepten die voortkomen uit een online omgeving niet voldoen aan de richtlijnen voor een gezond dieet.

Daarom was de centrale onderzoeksvraag van dit onderzoek: Volgen Belgische kookprogramma's op sociale media, die focussen op studenten, de Belgische voedingsaanbevelingen? Het kookprogramma dat in dit onderzoek nader werd onderzocht is 'Loïc Kotfood'. Dit programma is erop gericht studenten te voorzien van smakelijke gerechten die zonder veel inspanning klaargemaakt kunnen worden.

Om na te gaan of deze recepten passen binnen de Belgische aanbevelingen, was het uitvoeren van een nutritionele inhoudsanalyse noodzakelijk. Tijdens deze inhoudsanalyse werd er gefocust op de hoeveelheid energie, vetten, gesatureerde vetten, koolhydraten, suikers, eiwitten, vezels en zout die zich bevindt in de maaltijden. Ook hield het onderzoek rekening met de hoeveelheid groenten die aanwezig was.

Uit deze nutritionele inhoudsanalyse bleek dat de recepten van Loïc Kotfood zich niet houden aan de normen. Meer specifiek bevatten de maaltijden over het algemeen een teveel aan energie, vetten, gesatureerde vetten en zout, en een tekort aan koolhydraten.

Keywords: Social media; Nutritional content; Recipes; Cooking programme; Content analysis; Students; University; College

Words: 8032

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1 Introduction

There is evidence that behaviours linked to healthy living are created during young adulthood (18-25 years old) (Vaterlaus, Patten, Roche, & Young, 2015). At university, students establish new dietary behaviours (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). Their food choices are often of poor nutritional quality and exist out of small amounts of fruit and vegetables and high amounts of fast-food (Silliman, Rodas-Fortier, & Neyman, 2004).

The nutritional behaviours of students are influenced by different factors (individual factors, social networks, physical environment and macro-environment) (Vaterlaus et al., 2015). Social media, a factor from the macro-environment, can play an important role in the formation of students' food habits. Through social media it is possible to encounter new ingredients and ways of preparing food (Vaterlaus et al., 2015). The evaluation of this food-related content on the internet has been studied by several researches (Dickinson, Watson, & Prichard, 2018; Schneider, McGovern, Lynch, & Brown, 2013; Trattner, Elsweiler, & Howard, 2017)**.** The studies have constantly shown that these recipes exceed the guidelines for a healthy diet. This is alarming because they may have an impact on the cooking skills and knowledge of the audience (Pope, Latimer, & Wansink, 2015).

Young adults (eg. students) also use social media to obtain nutritional information (Vaterlaus et al., 2015). To date, there has been no detailed evaluation of online recipes that directly focus on students. On one hand, researches that investigate online food content are present, but these do not include a student population (Dickinson et al., 2018; Schneider et al., 2013; Trattner et al., 2017). On the other hand, studies are focussing on students, but these do not integrate a benchmark to evaluate the nutritional content of the media (Clifford, Anderson, Auld, & Champ, 2009; Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2014; Lane & Fisher, 2015; Nelson & Fleming, 2019; Silliman et al., 2004; Vaterlaus et al., 2015).

Therefore, the aim of this study was to explore to what extent cooking programmes on social media, targeting students, fit into a healthy diet. The present research made it possible to investigate the content of these student-centred recipes. The different nutrients that the analysis included were energy, protein, fat, saturated fatty acids (SFA), carbohydrates (CHO), sugar, fibre and salt. Also, the number of vegetables was taken into account. After performing a nutritional content analysis, it became clear that none of the recipes of the social media cooking programme 'Loïc kotfood' obeyed to all nutritional guidelines. More specific, the nutrients that were significantly different from the norm were energy, CHO, fat, SFA and salt.

2 Students and healthy diets

The transition from going to high-school to enrolling in university can affect students' diets (Nelson et al., 2008). There is evidence that behaviours linked to healthy living are created during this period of young adulthood (18-25 years old) (Vaterlaus et al., 2015). During university, students establish new dietary behaviours (Nelson et al., 2008). These young adults become more independent and need to make food choices without parental control (Deliens et al., 2014). This freedom can lead to poor food habits. Students' food choices are often of low nutritional quality and exist out of small amounts of fruit and vegetables and high amounts of fast-food (Silliman et al., 2004). In the study of Silliman et al. (2004) more than half (51%) of the respondents reported their diets as poor or fair.

Also, students are not always able to cook for themselves when going to university and often do not have enough knowledge about healthy diets (Clifford, Anderson, Auld, & Champ, 2009; Lane & Fisher, 2015).

2.1 Healthy diet

2.1.1 Belgian Food and Dietary intake guidelines

One of the many models for healthy eating is the Belgian Triangle of Nutrition. The Triangle of Nutrition is a model made by the Flemish Institute for Healthy Living (Vlaams Instituut Gezond Leven, 2019b). The reason for creating this framework is the oversupply of contradictory information concerning food intake.

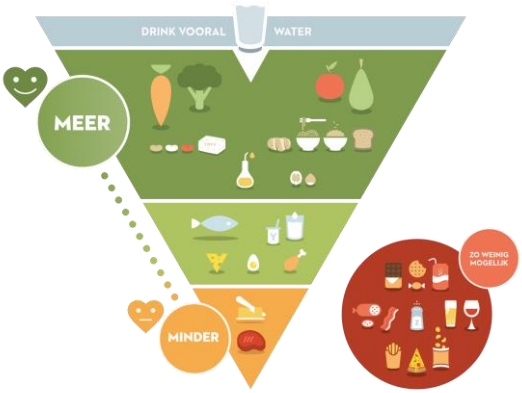

Figure 1: Triangle of nutrition, Flemish (Figure copied from Vlaams Instituut Gezond Leven, 2019)

The framework combined different scientific researches into one model that advises what the everyday diet should contain (Vlaams Instituut Gezond Leven, 2019b). It can offer guidance to those whose knowledge about healthy diets is minimal (for example university students) and tries to create sustainable food habits. This present research will use the triangle of nutrition as a framework because it is specially made for the Belgian population. This is the best fit for evaluating recipes from a Belgian program.

