This item is the archived peer-reviewed author-version of:

Investigating the nutrient content of food prepared in popular children's TV cooking shows

Reference:
Ngqangashe Yandisa, Matthys Christophe, Hermans Nina, De Backer Charlotte.- Investigating the nutrient content of food prepared in popular children's TV cooking shows.
British food journal - ISSN 0007-070X - 120:9(2018), p. 2102-2115
Full text (Publisher's DOI): https://doi.org/10.1108/BFJ-02-2018-0121
To cite this reference: https://hdl.handle.net/10067/1528930151162165141
Abstract

Purpose: Analyse the nutritional content of recipes prepared in popular children’s TV cooking shows.

Design: A cross-sectional analysis of 150 recipes focusing on calorie, total fat and carbohydrates, saturated fatty acids, fibre, sugar, protein and salt content. Main course recipes were evaluated against the United Kingdom (UK) Food Standards Agency (FSA), and the proportions of energy derived from each nutrient were evaluated against the World Health Organization (WHO) recommendations.

Findings: While a significant proportion met the FSA and WHO recommendations for energy and salt, 58% were above the FSA recommendation for total fat ($\chi^2 = 5.598, p = .01$), 56% failed to meet the recommendations for saturated fatty acids ($\chi^2 = 4.551, p = .03$), and 60% exceeded the FSA protein recommendations ($\chi^2 = 12.602, p < .001$). Only 17% and 21% of the recipes met the minimum recommendations for carbohydrates ($\chi^2 = 30.429, p < .001$) and fibre ($\chi^2 = 16.909, p < .001$), respectively. Only 37% had adequate portion of fruits and vegetables. The nutritional content varied depending on the composition of the recipes; vegetarian recipes were more likely to meet the recommendations than poultry, meat or fish recipes.

Implications: Foods displayed by children’s popular TV cooking shows fall short of the standards for healthy eating, thus warranting further research on how these shows affect eating behaviour.

Originality: This study is the first to consider children’s TV cooking shows as a platform of exposure to unhealthy foods.

Key words: Nutritional Content, Analysis, TV cooking shows, Children
Introduction

The global burden of obesity has increased to epidemic proportions over the past three decades (Finucane et al., 2011; Han et al., 2010; Stewart, 2011). The prevalence of childhood obesity has followed this upward trend, with the 2013 global burden of disease study showing a 47.1% increase in childhood obesity between 1980 and 2013 (Ng et al., 2014). Another prevalence estimation of the global burden of childhood obesity showed an increase from 5.2% in 1990 to 7.7% in 2010 and projected a further increase to 10.9% by 2020 (De Onis et al., 2010). The most recent WHO estimations show that more than 340 million children between five and 19 were overweight or obese in 2016 (WHO, 2018). The rise in prevalence of childhood obesity and weight gain is positively associated with a high prevalence of non-communicable diseases such as strokes, coronary heart diseases, hyperlipidaemia, diabetes and cancers in adulthood (The Lancet, 2015; Ebbeling et al., 2002). The consequences of obesity therefore warrant prevention and early treatment of childhood obesity. In children, modifying television (TV) consumption and promoting the consumption of healthier foods have been listed as potentially effective preventive actions to tackle obesity early on (Lobstein et al., 2004). This study therefore investigates the role of children’s TV cooking shows in exposing children to unhealthy food messages.

The association between childhood obesity and TV watching is well researched and has been mainly attributed to food advertising (Bodenlos and Wormuth, 2013; Boyland and Halford, 2013; Dietz and Gortmaker, 1985). Studies that analysed the nutrient content of foods advertised during children’s TV shows showed that advertised foods were high in fat, sugars and salt, and were consistent with dietary patterns associated with childhood obesity (Byrd-Bredbenner and
Grasso, 2000; Harrison and Marske, 2005). Exposure to food advertisements has been linked not only to an increase in consumption of unhealthy foods shown in these advertisements, but also with increased intake of fast foods and take-away foods (French et al., 2001) and a decrease in the consumption of fruits and vegetables (Boynton-Jarrett et al., 2003). Food cue reactivity and mere repetitive exposure theories have explained how exposure to food cues on TV can induce cravings (Boswell and Kober, 2016; Jansen, 1998) and alter food preferences among audiences (Zajonc, 2001). Therefore, if TV advertisements advertise mainly unhealthy foods, audiences who are exposed to these advertisements might crave and consume more of these foods. In response to the accumulating evidence on the effect of exposure to unhealthy foods through TV advertisements (Cairns et al., 2013), the European Union (EU) instituted a pledge regulating food and beverage advertising to children under the age of 12 (EU, 2015). Nevertheless, a recent study has shown that European children are still exposed to unhealthy foods via online advertising (Neyens and Smits, 2016) and perhaps even TV cooking shows.