The triangle divides three different food categories (Vlaams Instituut Gezond Leven, 2017). The intake of the foods on top (green part) needs to be greater than the intake of ingredients from the orange part. The dark green part consists of products of plant origin. The next category, the light green part, consists of products of animal origin. The last, orange category includes both products of vegetable

and animal origin. These products, in contrast with the other categories, may have an unbeneficial effect on peoples' health but still have useful nutrients. The red circle outside the triangle stands for all products that are unnecessary for a healthy diet. A common characteristic of these products is the high amount of fat, sugar or salt that they contain without giving essential nutrients. The recommendation for a balanced dinner exists out of a bowl of soup, half a plate of vegetables (at least 200 grams), a quarter of potatoes or other whole grain products and a quarter of meat, fish, egg, legumes or meat substitutes (Vlaams Instituut Gezond Leven, 2019a). As a drink, water is the best option.

The triangle is based on the nutritional Belgian guidelines made by the Superior Health Council. It is more user-friendly than the compilation of all separate guidelines for the macro- and micro-nutrients (Vlaams Instituut Gezond Leven, 2017). Further, it is made to provide the wide public with achievable nutritional goals. The guidelines can also be used by those who work with nutrition in a professional context. The guidelines are made to provide the health professionals a nutritional standard.

In general, the triangle has three different principles (Vlaams Instituut Gezond Leven, 2017). Firstly, the institute recommends eating more products of plant origin. Secondly, they suggest eating less processed foods. That is the reason for focussing on preparing meals at home. This does not ensure eating healthy meals, but the intake of processed food and salt is generally lower when cooking from scratch. Thirdly, they try to discourage food waste.

2.1.2 Nutritional guidelines

More specific are the nutritional guidelines made by the Superior Health Council of Belgium. These recommendations reflect the nutritional intake for an average adult in Belgium (Hoge gezondheidsraad, 2016). The guidelines focus on keeping the general population healthy by making recommendations for the macro- and micro-nutrients that are useful and safe. In contrary to the triangle of nutrition, these recommendations are not made for all people but for professionals working within the nutritional sector.

The recommendations use the population reference intake (PRI) of every nutrient to ensure that the needs of at least 97,5% of the population are covered. The intake of the amount of energy to live a healthy lifestyle for an average person is 2000 kcal. This amount of energy is the reference for calculating all other nutrients. In Table 1 you can find the daily recommendations for adults in Belgium. The Superior Health Council expresses most of their recommendations in percentages of energy.

Table 1: Recommendations for the intake of nutrients per day

Nutrients	**Amount/ A day** (a)
Energy	2000 Kcal
Fat	Max 35%
SFA	Max 10%
CHO	Min 50%
Sugar	Max 10%
Protein	Max 25%
Fibre	Min 25g
Salt	Max 5g

(a) Recommendations from Superior Health Council Belgium (Hoge gezondheidsraad, 2016)

2.2 Determinants of food choices

Students' diets are influenced by different internal and external factors (Deliens et al., 2014). The study of Deliens et al. (2014) found that social networks, individual factors, the physical environment, and the macro-environment affect students' choices (see Figure 2). These influences are moderated by the university characteristics.

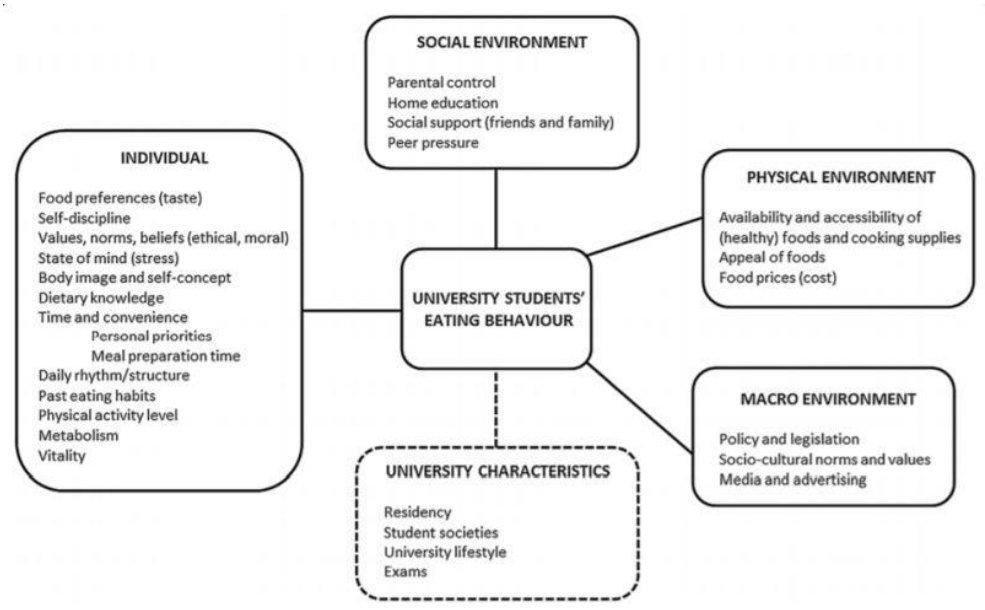

Figure 2: Determinants of food choices during university (Figure copied from Deliens et al., 2014)

2.2.1 Social environment

Within the social environment parents, eating habits at home, peer pressure and social support play a role in the formation of food habits (Deliens et al., 2014). Parents can influence their children's dietary behaviour by providing fruit and vegetables at home (Story, Kaphingst, Robinson-O'Brien, &

Glanz, 2008). Not only the availability of these food groups is important, also the accessibility can change the consumption. When fruit and vegetables are within reach, the intake of these food groups will augment. Further, children mirror the food intake of their parents (Story et al., 2008). The parents are a model for healthy eating habits. They need to consume fruits and vegetables in presence of their children to motivate them. Eating meals together, with the whole family, may also encourage a healthier food intake (Story et al., 2008).

Due to changing environments adolescents are more likely to create bad food habits (Davison et al., 2017). They eat more often away from home and are influenced by peers. Thus, it is important to provide these adolescents with an environment where healthy food habits are incorporated from a young age (Davison et al., 2017). This ensures that later in life, when children grow into adolescents and adults, their diets remain consistent.

2.2.2 Individual factors

The past food habits belong to the category of individual factors (Deliens et al., 2014). These factors are intra-personal and can be different for every student. For example, a student that experiences more stress than a fellow student, is more likely to follow an unhealthy diet (Kandiah, Yake, Jones, & Meyer, 2006). In the study of Kandiah et al. (2006) almost two-thirds of the participants (N=272 female college students) reported a greater appetite when being stressed. Another important individual factor is the time constrains that students encounter (Pelletier & Laska, 2012; Silliman et al., 2004). People are set to use as little time as possible being occupied with nutrition (Freeland-Graves & Nitzke, 2013). Experiencing a lack of time will have a negative influence on living a healthy lifestyle.

2.2.3 Physical environment

The availability and accessibility of food does not only affect children and adolescents, also university students are influenced by easy accessible food (Deliens et al., 2014). These factors (availability and accessibility) belong to the physical environment of the students. In this environment food prices and the appeal to food play an additional role in creating students' food habits (Deliens et al., 2014). A reduction in price of foods that fit a healthy diet (eg. fruits and vegetables) should provoke a raise in their consumption (Story et al., 2008). When products are more expensive than others, students are more prone to avoid these high-priced products, except when eating out they might spend more money (Deliens et al., 2014). This is alarming because eating food away from home is linked to unhealthy diets (Story et al., 2008).

2.2.4 Macro-environment

Lastly, the macro-environment shapes the food intake of students (Deliens et al., 2014). Different governmental decisions and the existing socio-cultural norms and values can have an impact on the consumption of different kinds of food and drinks. One example is that taste preferences are shaped by the local cultural food habits (Freeland-Graves & Nitzke, 2013).

Another important factor from the macro-environment are the media (Deliens et al., 2014). For example, students are more likely to buy food that they encountered earlier through advertisements or other forms of media. As these different kinds of media can have an influence on the food consumption of students, this will be the focus of the present study.

3 Food and Media

3.1 Advertisements

Food advertisements draw a lot of scientific research (Dovey, Torab, Yen, Boyland, & Halford, 2017; Mink, Evans, Moore, Calderon, & Deger, 2010; Rusmevichientong, Streletskaya, Amatyakul, & Kaiser, 2014) One of the reasons to conduct research about advertisements is that they make it possible to influence the choices people make while shopping (Dovey et al., 2017). The objective of food advertisements is to familiarize the viewer with the product. This will ensure that people will buy the product when passing it. Further, advertisements create a preference for the product advertised, and even for other products that belong to the same food category (Dovey et al., 2017).

Another use of food advertisements is to send health messages into the world. These are less frequent but can still have a significant influence on the audience (Rusmevichientong et al., 2014). These two observations are important reasons to conduct research about the content of advertisements.

All around the world researchers investigated the content of food advertisements (Eyal & Te'eni-Harari, 2016; Howard, Adams, & White, 2012; Keller & Schulz, 2011; Mink et al., 2010). Products high in fat, sugar and salt are more common in advertisements and thus contradict the guidelines for a healthy diet (Mink et al., 2010).The main finding in these studies is that the majority of food advertisements consists of energy-dense food products (Eyal & Te'eni-Harari, 2016; Howard et al., 2012; Keller & Schulz, 2011; Mink et al., 2010). The energy-dense food products are those that contain lots of calories but only small amounts of essential nutrients. These findings are consistent in advertisements targeting different age groups and also different countries (Eyal & Te'eni-Harari, 2016; Keller & Schulz, 2011). In a study of French, Story, Neumark-Sztainer, Fulkerson, and Hannan (2001) there was a positive association

between watching television advertisements and the consumption of fast food. Although the amount of researches that emphasise the negative side of advertisements, it can be a positive medium (Dovey et al., 2017).The amount of health message advertisements is small but these messages can have a significant effect on the eating patterns of the audience (Rusmevichientong et al., 2014). When people see messages linked to healthy eating behaviours, there can be a significant lower calorie intake (Dovey et al., 2017). This can also be relevant for the exposure to food through television and the internet.

3.2 Television

The promotion of food on television goes further than advertising alone. Cooking programmes are a part of the daily television schedule (Ketchum, 2005). These programmes know a big success (Clifford et al., 2009; de Solier, 2005; Pope et al., 2015; Villani, Egan, Keogh, & Clifton, 2015). Through the years different kinds of cooking programmes appeared (Ketchum, 2005). It is possible to divide them into four categories: Traditional domestic instructional cooking, personality driven domestic cooking, food travel programs and avant-garde programming. The programmes in the first category aim to teach the viewer how to cook. Through these shows the audience can obtain basic cooking skills or learn how to prepare a meal with various ingredients (Villani et al., 2015). The other three categories exist to entertain the audience. In the current research, educational cooking shows were defined as those programmes that have the intent to teach the viewers how to prepare meals from scratch.

A study of Pope et al. (2015) showed that it is possible to link someone's body mass index (BMI) to watching cooking programmes. When these programmes ignore the guidelines for a healthy diet, it may have a negative influence on the cooking habits of the viewers and consequently on their BMI's (Pope et al., 2015). The impact of the cooking programmes is greater when a viewer does not have a lot of experience with cooking (Day, Kyriazakis, & Rogers, 1998). This group often includes people that live alone or are a part of a young family. Further, the influence can expand when the audience views the programme for educational reasons, rather than for leisure purposes (Pope et al., 2015).

There are various reasons why cooking programmes can have such an impact. The first possible reason can be the authority the cook has over the recipes (Pope et al., 2015). The last couple of years, television chefs gained popularity (Remnant & Adams, 2015). Because of this trend, the chefs are able to develop a relationship with the spectator. This relationship can be established through being authentic, charismatic, familiar and approachable (Barnes, 2017). The viewer will assume that the cook has the greatest knowledge of how to prepare a meal (Pope et al., 2015). The audience will see the cook as a model and this leads to mirroring the cooks' recipes.