Children watch TV cooking shows such as Junior MasterChef, for entertainment, vicarious participation and education (Goodchild, 2012). According to Goodchild (2012), parents reported that watching Junior MasterChef sparked an interest in cooking. In another study that assessed what children aged 8-9 associated with food, a sizable number of children named celebrity chefs (Caraher et al., 2004). Some studies have suggested that through watching TV cooking shows such as Junior MasterChef, children can gain culinary capital and learn the use of food language and cooking practices (Schmeh, 2014). However, this optimistic view might not always match the reality. Although little is known about the effects of TV cooking shows on children, a recent study found that children who watched a TV cooking show involving pancakes and sugar
consumed more pancakes and sugar after watching the TV cooking show compared with those
who watched a non-food related TV show (Neyens and Smits, 2017). This finding is in line with
other studies about TV cooking shows and adult audiences. Among adult women, watching a TV
show containing food in an experimental setting was proven to result in a higher consumption of
sweets compared to watching a non-food related TV show (Bodenlos and Wormuth, 2013). A
similar association between watching TV cooking shows and consuming sweets among women
was found in a survey study (De Backer and Hudders, 2016), which also revealed that for both
adult men and women, watching TV cooking shows was unrelated to the intake of fruits and
vegetables (De Backer and Hudders, 2016). Furthermore, women that watch TV cooking shows
and frequently cook from scratch were more likely to report higher BMIs compared to those that
watch but do not cook (Pope et al., 2015). These results combined with the aforementioned food
cue reactivity (Boswell and Kober, 2016; Jansen, 1998) and mere repetitive exposure theories
(Zajonc, 2001) indicate that the foods prepared in TV cooking shows may not reflect healthy
food choices.

Several studies that have examined adult TV cooking shows indicate that recipes from
these warrant public health concern (e.g. Jones et al., 2012; Howard et al., 2012). A nutrient
content analysis study that compared UK TV chefs’ recipes to supermarket ready meals found
that TV chefs’ recipes were not only less healthy but they also failed to meet the World Health
Organization (WHO) guidelines for healthy eating (Howard et al., 2012). Another study showed
that UK celebrity chefs’ recipes were high in total fat, saturated fatty acids and salt (Jones et al.,
2012), and another nutrient content analysis of two United States (US) based Food Network
shows found that the recipes on these shows were high in calories, sodium and saturated fatty
acids and could therefore be considered unhealthy (Silva et al., 2010). The standards used to evaluate the nutritional content of recipes on adult TV shows varied among these aforementioned studies; however, they all found the recipes to fall short of respective standards. The question of whether recipes from TV cooking shows targeting children follow similar trends remains unanswered. Based on a keyword search of Google scholar and Ebscohost research databases, this study is the first to analyse the nutritional content of TV cooking shows that target children. Considering the paucity of studies in this area, this study seeks to determine how the nutritional content of recipes prepared on children’s TV cooking measure up against the standards of healthful eating. This study thus aims to (1) analyse the nutritional messages that children are exposed to through TV cooking shows and (2) inform whether the current situation is a public health concern.
Methods

Selection of Shows and Recipes

A cross-sectional analysis of 150 recipes from popular children’s TV cooking shows was performed. The TV cooking shows were chosen according to their popularity and availability; however, the majority of recipes (117 = 78%) came from the most popular children’s TV cooking show Junior MasterChef. Junior MasterChef was selected because it is the longest running children’s TV cooking show that was first broadcast in the UK in 1994, and it has been adapted and broadcast in more than 20 countries including Australia, Belgium, the United States and France. Recipes from other children’s TV cooking shows such as the US based Kid’s Cook-Off with Rachel Ray and the UK based Matilda and the Ramsay Bunch and Disney’s First Class Chefs were included in the analysis because they aired recently and were the most popular TV cooking shows of 2016. Table 1 presents the details of all the TV cooking shows analysed in this study. The nutrient content of the recipes was not compared by country because the number of recipes was too restricted for a country-specific analysis.

(Table 1)

Main course and dessert recipes were selected for analysis. Recipes for entrees that are parts of a main course and snacks such as “how to make fresh pasta” or “how to make mayonnaise” were excluded from the analysis. Similar to Schneider et al.’s (2013) nutrient content analysis performed on food blogs, the recipes in this study were categorised by protein source, i.e. vegetarian, seafood, red meat, poultry and desserts. This categorisation also enabled contrasting of vegetarian and non-vegetarian recipes. Dessert recipes were included in this
study because of the significant interest in sweet foods among children (Ventura and Mennella, 2011) and the overrepresentation of dessert recipes in children’s TV cooking shows. The proportions of recipes that met each nutrient recommendation (Benelam and Stanner, 2015) were calculated for all the main course recipes and in each recipe category to determine which category had the highest number of recipes that met the recommendation for each nutrient.