The authority of the cook was not the focus of the current research. The emphasis was placed on the norms these shows create (Pope et al., 2015). The continuous exposure of people to energy-dense recipes can create a norm for preparing these kinds of meals. This highlights the importance of exposing the audience to meals that fit into a healthy diet.

During the last couple of years, television chefs gained a great amount of popularity (Remnant & Adams, 2015). Thus, the opportunity exists to use the cook's popularity to educate the public about proper food choices and the way to prepare a meal that fits a healthy diet (Barnes, 2017). Instead, different studies found that the recipes made in these programmes regularly exceed the guidelines for a healthy diet (Cohen & Olson, 2016; Howard et al., 2012; Jones, Freeth, Hennessy-Priest, & Costa, 2013; Ngqangashe, de Backer, Matthys, & Hermans, 2018; Pope et al., 2015; Villani et al., 2015). For example, the use of an excessive amount of butter and cream are often important during the cooking process (Jones et al., 2013) .

Now, the television is not the medium that grabs most of the attention anymore. The rise of the laptop computers made it very easy to use different kinds of media at the same time (Brasel & Gips, 2011). Multi-tasking between watching television and being online became commonplace. Brasel and Gips (2011) found a greater focus on the computer screen during multi-tasking. Further, the traditional way of watching television is being replaced by watching programmes online (Damratoski, Field, Mizell, & Budden, 2011).

3.3 Social media

Despite all research on cooking programmes, most of them focus on television shows. There is little information about the use of social media in this context (Lane & Fisher, 2015). Because social media becomes more popular in all layers of society, it is important to know what nutritional information can be found on these platforms (Schneider et al., 2013).

These platforms are used to promote healthy lifestyles (Klassen et al., 2018). Social media can be a cheap and effective way to teach individuals about healthy food habits (Tobey & Manore, 2014). Topics like health, nutrition and food are common on social media (Klassen et al., 2018). Those social media users, who encounter these topics, get information through the health messages posted on the platforms.

Further, these platforms are used to spread recipes. The nutritional content posted on these kinds of blogs has been the subject of several studies (Dickinson et al., 2018; Schneider et al., 2013). The main finding of these studies was that the nutritional values of the meals on these platforms do not always

remain within the recommendations. The study of Dickinson et al. (2018) about food blogs found that the recipes that are recommended for a healthy diet had a low nutritional value. An overuse of sugar, fat and saturated fat was found in almost all recipes. Another research from Schneider et al. (2013) analysed six popular food blogs. In this study the recipes met the recommendations for the daily energy intake but contained an excessive amount of sodium and saturated fatty acids. Also recipes that are available on food related websites tend to exceed the stated norms (Trattner et al., 2017). The study showed that the internet recipes were less healthy than meals from television chefs and pre-made supermarket meals.

3.3.1 Students and social media

Social media is important for students who enrol in university for the first time (Thomas, Briggs, Hart, & Kerrigan, 2017). It helps them to say goodbye to their friends and family and makes it easier to create new friend groups. On these social media platforms they can also encounter food related content (Vaterlaus et al., 2015). The growth of social media ensures that everybody with an internet connection can easily access this kind of information (Vaterlaus et al., 2015). Vaterlaus et al. (2015) involved young adults in their research about the perceptional influence of social media on health behaviours. The participants reported that their diets were influenced by these platforms. The study of Nelson and Fleming (2019) had similar results. This research found that 96% of the respondents used the internet at least once to find recipes. Also, they showed that students were most likely to search recipes on the social media platform 'Facebook'.

Thus, there are several studies concerning the food intake of university students. These researches try to figure out how great the students' nutritional knowledge is and how their diets are influenced. None of these studies integrated an objective benchmark to determine a detailed analysis of the nutritional content of the meals to which students are exposed. Therefore, the objective of this study was to determine to which extent student-centered social media cooking programmes fit into a healthy diet.

***Key research question*: Do Belgian social media cooking programmes, targeting students, follow the stated Belgian Food and Dietary intake guidelines?**

4 Data and methods

4.1 Case Selection

This study conducted a nutritional content analysis of a Belgian educational cooking programme on social media. More specifically, it concentrated on one cooking program named 'Loic kotfood' (Loïc dormfood). Its name suggests that it focusses on preparing meals for those who go to university and live individually on a restricted budget. In this cooking programme the chef takes the typical dorm kitchen into account. Often these kitchens are not fully equipped, which makes it difficult to follow normal recipes. For example, rice is cooked in the microwave and the pizzas are baked in a frying pan. The programme is broadcasted in Dutch and French.

Through this channel, students get the possibility to learn about healthy eating habits and it provides a way to learn how to cook tasteful meals. Because this study wants to conduct an analysis of a cooking program on social media, 'Loïc Kotfood' is an interesting case. The program is only available through social media and not trough television. All the separate episodes can be found on Facebook and on Youtube. Further, the show has a page on Instagram.

Only the episodes that included a main course (lunch or evening meal), were considered in this research. The reason for only including the main courses and not the side dishes is the absence of guidelines that give specific amounts of nutrients that a side dish may consist of.

The categorisation of the episodes was similar to the approach in the study of Ngqangashe et al. (2018). This study is used as a reference because it is located in the same niche as the current study. Here they analysed different recipes and evaluated the nutrients against certain norms. Ngqangashe et al. (2018) categorised meals from children cooking shows by amounts of protein, i.e. vegetarian, seafood, red meat, poultry and desserts. The present research did not include desserts, as the number is too little to conduct a representative analysis (2 episodes).

A total of 71 episodes (N = 123) was suitable for this analysis. More precisely, the episodes of the Blokfood (Studyfood) and the Kotfood (Dormfood) part. The reason for choosing these parts was that they included the biggest number of episodes and are the most relevant in the regular life of a student. For example, the collection of recipes did not include festival themed episodes because there were just a couple of them. Those recipes are handy when going to a festival but not necessarily when the students have to cook at their dorm.