Nutritional Content of the Recipes

The analyses were performed using the Nubel meal planning software version 6.6 [1], and all analyses were carried out according to the portion specified by number of servings on all recipes, e.g. “this recipe serves four”. The nutritional content analysis was based on information provided by the recipes and did not take into account any potential additions or changes made by the consumer. The content of energy (kcal), total fat (g), saturated fatty acids (g), total carbohydrates (g), sugar (sum of mono- and disaccharides, both natural and added) (g), fibre (g), protein (g) and salt (g) was calculated for all the recipes. Raw ingredients were used for all analysis. If the nutrient content of a food item was unavailable in the Belgian food composition database, the US Department of Agriculture (USDA, 2015) food composition database (version 3.8.6.4 10.02.2017) was used, and data were manually added. For standardisation purposes, all fluids such as milk, oil and butter that were in millilitres, centilitres or decilitres were converted to grams using an appropriate product density for each item. For all recipes that contained cooking fats and salt in the ingredients but no specific amounts, standard amounts of 15 g (spoon) and 6 g (teaspoon) were added for cooking fats and salt, respectively. A pinch of salt was converted to .4 g based on the online search computational engine Wolfram Alpha[2] To evaluate
the main course recipes’ compliance with nutrient guidelines for the contribution of specific food groups such as fruits and vegetables, this analysis also considered starch and protein sources. Information on the number of main course recipes that were based on starchy foods, protein sources for each recipe and the fruits and vegetables content per recipe (in grams) was analysed for each recipe.

**Comparisons**

The recipes were evaluated against two guidelines. Firstly, the nutrient composition of the main course recipes was evaluated against a criteria developed by Benelam and Stanner (2015) based on the UK FSA guidelines. Dessert recipes were excluded from the comparisons against the FSA guidelines because they do not constitute a main course. Benelam and Stanner’s (2015) criteria assume that each nutrient of a main meal (lunch or dinner) is approximately 30% of an adult’s daily nutrient intake. This percentage was used to estimate the appropriate energy intake for children (Benelam and Stanner, 2015). The TV cooking shows used in this study target audiences aged mainly between 8 and 16; thus, the mean energy recommendations from the Food and Agricultural Organization (FAO, 2001) for this age range were used to establish energy criteria for the main course recipes. The approximated mean energy requirement for moderately active boys and girls based on the FAO (2001) recommendations is 2,230 kcal. The FAO recommendation was used to establish an approximate daily energy requirement, because the energy intake recommendations for children vary according to age and physical activity. Assuming that each recipe accounts for 30% of the required daily energy intake, 669 kcal was the maximum requirement per main course recipe. This estimation was in line with the energy
recommendations used in other nutritional content studies: Benelam and Stanner (2015) used 600 kcal and Schneider et al. (2013) used 670 kcal. Table 2 displays the nutrient criteria used to evaluate the main course recipes. In addition, the UK FSA traffic light system was used to visually present the key nutrients in the main course recipes from this study. Each macronutrient in each main course recipe was assigned a traffic light colour based on the median nutrient content per recipe: red indicated high, amber indicated medium and green indicated low, depending on the content as stated in the FSA guidelines (FSA, 2013).

Secondly, all recipes (main course and desserts) were evaluated – based on proportions of energy derived from each nutrient – against the WHO recommendations for the prevention of diet-related chronic diseases published in 2003. As the WHO guidelines are based on nutrient intake per day not per meal, dessert recipes were included. Although several recipes in our sample come from UK-based TV cooking shows, recipes from other countries whose recommendations may differ from the UK FSA were also selected. Thus, the WHO recommendations were also used to allow evaluation of the recipes against a more international standard.

Each nutrient was converted from grams to kilocalories, and the proportions of energy derived from of each nutrient were calculated and compared to the WHO recommendations. For nutrients that differ for adults and children, such as saturated fatty acids, the children’s recommendation was used as a standard (WHO, 2010). As the proportions of energy derived from each nutrient did not apply to salt and energy, these were not included in the WHO analysis.
Statistical Analysis

Data were analysed using IBM’s Statistical Package for the Social Sciences (SPSS version 24). Non-parametric tests were performed because none of the analysed nutrient data was normally distributed. Chi Square tests were conducted to compare the content of each nutrient and the representation of the food groups per portion to the recommendations. A Kruskal-Wallis test was used to compare the recipe categories. The threshold for significance was .05 and was adjusted using the Bonferroni correction for multiple tests.

Ethical Considerations

As human participants were not involved in this analysis, no specific ethical approval was required.

Results

The Sample

The number of recipes analysed was $N = 150$, comprising $n = 39$ dessert recipes and $n = 111$ main course recipes. Table 1 presents the representation of the different TV cooking shows. Of the 111 main course recipes, $n = 21$ were categorised as vegetarian and included all meat free dishes (pasta, pizza, salads), $n = 36$ featured seafood as the main protein source, and $n = 31$ and $n = 23$ featured red meat and poultry as protein sources, respectively.
Comparison of the Main Course Recipes Against FSA Guidelines

Energy

Based on the mean energy requirements for the target age group of these TV cooking shows, the main course recipes did not deviate significantly from the energy recommendation of 669 kcal per recipe, $\chi^2 = 2.546$, $p > .05$; 62% of the recipes met this recommendation. No significant difference in energy was found between the different categories of recipes, $\chi^2 = 5.996$, $p = .12$ (see Table 3).

Fat

A significant proportion (58%) of the main course recipes contained higher amounts of total fat than the recommended 21 g per meal, $\chi^2 = 5.598$, $p = .01$. No statistically significant differences in total fat content among the recipe categories were found, $\chi^2 = 4.612$, $p = .20$. At least 56% of the recipes exceeded the saturated fatty acids recommendations, $\chi^2 = 4.551$, $p = .03$. The categorical comparison of the recipes revealed no statistically significant differences between the recipe categories, $\chi^2 = 5.31$, $p = .14$ (see Table 3). The main course recipes were high in total fat and saturated fatty acids regardless of recipe category.

Carbohydrates

A statistically significant proportion of the main course recipes (83%) had lower carbohydrate content than the minimum recommendation of 75 g, $\chi^2 = 30.429$, $p < .001$. The recipe categories did not significantly differ in carbohydrate content, $\chi^2 = 1.75$, $p = .78$. The sugar content of the main course recipes was within the recommendations, $\chi^2 = .285$, $p = .6$, and no
statistically significant differences were evident among the recipe categories, $\chi^2 = .955$, $p = .8$.

The fibre content in most of the main course recipes (79%) was significantly lower than the FSA recommendations of 7.2 g and a significant proportion of the recipes fell short of this recommendation, $\chi^2 = 16.909$, $p < .001$. No statistically significant difference was found in the proportion of recipes that met the recommendations for fibre content between recipe categories, $\chi^2 = 7.121$, $p = .06$ (see Table 3).

**Protein**

Protein content was higher than the recommended 17 g in 60% of the main course recipes, $\chi^2 = 12.602$, $p < .001$, and varied significantly between recipe categories, $\chi^2 = 36.58$, $p < .01$. The vegetarian recipes had the lowest protein content compared to other recipe categories (see Table 3).

**Salt**

The median salt content of the main course recipes was 1.3 g (0.5 - 2) per recipe and did not deviate significantly from the recommended maximum of 1.8 g, $\chi^2 = 3.842$, $p = .05$. A comparison of the salt content among recipe categories showed a significant variation, with the vegetarian recipes containing the least salt, $\chi^2 = 34.29$, $p < .01$ (see Table 3).

**Food groups**

Only 37% of the main course recipes had adequate portions of fruits and vegetables. The recipes therefore fell short of the recommendations, $\chi^2 = 9.206$, $p = .02$. The amount of fruit and
vegetables of the recipes varied significantly among the different recipe categories; $\chi^2 = 12.030$, $p = .01$. The seafood and red meat recipes had lower fruit and vegetable content than did the vegetarian recipes (see Table 3).

All the main course recipes met the minimum recommendation of having a portion of protein from either a non-dairy or dairy source. Although the recipes met the minimum standard for protein portions, $\chi^2 = 1.292$, $p > .05$, 45% of the recipes had dual sources of protein, i.e. they used both dairy and non-dairy protein.

Traffic Light Colour Presentation of the Key Macronutrients in Main Course Recipes

The modal traffic light colour was red for total fat and saturated fatty acids and amber for salt and sugar (see Figure 1). The main course recipes were high in total fat and saturated fatty acids and contained moderate amounts of salt and sugar. Except the vegetarian recipes, the rest of the main course recipes categories were recognised by high total fat and saturated fatty acids and medium salt and sugar. Red meat recipes were also high in salt. None of the nutrients were in the green.