Table 2: Selected episodes

Protein categories	Amount
Red Meat	29
Poultry	8
Sea Food	14
Vegetarian	20
Total	71

4.2 Nutritional content of the recipes

Along the lines of the study of Ngqangashe et al. (2018) this research calculated the following nutrients: energy (kcal), total fat (%), saturated fatty acids (%), total carbohydrates (%), sugar (sum of mono- and disaccharides, both natural and added) (%), protein (%), fibre (g) and salt (g**).** The reasons for choosing these nutrients are the following: the study of Ngqangashe et al. (2018) also performs a nutritional content analysis. Thus, the current study is located in the same niche. When using the same nutrients as earlier studies it becomes possible to compare outcomes. Further, these nutrients are referred to as macro-nutrients, except for salt (Hoge gezondheidsraad, 2016). They are essential for the build-up of energy that humans need for a proper body functioning.

This study used Nubel mealplanning software to extract all nutritional data from the online recipes. The Nubel Foodplanner is a program where all available nutritional information on 3678 different foods available in Belgium are grouped into one database (Nubel, n.d.). The planner is utilised to track and plan peoples' daily food intake. The Nubel software is used in this study because it makes it possible to calculate the amount of each nutrient per meal.

Only the information that was accessible through the recipes and videos, were implemented in the Nubel software. The food composition database of the Nubel vzw was the main source to collect information about the different ingredients. When the Nubel database did not include a particular food item or an item that could be used as a substitute, another database provided this information. The Wolfram Alpha database was the first source for finding nutritional information. When also this database could not provide more details, websites from various supermarkets were visited, such as Delhaize and Colruyt.

Further, the recipes were based on a single serving. This was not mentioned explicitly in the cooking show, but the author of the recipes has confirmed it. It was possible to contact him through

social media (Facebook and Instagram). The analysis kept the amount of meals on one serving because it simplifies the comparison of the nutritional information.

To be able to make comparisons, it was important to use the same capacity measures for all ingredients. This standardization process relayed on the study of Ngqangashe et al. (2018). Several recipes can include fluids like milk, oil and butter. Expressed in different forms of litre, the fluids needed conversion to grams. The amounts of cooking fats were defined as 15g (spoon), when no specific amounts were available. A pinch of salt was defined by the online search engine 'WolframAlpha 'as 0.4g.

4.3 Benchmark

This study used the guidelines of the Superior Health Council of Belgium to make criteria to evaluate the main courses. The Triangle of Nutrition was used to determine the right amount of vegetables. As stated above, 200 grams of vegetables per meal is the norm.

This study followed the criteria of Benelam and Stanner (2015) to determine how much of each nutrient a main meal can consist. They assume that a main meal (lunch or evening meal) consists of nearly 30 percent of an adult's nutrient intake. This equates to 600 kcal for the energy intake. The criteria to evaluate the macronutrients comprised the tolerable upper intake level for each nutrient. For the amount of fibres and carbohydrates, the minimum level was used. Just like the energy intake, the criteria for the fibre and salt will be 30 percent of the daily requirements. Table 3 shows the criteria that apply to this research.

Table 3: Recommendations for the intake of nutrients per meal

Nutrients	**Amount/ main meal** (a)
Energy	600 Kcal
Fat	Max 35%
SFA	Max 10%
CHO	Min 50%
Sugar	Max 10%
Protein	Max 25%
Fibre	Min 7.5g
Salt	Max 1.5g

(a) Recommendations from Superior Health Council Belgium (Hoge gezondheidsraad, 2016)

4.4 Statistical analyses

This study used version 25 of IBM's Statistical Package for Social Sciences (SPSS) to perform different analyses. Because the retrieved nutritional data was not normally distributed for all nutrients, a chi-square test and non-parametric test were used to find out whether or not there were significant

differences between the content of each nutrient and the Belgian nutritional guidelines, and also between the four food categories (red meat, poultry, sea food and vegetarian). The first analysis was a chi-square. Only when the *p*-value was smaller than .05, the differences between the norm and the actual nutritional values were considered to be significant. To compare the different food groups a Kruskal-Wallis test was performed. When one of the nutrients scored a p-value smaller than 0.05 a post-hoc test could determine between which food categories there was a significant difference. Here the *p*-value was adjusted with the Bonferroni-correction so that the interpretation of the significance could be the same. This means that the difference is seen as significantly different when $p < 0.05$.

5 Results

5.1 Overall comparison of the recipes against the guidelines

If we look at Table 4, it is possible to see how the median of all nutrients of the main course recipes scored against the norm. The median was used as a reference because the data is not normally distributed. The use of the mean rank would give a biased result. In Table 5, more information can be found about the significance of the differences in Table 4. Figure 1 gives more information about the percentage of oversupply or undersupply of the nutrients that were significantly different from the norm.

Table 4: Median of the nutrient content of main course recipes compared against the guidelines

	Norm	**Overall (n=71)**	**% within norm**
Energy(kcal)	≤ 600 kcal	698 (548-926)	32
Protein (%)	≤ 25 %	20 (14-26)	70
Fat (%)	≤ 35 %	43 (32-53)	30
SFA (%)	≤ 10 %	16 (10-23)	21
CHO (%)	≥ 50 %	33 (22-46)	18
Sugar (%)	≤ 10 %	7 (4-11)	70
Fibre (g)	≥7,5 g	8 (5-11)	55
Salt (g)	≤ 1.5 g	3 (1.4-4.4)	25
Vegetables (g)	≥ 200g	205 (116-410)	55

For *energy*, we can observe a significant difference between the energy content of the meals and the recommendation of 600 kcal. This means that the median amount of energy (698 kcal) can be seen as higher than the recommendation. $chi^2 = 3.948$, df =1, p=.047. A minority of the meals, more specifically 32%, met the recommendation.

For protein, 70% of the recipes contained 25% of protein or less and thus abide to the norm. The difference is not significant because $chi^2 = 0.830$, df =1, *p*= .326.

For Fat, the amount of fat in the recipes was significantly higher than the maximum recommendation of the 35%. $chi^2 = 4.470$, df =1, p=.034. In 70% of the courses the recommendation was surpassed. When analyzing the saturated fatty acids, a significant proportion (79%) of the meals exceeded the recommendation of a maximum of 10%. $chi^2 = 6.774$, df =1, p=.009.