Comparison of all Recipes (Including Dessert Recipes) Against the WHO Guidelines

The nutrient content of the recipes followed similar trends to the comparisons against the FSA guidelines, i.e. the proportion of energy derived from total fat, saturated fatty acids and
protein was higher than the recommendations. The recipes (including desserts) were also low in carbohydrates and fibre (see Table 4), and when the dessert recipes were included, sugar $\chi^2 = 143.69$, $p < .01$, was higher than the recommendations. Also similar to the FSA comparison, the median nutrient content of the vegetarian recipes came closest to meeting the recommendations and had the biggest proportion of the recipes that met the WHO recommendations for protein.
**Discussion**

The recipes prepared in the children’s TV cooking shows that were analysed in this study were higher in total fat, saturated fatty acids and protein and lower in total carbohydrates and fibre than both the FSA and WHO recommendations. While the recipes were within the recommendations for salt and energy, the findings for sugar varied depending on whether desserts were included. The inclusion of the dessert recipes altered the sugar content, making it higher than the WHO recommendations but did not alter how the other nutrients measured up against the recommendations. In sum, the nutrient content of the recipes fell short of the recommendations made by the FSA and the WHO.

Similar to recipes presented on adult TV cooking shows, the recipes from the children’s TV cooking shows were high in total fat and saturated fatty acids (Silva *et al.*, 2010). However, the recipes in this current analysis scored better for sodium and sugars compared to adult cooking show recipes, which were found to have high sodium and sugar contents (Silva *et al.*, 2010; Jones *et al.*, 2012). Notably, previous studies used different methods to evaluate the recipes from the current analysis; the UK study (Jones *et al.*, 2012) used the British healthy eating index while the US study (Silva *et al.*, 2010) compared the recipes against US recommendations. When comparing the findings of this study to a nutrient content of recipes by British celebrity chefs (Howard *et al.*, 2012) that used similar standards, more congruencies were evident. The recipes of the British celebrity chefs and the children’s TV cooking shows were both high in total fat, saturated fatty acids and protein and were within the recommendations for sodium. Similar findings were obtained for sugar prior to the inclusion of dessert recipes. The visual presentation of the main course recipes from children’s TV cooking
shows using the UK traffic light system also depicted similar traffic light colours to the UK TV chefs’ recipes, i.e. the recipes had a red light for saturated fatty acids and total fat (Howard et al., 2012). While the TV chefs’ recipes were low in sugars and salt (Howard et al., 2012), the children’s TV cooking shows analysed herein contained medium levels of salt and sugar.

The recipes failed to meet the minimum recommendations for fruits and vegetable portions, which is concerning considering that increasing consumption of fruits and vegetables is one of the key strategies for preventing diet related non-communicable diseases (The Lancet, 2010; He et al., 2006). None of the previous nutrient content analysis conducted on TV cooking shows considered the representation of the different food groups in the recipes. Although the recipes adequately met the standards for protein sources, a majority of the recipes added more than one source of protein, e.g. fish or meat, with cream and cheese in one recipe, which may have contributed to the excessive protein content of the recipes. Large portions of meat and fish might also have contributed to the excessive protein content. The opposite is true for carbohydrates; although the recipes met the minimum recommendations of having at least one starchy food per recipe, the carbohydrate content still fell short of the recommendations. The presentation of these key food groups is important in a nutritional content analysis because they can indicate the possible causes of the shortcomings and contribute to devising perhaps simpler ways of improving the recipes.

The vegetarian recipes scored better than other recipe categories against the FSA and WHO recommendations, which is consistent with a previous study that analysed the nutrient of food blogs (Schneider et al., 2013). However, comparatively few vegetarian recipes were presented on children’s TV cooking shows compared to the number of dessert recipes shown,
which supports the notion that TV cooking shows do not necessarily focus on nutrition but rather aim toward viewing pleasure (Adema, 2000). The proportions of recipes that met the recommendations for saturated fatty acids and sugar were significantly lower among the dessert recipes compared to all other recipe types. This finding is a concern because a recent study by Neyens and Smits (2017) has shown that the mere exposure to sweet foods via TV cooking shows can increase children’s consumption of sugar. Studies such as Neyens and Smits’ (2017) warn about the potential effect of TV cooking shows on their audiences, referring to the mere repetitive exposure effects (Zajonc, 2001) and food cue reactivity theories (Boswell and Kober, 2016). The latter asserts that exposure to visual foods cues can result in increased cravings for these foods, and explains how children who were exposed to sugar consumption via a TV cooking show also consumed more sugar in the study by (Neyens and Smits, 2017). According to the mere repetitive exposure theory, the repetition of such encounters with visual food cues could result in changes to food preference (Zajonc, 2001; Jansen, 1998).

Furthermore, children are likely to be influenced by adult and/or celebrity behaviour that they are exposed to while watching TV cooking shows or indirectly through the show’s influence on their parents (Ross et al., 1984; Dixon et al., 2014; Savage et al., 2007). Conversely, exposure to a TV cooking show that endorses fruits and vegetable has been shown to momentarily alter children’s food choice behaviour towards fruit and reduce overall appetite for unhealthy food (Ngqangashe et al., 2018). Food preferences and eating habits are shaped in childhood and may persist into adulthood (Branen and Fletcher, 1999; Kelder et al., 1994); thus, it is important to be mindful of the food messages children receive early in life. While the findings of this study cannot say anything definitive about the potential effects of TV cooking...
shows on children, we can only conclude that the foods in these shows may not represent healthy diet choices.