For carbohydrates (CHO), 82% of the meals failed to follow the norm. The deviation between the norm and the actual amount of carbohydrates is significant. $chi^2 = 7.951$, df =1, p=.005. For sugar there was no significant difference found. $chi^2 = 0.830$, df =1, p=.362. 70% of the recipes stayed under 10% of sugar per meal. The amount of fibre in the meals is not significantly lower than the recommendations. $chi^2 = 1.605$, df =1, p=.205. Here 55% of all recipes contained 7.5 grams of fibre or more.

For salt, most of the recipes did not follow the guidelines for a healthy diet. A significant amount (75%) of the meals contained more grams of salt than recommended. $chi^2 = 5.449$, df =1, p=.020.

For vegetables, more than half of the recipes contained 200 grams of vegetables or more. There is no significant difference between the median of 205 grams and the norm of 200 grams of vegetables. $chi^2 = 1.605$, df =1, p=.205.

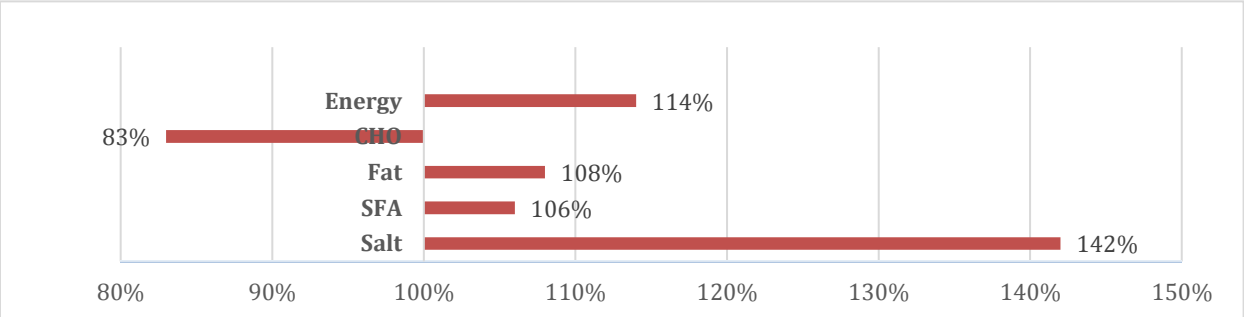

Figure 3: Nutrients of significant differences

Table 5: Pearson's chi-square

Variables	Pearson's chi-square		
	chi²	**df**	***p***
Energy	3.948	1	.047*
Protein	0.830	1	.362
Fat	4.470	1	.034*
SFA	6.774	1	.009*
CHO	7.951	1	.005*
Sugar	0.830	1	.362
Fibre	1.605	1	.205
Salt	5.449	1	.020*
Vegetables	1.605	1	.205

* $P < 0.05$

5.2 Respected criteria

Table 6: The number of criteria that are respected

Number of respected norms	Percentage of the recipes
0	0 (0)
1	7.0 (5)
2	16.9 (12)
3	23.9 (17)
4	18.3 (13)
5	15.4 (11)
6	14.0 (10)
7	4.2 (3)
8	0 (0)
9	0 (0)

Table 6 shows the number of criteria that the recipes met. All the meals were situated between one and seven criteria. This means that none of the recipes obeyed all nine criteria. However, this also implies that all meals met at least one criterion. The five recipes that respected one norm were all meals that contained red meat (Boulet sandwich, Lasagna, Mac and Cheese, Steak sambal and a Triple cheeseburger). The recipes that respected seven norms were all from different food groups (BBQ chicken, Tabbouleh and Endive and ham gratin)**.** Most of the recipes (23.9%) respected three different norms. The amount of recommendations met augmented until they met three criteria.

5.3 Food category comparison of the recipes against the guidelines

After performing the Kruskall-Wallis test, it was clear that three nutrients had intergroup differences regarding the amount of these nutrients. The variables that were the subject of the post-hoc test were saturated fatty acids, protein and energy.

Table 7: Median of the nutrient content of the different food group recipes compared against the guidelines

	Norm	**Red Meat (n=29)**	% within norm	**Poultry (n=8)**	% within norm	**Sea Food (n=14)**	% within norm	**Vegeta -rian (n=20)**	% within norm
Energy(kcal)	≤ 600 kcal	**806** (533-1118)	28	**654** (505-919)	50	**600** (516-703)	50	**705** (631-851)	20
Protein (%)	≤ 25%	**22** (15-27)	72	**27** (20-32)	38	**23** (16-31)	31	**14** (11-20)	85
Fat (%)	≤ 35%	**45** (39-58)	17	**30** (20-40)	75	**48** (28-53)	36	**41** (35-54)	25
SFA (%)	≤ 10%	**21** (15-25)	10	**9** (4-18)	50	**11** (7-16)	43	**21** (12-24)	10
CHO (%)	≥ 50%	**30** (21-40)	7	**39** (29-58)	38	**26** (18-47)	21	**42** (26-51)	25
Sugar (%)	≤ 10%	**7** (3-10)	76	**16** (6-29)	50	**6** (4-13)	57	**8** (5-10)	80
Fibre (g)	≥7.5g	**7.8** (5-10)	52	**9** (5.6-12.3)	63	**7.2** (5.1-10.9)	43	**9.4** (5.5-12.7)	65
Salt (g)	≤ 1.5g	**3** (1.9-5.4)	17	**3.4** (0.9-4.7)	38	**2.4** (1.7-3.4)	7	**1.9** (1-2.8)	45
Vegetables (g)	≥200 g	**156** (54-292)	41	**262** (188-376)	75	**221** (183-431)	64	**337** (104-486)	60

For energy, there were significant differences between the food groups because $chi^2 = 8.374$, df = 3, p=.0.039. More specifically, the food groups that varied significantly were sea food and red meat. The amount of energy was the lowest for sea food recipes and the highest for red meat recipes (see Table 7).

The amount of protein in the meals differed significantly among the food categories. $chi^2 =13.467$, df = 3, p=004. The difference was situated between the vegetarian recipes and both poultry and sea food recipes. The vegetarian meals contained a greater proportion of recipes that comply to the norm than the other two categories (see Table 7).