Limitations of this Study

The recipes used in this study were selected based on availability and might not, therefore, be a complete representation of all recipes prepared on different TV cooking shows targeting children. Some of the shows were more than two years old at the time of the analysis; however, this does not make the food messages they contain irrelevant because the recipes books and YouTube clips of the shows are still accessible to consumers. The energy reference intake for children varies depending on age, gender and physical activity; thus, the approximated 30% must be interpreted bearing that in mind. As many recipes did not specify the amount of salt or butter to use, a teaspoon was assumed for salt and a tablespoon for butter; these amounts were applied across all recipes for consistency. Furthermore, as no validated academic source exists, an online search engine conversion[2] was used to convert a pinch of salt into grams. What people use in reality might differ and this has to be taken into account; thus, the salt findings were interpreted with caution and could not be overemphasised. There is no single international guideline against which the recipes could be evaluated; the WHO guidelines used were based on average intakes per day, which limits their applicability to individual recipes, while the FSA guidelines were only specific to the UK, which limits the applicability of their criteria to recipes from other countries. To counter these shortcomings, the researchers used both guidelines and obtained fairly similar results. As consumers may alter recipes by adding, omitting or swapping ingredients, the findings of this study are limited to the foods the audiences are exposed to but
not those they consume.

Conclusion and Implications for Further Research and Practice

The findings of this study confirm the previous observations that recipes from TV cooking shows and celebrity chefs fall short of the recommendations for healthy eating (Howard et al., 2012; Jones et al., 2012; Silva et al., 2010) and necessitate further research on the subsequent effects of these shows on their audiences. The subsequent effects of this exposure are beyond the scope of this study; however, this study lays a foundation for future studies on the effects of TV cooking shows on young audiences.

There are multiple opportunities to nudge TV cooking show producers to incorporate health promotion into their shows such as selecting recipes according to the criteria for healthy eating, using health-related themes or adding healthfulness as a criterion for good dishes in cooking challenges. Changing the content of advertisements to promote healthy eating has been found to be effective in improving food healthy food preferences and nutrition knowledge among children (Kraak et al., 2006; Nelson and Kehr, 2016). Furthermore, TV cooking shows could also be used as platforms to endorse healthier dietary choices. A recent study has shown that children’s overall preference for unhealthy foods declines and they are more likely to choose a piece of fruit over a popular cookie after exposure to a popular TV cooking show episode that endorses fruit and vegetable consumption (Ngqangashe et al., 2018). Follow up studies should also measure food consumption patterns of children that watch these shows and their subsequent health outcomes. Local health authorities, TV cooking show chefs and producers can collaborate to modify the existing recipes and establish a standard for recipes that can be
portrayed on children’s TV cooking shows. Small changes such as using more fruits and vegetables, specifying the use of healthier alternatives such as high fibre unprocessed foods would improve the nutritional content of these recipes. All of these actions are timely and necessary, considering the burden of childhood obesity and the ongoing popularity of TV these shows worldwide.
References


French, S.A., Story, M., Neumark-Sztainer, D., Fulkerson, J.A. and Hannan, P. (2001), "Fast food restaurant use among adolescents: associations with nutrient intake, food choices and


Schmeh, C. (2014), "Why children are the better cooks and better people - How MasterChef Junior reinforces the 'taste of luxury and freedom', gives children high culinary capital and portrays them as having a multitude of positive characteristics", Master's Thesis, Lund University.


Footnotes


Tables

Table 1: Representation of the selected cooking television shows whose recipes were analysed (N=150).

<table>
<thead>
<tr>
<th>Television show</th>
<th>Country of origin</th>
<th>Season</th>
<th>Year of broadcast</th>
<th>Number of Recipes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior Master Chef</td>
<td>Australia</td>
<td>2</td>
<td>2011</td>
<td>42</td>
</tr>
<tr>
<td>Junior Master Chef</td>
<td>Belgium</td>
<td>1</td>
<td>2012</td>
<td>31</td>
</tr>
<tr>
<td>Junior Master Chef</td>
<td>France</td>
<td>1</td>
<td>2012</td>
<td>29</td>
</tr>
<tr>
<td>Junior Master Chef</td>
<td>UK</td>
<td>**</td>
<td>**</td>
<td>8</td>
</tr>
<tr>
<td>Junior Master Chef</td>
<td>US</td>
<td>**</td>
<td>**</td>
<td>4</td>
</tr>
<tr>
<td>Rachel Ray’s Little Cook Off</td>
<td>US</td>
<td>1</td>
<td>2015</td>
<td>11</td>
</tr>
<tr>
<td>Matilda &amp; the Ramsay Bunch</td>
<td>UK</td>
<td>1</td>
<td>2016</td>
<td>15</td>
</tr>
<tr>
<td>Disney’s First Class Chefs</td>
<td>UK</td>
<td>1</td>
<td>2016</td>
<td>10</td>
</tr>
</tbody>
</table>

**Recipes were obtained online and did not have seasons’ details**
Table 2: The nutrient criteria used to evaluate the recipes at daily and meal intake levels.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>FSA\textsuperscript{a}</th>
<th>WHO\textsuperscript{b}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (Kcal)\textsuperscript{c}</td>
<td>Max 669 kcal</td>
<td>Max</td>
</tr>
<tr>
<td>Total Fat (g)</td>
<td>Max 21g</td>
<td>Max 35%</td>
</tr>
<tr>
<td>SFA (g)</td>
<td>Max 6g</td>
<td>Max 8%</td>
</tr>
<tr>
<td>CHO (g)</td>
<td>Max 75g</td>
<td>Min 55%</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>Max 17g</td>
<td>Max 15%</td>
</tr>
<tr>
<td>Sugar (g)</td>
<td>Max 27g</td>
<td>Max 10%</td>
</tr>
<tr>
<td>Fibre (g)</td>
<td>Min 7.2g</td>
<td>Min 3%</td>
</tr>
<tr>
<td>Salt (g)</td>
<td>Max 1.8g</td>
<td></td>
</tr>
<tr>
<td>Starch portion</td>
<td>Min 1</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>Min 120</td>
<td></td>
</tr>
<tr>
<td>Fruit and vegetables</td>
<td>Min 1</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a} recommendations from FSA guidelines (Benelam & Stanner, 2015)

\textsuperscript{b} recommendations from WHO recommendations for prevention of diet related chronic disease published in 2003 (WHO, 2003)

\textsuperscript{c} 30\% of energy the mean recommendation by FAO for moderately active girls between the ages of 8 and 18 (FAO, 2001)
Table 3: Median (Interquartile range) of nutrient content of main course recipes (N=111) compared against FSA guidelines (excluding desserts)

<table>
<thead>
<tr>
<th></th>
<th>Norm&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Overall</th>
<th>Seafood (n=36)</th>
<th>Red meat (n=31)</th>
<th>Poultry (n=21)</th>
<th>Vegetarian (n=23)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (Kcal)</td>
<td>670&lt;sup&gt;b&lt;/sup&gt;</td>
<td>485 (341-677)</td>
<td>448(341-677)</td>
<td>562(371-733)</td>
<td>495(388-815)</td>
<td>358(306-578)</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>21g</td>
<td>23 (12-36)</td>
<td>23(11-30)</td>
<td>26(11-50)</td>
<td>22(14-37)</td>
<td>21(12-29)</td>
</tr>
<tr>
<td>SFA (g)</td>
<td>6g</td>
<td>6 (3-13)</td>
<td>6(3-16)</td>
<td>7(3-13)</td>
<td>7(3-13)</td>
<td>7(3-12)</td>
</tr>
<tr>
<td>CHO (g)</td>
<td>75g</td>
<td>30(14-54)</td>
<td>28(10-52)</td>
<td>29(20-45)</td>
<td>27(13-49)</td>
<td>37(15-69)</td>
</tr>
<tr>
<td>Sugar (g)</td>
<td>27g</td>
<td>7(4-15)</td>
<td>5(2-12)</td>
<td>6(3-10)</td>
<td>6(6-16)</td>
<td>5(10-14)</td>
</tr>
<tr>
<td>Fibre (g)</td>
<td>7.2g</td>
<td>4 (2-6)</td>
<td>3(2-6)</td>
<td>3(2-6)</td>
<td>4(2-6)</td>
<td>5(3-8)</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>17g</td>
<td>29(17-44)</td>
<td>34(20-44)</td>
<td>32(24-52)</td>
<td>39(34-50)</td>
<td>14(9-22)</td>
</tr>
<tr>
<td>Salt (g)</td>
<td>1.8g</td>
<td>.3(.5-2)</td>
<td>1.3(.6-2)</td>
<td>2(.7-4)</td>
<td>.5(1-2)</td>
<td>.1(.4-1.6)</td>
</tr>
<tr>
<td>F &amp; V&lt;sup&gt;c&lt;/sup&gt;</td>
<td>120g</td>
<td>73(28-146)</td>
<td>52(5-109)</td>
<td>57(28-114)</td>
<td>87(13-177)</td>
<td>150(85-277)</td>
</tr>
</tbody>
</table>

<sup>a</sup> recommendations from FSA guidelines (Benelam & Stanner, 2015)

<sup>b</sup> 30% of energy the mean recommendation by FAO for moderately active girls between the ages of 8 and 18 (FAO, 2001)

<sup>c</sup>Fruits and vegetables
Table 4: Median (Interquartile range) energy proportions derived from each macronutrient against the WHO recommendations (N=150) including desserts

<table>
<thead>
<tr>
<th>Norm</th>
<th>Overall</th>
<th>Seafood (n=36)</th>
<th>Red meat (n=31)</th>
<th>Poultry (n=21)</th>
<th>Vegetarian (n=23)</th>
<th>Dessert (n=39)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;35% Fat</td>
<td>41(28-56)</td>
<td>43(26-60)</td>
<td>52(27-60)</td>
<td>43(31-49)</td>
<td>32(17-52)</td>
<td>40(32-50)</td>
</tr>
<tr>
<td>&lt;8% SFA</td>
<td>13(8-21)</td>
<td>13(7-18)</td>
<td>12(8-25)</td>
<td>13(7-18)</td>
<td>12(6-18)</td>
<td>20(13-30)</td>
</tr>
<tr>
<td>55-70% CHO</td>
<td>36(18-15)</td>
<td>34(13-46)</td>
<td>34(19-45)</td>
<td>32(16-45)</td>
<td>42(14-59)</td>
<td>37(22-51)</td>
</tr>
<tr>
<td>&lt;10% Sugar</td>
<td>9(3-23)</td>
<td>5(2-10)</td>
<td>6(2-10)</td>
<td>5(3-10)</td>
<td>9(5-15)</td>
<td>29(20-46)</td>
</tr>
<tr>
<td>&gt;3% Fibre</td>
<td>2(1-3)</td>
<td>2(1-3)</td>
<td>1(1-2)</td>
<td>1(1-2)</td>
<td>3(1-4)</td>
<td>1(1-2)</td>
</tr>
<tr>
<td>10-15% Protein</td>
<td>17(9-25)</td>
<td>23(19-31)</td>
<td>22(16-32)</td>
<td>26(16-45)</td>
<td>12(9-17)</td>
<td>7(5-12)</td>
</tr>
</tbody>
</table>

a WHO/FAO release independent Expert Report on diet and chronic disease, Fats and fatty acids in human nutrition and report of an expert consultation

b Based on 8.4 MJ/day (2000 kcal/day) diet and recommended daily fibre intake of >25 g

IQR – interquartile range
FIGURE 1: FSA traffic light system for the all the recipes and recipe categories.

**Overall recipes from popular children’s TV cooking shows**

- **HIGH FAT**: 23.0 g per portion
- **HIGH SFA**: 6.0 g per portion
- **MED SUGAR**: 7.0 g per portion
- **MED SALT**: .3 g per portion

**Seafood recipes from popular children’s TV cooking shows**

- **HIGH FAT**: 23.0 g per portion
- **HIGH SFA**: 6.0 g per portion
- **MED SUGAR**: 5.0 g per portion
- **MED SALT**: 1.3 g per portion

**Red meat recipes from popular children’s TV cooking shows**

- **HIGH FAT**: 26.0 g per portion
- **HIGH SFA**: 7.0 g per portion
- **MED SUGAR**: 6.0 g per portion
- **MED SALT**: 2.0 g per portion

**Poultry recipes from popular children’s TV cooking shows**

- **HIGH FAT**: 22.0 g per portion
- **HIGH SFA**: 7.0 g per portion
- **MED SUGAR**: 6.0 g per portion
- **MED SALT**: 1.1 g per portion

**Vegetarian recipes from popular children’s TV cooking shows**

- **MED FAT**: 21 g per portion
- **HIGH SFA**: 7.0 g per portion
- **MED SUGAR**: 5.0 g per portion
- **MED SALT**: .3 g per portion

Key
<table>
<thead>
<tr>
<th></th>
<th>Green</th>
<th>Orange</th>
<th>Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAT</td>
<td>&lt;5g</td>
<td>&gt;5&lt;22g</td>
<td>&gt;22g</td>
</tr>
<tr>
<td>SFA</td>
<td>&lt;1.5</td>
<td>&gt;1.5&lt;5g</td>
<td>&gt;5g</td>
</tr>
<tr>
<td>SUGAR</td>
<td>&lt;5</td>
<td>&gt;5&lt;27g</td>
<td>&gt;27g</td>
</tr>
<tr>
<td>SALT</td>
<td>&lt;0.3</td>
<td>&gt;0.3&lt;1.8</td>
<td>&gt;1.8</td>
</tr>
</tbody>
</table>