When looking at fat in general there were no significant differences between the food categories. $chi^2 = 6.768$, df = 3, p=.080 This means that the amount of fat in the recipes was too high regardless of the food group. For the saturated fatty acids (SFA) this was different. $chi^2 = 13.910$, df = 3, p=.003 The post-hoc test revealed that red meat was higher in SFA than poultry and sea food recipes.

The amount of carbohydrates (CHO) did not differ between the different categories. chi² = 4.930 , df = 3, p=.177 Because the overall median of the recipes was significantly higher than the norm, it is possible to say that regardless of the food categories, the amount of CHO in the recipes was high. For sugar there was no difference between the four groups. chi² = 4.767, df = 3, p=.190. Also, the proportion of recipes that met the recommendation for fibre did not vary between the food groups. chi² = 1.906, df = 3, p=.592

For salt, the comparison of the four food categories showed that there was no observable significant difference. chi² = 6.720, df = 3, p=0.081.

Lastly, the amount of vegetables in the recipes did not vary between the different food categories. chi² = 4.844, df = 3, p=.184.

Table 8: Significant differences between food categories

Nutrients	**Comparisons**	**Chi²**	***p***
Energy	Sea food – Red meat	18.958	.029
Protein	Vegetarian - Poultry	27.312	.009
	Vegetarian – Sea food	19.411	.042
SFA	Red meat - Poultry	22.903	.033
	Red meat – Sea food	19.037	.028

6 Discussion

In this study 71 recipes from the social media cooking program 'Loïc kotfood' are analysed against the Belgian nutritional guidelines. These recommendations are made by the Superior Health Council. The eight nutrients that are included in this analysis are: energy, protein, fat, saturated fatty acids (SFA), carbohydrates (CHO), sugar, fibre and salt. Also, the food group 'vegetables' is added to the analysis. The analysis shows that an excessive amount of energy, fat, SFA, and salt and an undersupply of CHO are found in these meals.

The excessive amount of nutrients in recipes can be linked to other researches. A study of Trattner et al. (2017) compared internet recipes from allrecipes.com with supermarket ready meals and scripts that were made by television chefs. Their conclusion was that the recipes from the internet tended to follow less recommendations. Here, they did not only found levels of fat, SFA and salt that were too high but also an excessive amount of protein. The amount of CHO was lower than the

recommended amount of 50%. Another research that included online food information is the following. Schneider et al. (2013) looked at food blogs to determine if social media offered recipes would fit a healthy diet. In line with the present study, the analysis showed that the amount of fat and salt did surpass the maximum recommended amount. The portion of recipes that met the recommendations for carbohydrates was low. In contrary to our findings, the recipes here met the recommendations for energy. The research of Dickinson et al. (2018) used clean eating blogs in their sample. Although the 'healthy' connotation of clean eating, the outcome of this study was that these recipes responded less to the norms than meals from 'normal' food blogs. Overall, the recipes contained high amounts of fat, SFA and sugar. Compared to the present study, none of the abovementioned studies found an excessive amount of energy in their recipes.

Not only studies that perform analysis on online samples find similar results, also recipes from various celebrity and television chefs do not always fit in the nutritional recommendations. Cooking shows on television that focus on children tend to over- and undersupply various nutrients. Ngqangashe et al. (2018) analysed such cooking shows and encountered recipes that were higher in fat, SFA and protein and lower in CHO and fibre. In this study, there was not an excessive amount of energy or salt present. Ngqangashe et al. (2018) also included the number of vegetables (and fruits) in their analysis. Their norm differentiated from the recommendation in the present study, namely 120 grams. Although, the smaller recommendation, the recipes still did not obey to the norm.

When looking at television shows targeting adults, the norms were also not respected. Similar to the findings in the present research, the recipes made by television chefs exceed in fat and SFA (Howard et al., 2012). A research from Jones et al. (2013) used the healthy eating index to figure out how 904 recipes from 26 British celebrity chefs would score. The nutrients fat, SFA, sugar and salt received the label 'high content', which means that they exceeded the norm.

None of the recipes in the present study meet all nine different recommendations. The study of Trattner et al. (2017) also mapped the amount of recipes that responded to the recommendations. Here, only 0.001% of the internet recipe sample responded to all recommendations. For the recipes made by television chefs the amount was even 0. The category that fitted the greatest number of recipes was one criteria. Almost 24% of the meals in the present study meet three recommendations. Thus, it is possible to say that the recipes in this study are healthier compared to the meals in the analysis of Trattner et al. (2017). An important side note to this observation is that these two studies use different benchmarks and evaluate a different amount of recommendations.

The present research includes four food categories: red meat, poultry, sea food and vegetarian. The amount of energy in the meals variate between sea food and red meat. The latter contains a much greater amount of energy than meals that existing out of sea food (see Table 7). The vegetarian recipes score better for protein in comparison with the poultry and sea food categories. Lastly, the proportion of recipes that contain an amount of SFA that exceed the norm is higher for red meat than for poultry and sea food recipes. The researches of Ngqangashe et al. (2018) and Schneider et al. (2013) also incorporated these food categories into their study. They found that the vegetarian recipes were healthier across all categories. Not only did protein score better in the study of Ngqangashe et al. (2018), but also the amount of salt in the recipes was lower. Schneider et al. (2013) could see a difference in energy, SFA and salt. All three nutrients scored better for vegetarian recipes than for meals that contained red meat and poultry.

It is important to realise that all conducted researches came to the conclusion that recipes, to which a great audience is exposed to, do not follow the nutritional guidelines (Dickinson et al., 2018). Through different sources (cooking shows, celebrity chefs, social media), people encounter recipes that do not fit a healthy diet. Thus, stimulating people to cook for themselves is not always positively related to a balanced nutritional diet because sources can provide misleading information (Trattner et al., 2017).

Further, the influence of online published nutritional information and information given by celebrities is still growing (Dickinson et al., 2018; Goldberg, Tanskey, Sanders, & Smith Edge, 2017). This only increases the possibility of a negative influence. The challenge is to raise awareness that the most reliable nutritional information cannot be found with celebrity chefs or online bloggers. Goldberg et al. (2017) suggests that registered dietitian nutritionists should use more new technologies to spread trustworthy information. Through this way it becomes possible to communicate in a direct way about what the people should consume and what not.

6.1 Limitations

In this study there were a couple of limitations that need to be taken into account. Firstly, some of the meals contained a big portion of food. These recipes were still included in the analyses because the chef of these meals confirmed that the portions were based on one person. For example, the weight of one portion sausage and chicory was 440.68 grams but the amount of one portion of Jambalaya was much greater (986.90 grams).

The interpretation of the recipes is subjective. It is up to the audience to estimate what it means to add a pinch of salt or a piece of butter. Therefore, it is possible that the interpretation had an

influence on the outcome of the results as the researcher's interpretation can be different than the chef's intention. The recipes did not always specify all amounts of ingredients. More information about the quantity could be derived from the accompanying cooking video.

Also, the audience can adjust the recipes as they please. Thus, the meals that are analysed in the present study can vary from the actual meal preparation at home. This study did not take notice of these possible alterations in the recipes. That is why conclusions of the present study can only be generalized to the recipes the audience comes into contact with (Ngqangashe et al., 2018).

Lastly, it is important to emphasize that there is not a universal set of nutritional guidelines that can be used to compare studies from different countries. The guidelines from the Superior Health Council are specified for the Belgian population and cover the nutritional intake for a whole day while other studies use for example the FSA guidelines from the UK. Therefore, it is recommended, when studying the comparisons made in the present study, to bear in mind that the outcome of the study could be different if another guideline was used.

6.2 Scientific implications

To make comparisons between different studies more reliable, it is possible to conduct a research about the differences between the several recommendations used in the studies. When the outcome of this study shows that some norms differentiate significantly, it could be advisable to leave out those norms in the comparisons.

It is beyond the scope of this study to investigate how this show will truly influence students. It can be interesting to use the same cooking show in another research to investigate to what extent the exceeded norms affect students' cooking habits. The study of Vaterlaus et al. (2015) found that young adults perceive an influence from the exposure to food on social media on their health habits. The limitation of this research is the subjectivity of the respondents' perception.

The research on food related programs that target students or young adults is limited. Therefore, making statements about a perceivable trend is it not possible yet. Only when more researches are conducted, an overall conclusion can be made about this specific sample. It would be recommended to repeat the present research to make a reliable comparison possible.

6.3 Societal relevance of the present study

Although the meals do not comply to all recommendations, the show still has an important role in the incitement to home-cooking. Through these cooking shows students can gain confidence in preparing meals for themselves, because they can gather new information about ingredients and the way how these need to be prepared (Lane & Fisher, 2015)**.** Another opportunity is to use the chef's popularity for promoting healthy eating habits through the cooking shows and their social media environment because the audience tends to believe the chef's message (Caraher, Lang, & Dixon, 2000). Loïc Van Impe, the chef of the program 'Loïc kotfood', will get an own television show this autumn. The reach of his meals will extend and that makes it even more important to choose the right ingredients for the recipes. This show can also serve as a reliable source for nutritional information if the meals are adjusted to the guidelines. The size of the servings and the availability of specific amounts of ingredients can give more guidance to the audience at home.

Not only is it possible to inform the chef of this particular show about the importance of exposing the audience to recipes that stay within the norms. Together with previous research a message can be send to each chef that they have the opportunity to provide the audience with health messages and positively influence them. They may not be aware of the effect that their cooking can have.

This study is also relevant outside the world of media. Health practitioners can use this information to guide their clients to make the right decisions. When people are advised to cook from scratch they need to know how to use different food sources and need to get sufficient nutritional information (Howard et al., 2012). The clients need to learn how to adjust the recipes into a meal that fits into a healthy diet (Schneider et al., 2013). The studies on the nutritional content can provide a guide for improving the nutritional content of the meals.

7 Conclusion

The purpose of the current study is to determine whether or not a student-centered social media cooking programme would meet the national guidelines for healthy eating. The results of this investigation show that the recipes of 'Loïc Kotfood' do not always correspond to all recommendations set by the Superior Health Council. Overall, the meals contain more energy, fat, SFA and salt than the norms and undersupply the amount of carbohydrates. The present study adds to the growing body of research that indicates to the already existing researches about the nutritional content of easily accessible recipes: Not all media recipes fit into a healthy diet.

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Attachments

Attachment 1: Declaration of honour

Verklaring op Eer

Ik, ondergetekende, aanvaard de volgende voorwaarden en bepalingen van deze verklaring:

In het kader van het uitvoeren van mijn Masterproef aan de Universiteit Antwerpen (UAntwerpen) binnen de faculteit Sociale Wetenschappen, zal ik toegang krijgen tot (technische en andere) informatie van UAntwerpen en/of derde partijen, in geschreven, elektronische, mondelinge, visuele of eender welke andere vorm, met inbegrip van (maar niet beperkt tot) documenten, kennis, data, tekeningen, foto's, filmmateriaal, modellen en materialen. Deze informatie wordt gezamenlijk met informatie voortkomend uit het door mij uitgevoerde onderzoek beschouwd als 'Vertrouwelijke Informatie'.

Ik zal de Vertrouwelijke Informatie uitsluitende aanwenden voor het uitvoeren van het onderzoek in kader van mijn studies binnen UAntwerpen. Ik zal:

a) de Vertrouwelijke Informatie voor geen enkele andere doelstelling gebruiken;
b) de Vertrouwelijke Informatie niet zonder voorafgaande schriftelijke toestemming van UAntwerpen op directe of indirecte wijze publiek maken of aan derden bekendmaken.
c) De Vertrouwelijke Informatie noch geheel noch gedeeltelijk reproduceren.

Voor de uitvoering van mijn werk verbind ik mij ertoe om alle onderzoeksdata en ideeën niet vrij te geven tenzij met uitdrukkelijke toestemming van mijn promotor(en).

Na de beëindiging van mijn Masterproef zal ik alle verkregen Vertrouwelijke Informatie en kopieën daarvan, die nog in mijn bezit zouden zijn, aan UAntwerpen terugbezorgen.

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Handtekening: