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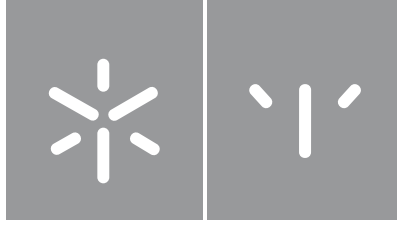
Catarina Viana Oliveira Vilas

**Children's perceived barriers for
a healthy diet: A case study**

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**Children's perceived barriers for a
healthy diet: A case study**

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Professor Doutor Pedro Rosário
e da
Professora Doutora Paula Magalhães

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Resumo

A alimentação saudável é um fator protetor contra vários problemas de saúde. No entanto, a alimentação das crianças não se aproxima das recomendações internacionais fornecidas. Neste sentido, o presente estudo tem como propósito explorar as barreiras percebidas pelas crianças para uma alimentação saudável. O modelo teórico, Modelo dos Seis C's, foi utilizado para orientar e interpretar os resultados. O presente estudo compreende 1343 respostas à questão "Top 5 de Barreiras para uma Alimentação Saudável" de 274 alunos do 5.º e 6.º anos e os dados foram analisados através da análise de conteúdo. Os resultados demonstram que as crianças destacam como principais barreiras para uma alimentação saudável, fatores controláveis e diretamente influenciáveis por elas, assim como fatores não controláveis e indiretamente influenciáveis por elas. Surpreendentemente, as crianças raramente referem fatores relacionados com características e comportamentos dos pais e da família, o que não foi antecipado pelos autores. Estes resultados contribuem para o aprofundamento do conhecimento sobre os processos integrados na alimentação saudável e também para o desenvolvimento de intervenções e campanhas mais eficazes para a promoção de uma alimentação saudável.

Palavras-chave: Análise de Conteúdo, Alimentação Saudável, Barreiras, Crianças, Modelo dos Seis C's

Children's perceived barriers for a healthy diet: A case study

Abstract

Having a healthy diet is a protective factor against several health problems. However, children's diet still falls short the recommended international guidelines. Thus, the current study explores children's perceived barriers to a healthy diet. The framework adopted to interpret the results was the Six C's Model. The study comprehends 1343 responses to the prompt "Top 5 Barriers to a Healthy Diet", from 274 students from the 5th and 6th grades, and data was analysed using content analysis. Findings showed that children highlighted factors that they can control and directly influence (e.g., "dietary intake"), as well as factors that they cannot control or directly influence, (e.g., "accessibility and proximity of food outlets"), as barriers to a healthy diet. Surprisingly, children seldom referred factors related to parents' and family's characteristics and behaviors, which was not anticipated by the authors. These findings may help deepen the understanding on the health eating processes and contribute to develop more effective interventions and campaigns to promote a healthy diet among children.

Key words: Barriers, Children, Content Analysis, Healthy Diet, Six C's Model

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STUDENTS' PERCEIVED BARRIERS FOR A HEALTHY DIET

Children's perceived barriers for a healthy diet: A case study

Since 1975, obesity rates have almost tripled worldwide (WHO, 2020a). Specifically, in 2016, 340 million children and adolescents between the ages of 5 and 19 had overweightness or obesity and this number is rising progressively (WHO, 2020a). Fortunately, international data indicates the majority of the cases result of modifiable factors, such as eating habits (Medina et al., 2012; Pereira et al., 2019). In an effort to decrease obesity and overweightness rates, the World Health Organization (WHO) provided guidelines for a healthy diet. Particularly, every child should include in their daily meals adequate portions of fruit and vegetables (five servings per day), and reduce or limit the intake of salt (<5g per day), sugar (<50g per day or replace sweet snacks for fresh fruit), and fat, mainly saturated and industrial trans-fat (WHO, 2020b). However, children's food consumption patterns still fall short of the recommended guidelines (Guenther et al., 2006; Kim et al., 2014). According to WHO (2020b), children are still consuming large amounts of energy dense foods, fat, sugar, and salt, and, conversely, consuming low amounts of fibre, vegetables, fruits, and whole grains.

Having a healthy diet is an important factor across the entire lifespan in children, with major influence for the promotion and maintenance of health (Chan, 2017). For example, literature has unveiled that a healthy diet is a key element for the prevention of chronic diseases, such as obesity, diabetes, heart disease, and cancer (Chan, 2017). Conversely, portion size, fast food, excessive fat, and carbohydrate consumption increases the risk of developing obesity and serious obesity-related co-morbidities (Ebbeling et al., 2002; Medina et al., 2012). Examples of obesity co-morbidities include high cholesterol and type 2 diabetes (Reilly et al., 2003; Swinburn et al., 2004), sleep apnoea and asthma (Medina et al., 2012), and low self-esteem, eating disorders, and depression (OECD/EU, 2018; Reilly et al., 2003). For the majority of the individuals, healthy eating habits can be a protective factor against obesity and overweightness, capable of modifying their weight status (Soskolne et al., 2018; Swinburn et al., 2004). However, many struggle to initiate and/or maintain a healthy diet (Viana, Santos, & Guimarães, 2008), even though having a healthy diet is mainly under the control of the individual. Previous literature identified several barriers likely to prevent a healthy diet, such as lack of nutritional knowledge, wrong perceptions towards healthy foods, and social, economic, cultural, and psychological factors (Adams, 1997; Beck et al., 2019; Rastogi, Mathur, & Khanna, 2018). Regarding nutritional knowledge, literature shows that despite children and adolescents' ability to identify healthy foods, like fruits and vegetables, and unhealthy foods, like fast food and beverages (Beck et al., 2019; Hesketh et al., 2005), they lack awareness on the consequences of their food choices (Rastogi et al., 2018; Taylor, Evers, & McKenna,

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2014). Other relevant barrier to a healthy diet are the beliefs, or perceptions, about what constitutes a healthy diet. For example, research has been alerting that many children have the misconception that foods containing “Bio” or “Organic” labels are healthy despite the content - some examples are organic beverages and organic donuts (Adams, 1997; Beck et al., 2019; Hesketh et al., 2005). Another misconception regards the relation between the price and the quality of the products. Recent research points out that many children believe that the higher the price, the healthier the food, regardless of the content (Beck et al. 2019; Rastogi et al., 2018). Data on social and psychological barriers regarding food choices show that children choices are mainly influenced by identity, image, and social belonging issues (Stead et al., 2011). The study by Roberts and Pettigrew (2013) illustrates that children typically associate eating highly promoted junk food brands with high social status within peers, i.e. “being cool and popular”. Simultaneously, eating less promoted foods, and less valued by children (e.g., vegetables or generic supermarket products), is associated with low social status within peers, i.e. “being unpopular” (Roberts & Pettigrew, 2013).

Moreover, economic background seems to be a key barrier to a healthy diet. Children from a low socioeconomic background are likely to experience higher rates of obesity and overweightness (Fradkin et al., 2015; Pereira et al., 2019; Swinburn et al., 2004), and higher probability of having a poorer diet (e.g., lower intake of fruit, vegetables, and vitamin C) (Lynch, Kaplan, & Salonen, 1997), than their counterparts from a higher socioeconomic background. Research suggests that this may be due to the high prices of healthy food. In fact, Turrell and colleagues (2003) found that the best predictor of food purchasing behavior is the household income. Coming from a low socioeconomic background affects negatively the dietary choices as these families have few resources and opportunities to buy healthy food and to incorporate healthy dietary patterns into their lives (Turrell et al., 2003). To illustrate, having a healthy diet is about \$1.50/day more expensive than opting for a less healthy one (Rao et al., 2013). Thus, when confronted with a decision between a healthy but somewhat expensive food item and an unhealthy but less expensive one, children tend to choose the latter. Thus, food prices play a direct effect on the diet that families can adhere (Swinburn et al., 2004).

Purpose of the study

Data on children failing to meet the recommendations regarding food intake merit researchers and educators attention (Guenther et al., 2006; Kim et al., 2014), particularly because children’s eating habits tend to persist into adulthood (Mikkilä et al., 2005), along with the well-studied health consequences that unhealthy eating involves (Chan, 2017; Medina et al., 2012). Furthermore, literature

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has shown that healthy eating is a protective factor against overweightness and obesity, and health in general (Chan, 2017; Soskolne et al., 2018; Swinburn et al., 2004). Therefore, it is particularly important to implement changes in children's diet as early as possible. However, data indicates that children seem to struggle to initiate and/or maintain a healthy diet (Viana et al., 2008). To the best of our knowledge researchers have been paying little attention to factors that may prevent children engagement with a healthy diet. We believe that children's perceived barriers to adopt a healthy diet may play a relevant role in children's food choices. Examining the barriers to a healthy diet that children identify is expected to deepen our understanding on the healthy eating processes and may help develop interventions and campaigns fit to children's (mis)beliefs. In all, the current study aims to explore children perceived barriers to a healthy diet and to comprehend the role that sex and family income may play in this process.

Method

Procedure

This study is part of a research project that has been approved by the University of Minho Ethics Committee for Research in Social and Human Sciences (CEICSH) (CEICSH 032/2019). Consent to conduct the study in a school setting was obtained from the Portuguese Ministry of Education. Prior to data collection, one member of the research team informed the class head teacher about the study, and an informed consent was provided to the class head teacher to be delivered to parents/guardians explaining the purpose of the study. On the day of data collection, only students with signed informed consent from the parents participated in the study. The participation was voluntary, and the anonymity and confidentiality of the data was guaranteed. Data collection took place during a school-based session.

Participants

The present study enrolled 274 participants from the 5th and 6th grades, 143 (52.2%) boys, from 14 classes of two schools in the North of Portugal. Students' age ranges between 9 and 14 years, with a mean age of 10.9 years ($SD = 0.86$, $Mdn = 11$). Of the 274 participants, 100 (36%) received economic support from the School Social Action.

Materials and Measurements

Sociodemographic Questionnaire

Demographic information about the participants included age, sex, and academic grade.

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Family's Income

To provide information about an individual socioeconomic status, the American Psychological Association suggests diverse approaches, such as income, educational level, and occupation (APA, 2007). Since family income is the best predictor of food purchasing behavior (Turrell et al., 2003), we choose this option for the current study. Participants' family income information was obtained by the School Social Action, which is divided into three levels. Level A corresponds to a family's income of up to 3.050,32 euros per year, Level B corresponds to a family's income of up to 6.100,64 euros per year, and Level C corresponds to a family's income of up to 9.150,96 euros per year (Santos, 2019). An income superior to this last value corresponds to a high-income family and, consequently, does not benefits of School Social Action. It should be considered that, in Portugal, the minimum wage in 2019 was 600 euros per month, i.e. 8.890,0 euros per year (DGERT/MTSSS, 2019). Accordingly, in the present study Family's Income was classified as echelon A, B, and C = low income, no echelon = median/high income.

Barriers for a Healthy Diet

Children read a scenario describing the global rates of overweightness and obesity in adults and children. Considering the scenario (presented below), children were asked to identify and elaborate on the "Top 5 Barriers to a Healthy Diet".

"It is estimated that:

- *>1,1 billion adults have overweightness, and 312 million have obesity;*
- *10% of children have overweightness or obesity, and 17.6 million under the age of 5 have overweightness;*

Write down the TOP 5 barriers for a healthy diet:"

Due to the explorative nature of the current study, an open-ended question was chosen as a data collection tool. Participants were encouraged to elaborate on their answers as there were no time constraints. This methodological option is expected to help us better understand the participant's own perspective and opinion and is fit to the goal for the present research (Creswell, 2012).

Data analysis

To summarize demographic data, descriptive statistics analyzes were conducted using the software *IBM SPSS Statistics, version 26.0*. Qualitative data was organized and coded using the software *NVivo 10* (QSR International version 10). This study followed the steps of content analysis proposed by Bardin (1996), which are pre-analyses, exploration of the data, and treatment. Starting with pre-analyses,

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firstly, all the responses of the “Top 5 Barriers to a Healthy Diet” were read by the researchers to get an overall idea of the data. Then, the exploration of the data, or the coding process, took place. Specifically, the number of times that a participants' answer referred to an idea was used to identify the categories and subcategories. The identification of categories and sub-categories followed a deductive and an inductive approach. Regarding the deductive approach, all categories and subcategories were established *a priori* in a codebook based on the spheres, and factors within each sphere, of the Six C's Model (Harrison et al., 2011) (see Table 1 and Figure 1). This model will be described in detail next. Regarding the inductive approach, as the analyses were conducted, a new subcategory emerged from the data and was added using the general idea of the participants' answer (e.g., “meal preparation”). Consequently, all the coded material was reviewed to check if the already coded material fit better into the new subcategory. The last step of content analyses, treatment, was conducted using the NVivo 10. This analysis provided the number of responses in each category and subcategory, and the respective percentages were calculated by the coders. An additional analysis was conducted considering the participants' attributes sex and family's income. Two researchers coded 100% of the data, separately, and all differences were resolved through discussion to reach a consensus, resulting in an inter-rater reliability of 0.86. Data were in Portuguese, the original language of the participants, however, in the final version of the paper, one of the coders translated the direct quotations, and the researches discussed and compared the new English version to the original quotations and reached consensus.

In total, 1239 responses from 274 participants were analyzed. It should be noted that several responses were coded in more than one subcategory, increasing the total number of references from 1239 to 1343 (104 increase). This means that one answer could be characterized by two or more subcategories. For example, the answer “*Laziness to cook*” (DJRS5, 11 years old boy) was coded simultaneously with the “self-regulation/emotionality” and “meal preparation” subcategory, since the answer transmits lack of self-regulation and will-power related to the meal preparation process.

Six C's Model

The Six C's Model (Harrison et al., 2011) is a developmental ecological model that summarizes a vast body of research focusing on factors influencing childhood overweightness and obesity (see Figure 1.). The model is organized into four dimensions: Spheres, NAP, ROP, and Time. However, for this study we will only consider the first dimension. The Six C's Model is described next.

Spheres Dimension. The first dimension comprises six spheres, ranging from more internal to more external influences (i.e. Cell, Child, Clan, Community, Country, and Culture). For each sphere authors provided examples of the influencing factors.

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- 1. Cell.** This sphere represents genetic/hereditary and biological characteristics influencing childhood obesity. For example, specific genes can contribute to the individual predisposition to obesity, whereas food allergies can limit the type of food the child includes in their diet (Ebbeling et al., 2002).
- 2. Child.** This sphere represents children's personal and behavioral factors influencing childhood obesity, some of which are under their control. For example, child's excessive media use (e.g., television viewing) is commonly associated with a daily increase of energy intake. A possible explanation is that children eat while viewing television. Extant data indicates that television viewing can encourage overconsumption of high energy dense foods and low nutritionally foods (Jordan & Robinson, 2008; Swinburn & Shelly, 2008).
- 3. Clan.** This sphere represents family characteristics likely to influence childhood obesity. Family plays an important role in children's life since it is the first and main context responsible for their education, including eating habits. Parents tend to pass to their children their eating habits, and children tend to mirror these eating patterns, knowledge, traditions, and restrictions. Research alerts that children assimilate eating information delivered at home and tend to imitate the eating behaviors observed (Savage, Fisher, & Birch, 2007).
- 4. Community.** This sphere represents every social context – peers, school, neighborhood, community, and other institutions – likely to influence childhood obesity, excluding family. For example, accessibility or proximity of food outlets is associated with an increased caloric intake. Similarly, peer food choices have a considerable influence on children food choices, healthy or/and unhealthy (Roberts et al., 2013).
- 5. Country.** This sphere represents national characteristics, such as food companies, national economy, and national legislation that may influence and limit individual's food choices, thus contributing to childhood obesity. For example, children and families are not in control of the media food marketing. Children are continuously bombarded with food advertising targeting high calorie and low nutrient foods, which may influence their preferences and purchase options (Jordan et al., 2008).
- 6. Culture.** This sphere represents cultural and societal characteristics, such as cultural norms, rules, myths, and rituals that guide the beliefs and behaviors of citizens regarding eating and food choices. For example, cultural beauty standards are likely to shape citizens' beauty concept and, individual's choices tend to be responsive to these standards (Furnham, Moutafi, & Baguma, 2002).

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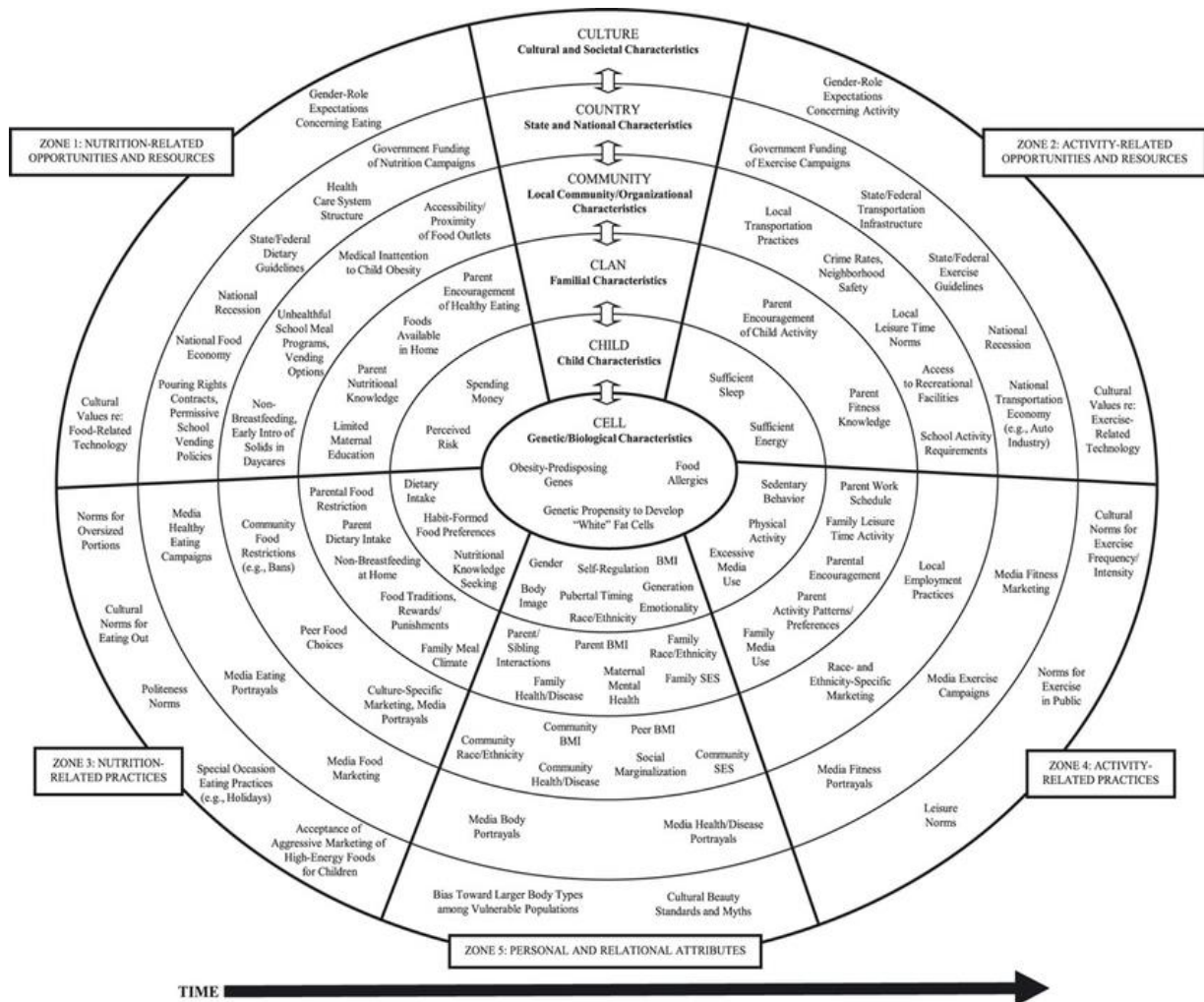
NAP and ROP Dimensions. The second and third dimensions of the model organize the spheres, excluding the cell, into zones. Particularly, the second dimension divides the model into sections Nutrition, Activity, and Personal and relational attributes (NAP) and reflects weight status as being influenced by eating, exercise, and individual characteristics. The third dimension divides the model into sections Resources and Opportunities and Practices (ROP) and reflects weight status as being influenced not only by daily routine/behaviors (e.g., doing physical activity in a neighboring park), but also by structural limitations on those behaviors (e.g., limited or no access to a park). The intersection of these dimensions (NAP and ROP) results into five zones: Nutrition-Related Opportunities and Resources (Zone 1), Activity-Related Opportunities and Resources (Zone 2), Nutrition-Related Practices (Zone 3), Activity-Related Practices (Zone 4), and Personal and Relational Attributes (Zone 5).

Time Dimension. The fourth and last dimension of the model is Time, which is represented by an arrow at the base of the model. The "Time Arrow" embodies two distinct types of developmental changes. The first developmental change represents the influence that elements from proximal spheres, i.e. the child and its family, have over factors in distal spheres, e.g., culture (outward direction of the arrow across the spheres). Conversely, it also represents the influence that factors in distal spheres have over the elements in proximal spheres (inward direction of the arrow across the spheres). For example, cultural beauty standards influence how children perceive their own body image, i.e. how they perceive their physical self and the thoughts and feelings associated with that perception. The second developmental change represents the importance attributed to certain influencing factors, which varies throughout the different developmental stages of the individuals (infancy, toddlerhood, preschool, school age, and adolescence). For example, during infancy, the constraints imposed by the community on public breastfeeding have a greater impact in a child's life compared to an adolescent, since breastfeeding is a characteristic of infancy, the first developmental stage. On the contrary, during adolescence school-vending policies become a relevant factor, since it influences adolescents' food choices.

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Figure 1.

The Six-Cs developmental ecological model of contributors to overweight and obesity in childhood. The model was reproduced with the permission of the first author, Kristen Harrison.



Findings

The barriers to a healthy diet identified by the participants were broad-spectrum and varied, and was possible to categorize the different barriers to a healthy diet according to the categories/spheres and the subcategories of the Six C's Model (Harrison et al., 2011). The present section was organized into two sub-sections. First, we present a detailed overview of the perceived barriers to a healthy diet, organized into spheres. Second, we examined data with gender (boys and girls) and family income (low income and median/high income) as attributes.

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Perceived Barriers to a Healthy Diet

We identified barriers within five categories: 1) *Child*, 2) *Clan*, 3) *Community*, 4) *Country*, and 5) *Culture*, the *Cell* category did not emerge in the present data. From all the subcategories considered during analysis (see Table 1), we identified 15 subcategories that were the most relevant and representative of the overall data. Of the 1343 responses, the majority (n = 953, 71%) were coded into the *Child* category, and the remaining were distributed through the other categories [84 (6%) into the *Clan* category, 167 (13%) into the *Community* category, 108 (8%) into the *Country* category, and 31 (2%) into the *Culture* category].

Table 1 presents the subcategories that emerged in each category with representative quotes and respective response frequency.

Child Sphere

We classified barriers as belonging to the *Child Sphere* when participants indicated that they perceived as a barrier factors that are related to themselves and their behavior. In this category, we identified six subcategories that represent a barrier to a healthy diet, being “dietary intake” the most prominent subcategory. Participants referred to specific foods, mainly high calorie dense foods, as barriers to a healthy diet: “*Juice, chocolates, lollipops, cakes and chips*” (GNC10, 10 years old girl). This subcategory relates to and complements the “perceived risk” subcategory. Participants seemed to understand the “perceived risk” associated with these types of foods. Specifically, participants highlighted that certain components of these foods are the reason why they are considered unhealthy, for example high levels of sugar, salt, and fat: “*Drinks with too much sugar*” (A36, 10 years old girl) and “*Fried and extra salty foods*” (BMT1, 12 years old girl). Consistent with findings from prior studies, the data from the “dietary intake” and “perceived risk” subcategories suggest that children have nutritional knowledge that allows them to identify unhealthy foods and to be aware of their harmful components (Beck, et al., 2019; Hesketh et al., 2005; Sharif Ishak et al., 2020). However, this information does not seem sufficient to prevent them from eating those foods and may indicate that children lack self-regulation skills to help them cope with unhealthy foods and have a healthy diet. In fact, participants expressed difficulties in controlling their food cravings ignited by smelling or seeing palatable food, which may indicate lack of self-regulation. These responses were coded in the subcategory “self-regulation/emotionality”: “*Temptation to eat delicious candies*” (AF4, 13 years old boy) and “*Seeing a sweet food and feeling like eating it*” (AF1, 10 years old boy). Conversely, participants indicated that lack of motivation or will power is a barrier to a healthier diet: “*Not wanting to eat healthy foods*” (HCR12, 11 years old boy) and “*There is little motivation for a healthy lifestyle*” (ABBC4, 11 years old girl). This finding is consistent with results

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from the study by Musaiger and colleagues (2013) which found that lack of motivation was considered one of the major barriers to healthy eating.

Other important subcategory emerging in the *Child Sphere* is “habit-formed or food preference”. Participants' answers suggest that liking unhealthy foods or disliking healthy foods, and having unhealthy daily food habits or traditions are a barrier to a healthy diet: “*Not liking vegetables*” (IGG11, 11 years old girl) and “*We want to go on a diet but we don't succeed because we are used to junk [food]*” (MPR21, 10 years old girl). Extant research has already reported that most children and adolescents that prefer fast food and energy dense foods have this preference due to the taste of those foods (Ross, 1995; Stevenson et al., 2007). Particularly, children believe that tasty food is associated with unhealthy food, mainly fast food, whereas not so tasty food is associated with healthy food, mainly fruit and vegetables (Rastogi et al., 2018; Shepherd et al., 2006).

Interestingly, participants mentioned “excessive media use” as a relevant barrier. Answers included excessive screen time in several types of device, for example, “*Social media; Television*” (ASC4, 12 years old boy) and “*Internet; Series*” (LFC16, 11 years old girl). This finding is consistent with findings indicating the excessive media use as a barrier to a healthy diet. For example, when engaging in activities like television watching and smartphone use, children are compelled to stay indoors and they may overconsume calorie dense foods throughout that time (Jordan et al., 2008; Watts et al., 2015). The “excessive media use” subcategory is related to and complements the “sedentary behavior” subcategory. Engaging in these types of indoor practices requires no physical effort and stimulates the desire to consume calorie dense food (Jordan et al., 2008): “*Spending a lot of time in the computer*” and “*Not doing physical exercise*” (CGA4, 12 years old boy).

In sum, in this sphere, we found activity and nutrition barriers, proximal and controllable by the child. Regarding activity barriers, participants stated that engaging in sedentary activities including excessive use of screen time encourages the consumption of energy dense foods. Regarding nutrition barriers, participants showed nutritional knowledge sufficient to recognize the components of unhealthy foods, and expressed difficulty in controlling their desires or impulses to eat specific foods, mainly unhealthy food, simply by smelling or seeing the food. For example, habits for eating palatable foods (e.g., fast food) makes it difficult to include healthy food into their diet. These findings may suggest that children are experiencing low levels of self-regulation towards having a healthy diet.

Clan Sphere

Participants quotes related to their family's characteristics and behaviors were classified in the *Clan Sphere*. In this category, we identified several subcategories representing family barriers to achieve

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a healthy diet. The major perceived *Clan* barrier for children was “meal preparation”. As aforementioned in the data analysis section, this subcategory is not part of the original Six C's Model (Harrison et al., 2011). Parents/guardians are responsible for preparing and cooking family meals, since children do not have enough autonomy and cooking skills to take this responsibility. In this line of thought, participants' answers indicated that parents/guardians lack time and energy to prepare healthy and balanced meals. Instead, parents/guardians choose a fast and easy meal, mainly unhealthy food, such as fast food: “*For instance, it is easier to cook sausages than to cut some vegetables, and wash them*” (ALVB6, 11 years old girl) and “*Running out of time and choosing fast food*” (LA15, 11 years old boy). This finding is consistent with previous studies in which parents/guardians reported lack of time to prepare a healthy and complete meal due to their busy schedule (Gray et al., 2016; Nepper & Chai, 2016). The subcategory “family media use” was also well represented in the data. Participants' answers indicated that using digital devices during family mealtime, mainly watching TV, works as a barrier for a healthy diet: “*Eating and watching TV at the same time*” (SASS20, 10 years old girl) and “*Play with the mobile phone while eating*” (IFS12, 11 years old girl). Jordan and Robinson (2008) alerted that watching TV during family mealtime acts as a distractor factor likely to undermine children's healthy eating patterns.

Participants also highlighted “parent dietary intake” as an important factor influencing their eating patterns. As expected, parents/guardians, not children, decide where or what the family is going to eat: “*Parents habituate their children to eat poorly from a young age*” (ARM6, 11 years old girl) and “*Go to restaurants too many days*” (TMMCF30, 11 years old boy). The “parent dietary intake” subcategory is related to and complements the subcategory “foods available at home”. Parents/guardians are the primary economic source in the family and are also responsible for deciding what type of food is bought and available at home. For example, parents/guardians may decide to buy caloric dense foods for children to consume: “*Having candy at home*” (MST19, 11 years old girl) and “*[having] Too many cookies in the pantry*” (TMMCF30, 11 years old boy). These findings are consistent with literature reporting that making decisions on food purchase and on food to serve at meals is entirely up to the parents/guardians to decide (Sharif Ishak et al., 2020; Watts et al., 2015).

In sum, this sphere represents family, mostly characteristics of the parents/guardians. We found activity and nutrition barriers, proximal but non-controllable by the child. Regarding activity barriers, participants expressed that parents/guardians have the responsibility to cook and prepare their healthy meals; however, they are likely to lack time and energy to cook due to their busy lives. This translates to parents opting for a fast, easy, and not so healthy meal (e.g., fast food or order food from the restaurant). Current data are important and may merit researchers and educator's attention. For example, the study

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by Fertig and colleagues (2019) found that families that prepare home-cooked meals are more likely to increase their fruit and vegetables intake, as well as whole grains intake, compared to families that lack the time to prepare family meals and buy pre-prepared meals instead. Regarding nutrition barriers, participants stated that parents/guardians have the control and the economic decision on what foods to buy, and consequently, what foods are available for the family to eat. The barriers from this sphere indicate that parental behavior can directly influence and control children's eating patterns and their food choices.

Community Sphere

The participants' quotes included in the *Community Sphere* mentioned barrier factors related to their social context, excluding family. In this category, we identified two subcategories indicating that community constraint also works as a barrier to a healthy diet, being "accessibility and proximity of food outlets" the most prominent one. Participants' answers suggested and unveiled their difficulty in controlling impulses for unhealthy food when having easy access to a food store or restaurant, mainly, a fast food restaurant: "*When I pass through McDonald's I want to eat right away*" (DBM2, 11 years old boy) and "*Having too many cakes in the place we are going*" (MCC22, 11 years old girl). Answers included in this subcategory were simultaneously coded with the "self-regulation/emotionally" subcategory, since participants' answers draw attention to lack of self-control when seeing or smelling the food stores or restaurants. Several studies reported that easy access to fast food restaurants surrounding homes and schools encouraged the consumption of fast food (Beck et al., 2019; Rastogi et al., 2019).

Participants also mentioned "peer food choices" as a barrier to healthy eating. Participants' answers indicated that peers and friends can influence children food choices in many ways: participants expressed difficulty in refusing an invitation from a friend to go to a restaurant: "*Friends' invitation to go to McDonalds*" (FPFG8, 11 years old girl); Seeing a friend eating unhealthy food and trying to control the desire to eat the same food item: "*Seeing my classmates buying things at the [school] bar/cafeteria*" (LV17, 11 years old girl) and "*Being in a restaurant eating vegetables and watching someone eating meat with French fries*" (FSA7, 12 years old boy); Refusing a friend's offer of an unhealthy food: "*Offering me sweets or unhealthy food*" (MFVRM24, 11 years old girl) and "*Someone suggest to you a food [to eat]*" (JPCV19, 12 years old boy). Beck and colleagues (2019) reported similar findings regarding peer influences. The authors described that peers influence both negatively and positively children and adolescents' eating patterns, considering their daily consumption of high calorie dense foods or healthy foods, respectively. Answers included in this subcategory were also simultaneously coded with the "self-regulation/emotionally" subcategory, since participants' answers draw attention to lack of self-control

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when seeing or smelling the food that other person is eating: *"Watching someone eating a candy that I cannot eat"* (AMJC3, 11 years old girl) and *"People sending messages [photos] of unhealthy foods"* (FSA7, 12 years old boy).

In this sphere, we only found nutrition barriers, less proximal and less directly controllable by the child, since this sphere represents community characteristics capable of influencing children food choices. One of those community characteristics are neighborhood convenience stores and fast food restaurants, participants expressed feeling tempted when they see, smell or pass through those establishments. Participants expressed an additional difficulty in resisting those establishments when they see their friends and classmates going there or when receive an invitation to go. These barriers demonstrate that there are factors concerning the child social network, outside the home environment, that can also indirectly influence children's eating patterns, and consequently, their diet.

Country Sphere

We classified barriers as belonging to the *Country Sphere* when participants indicated that they perceived as a barrier factors related to the country, like national economy and legislation. In this category, we identified two subcategories that demonstrated how country or national constraints play an important role in food options, being "media food marketing" the main barrier to a healthy diet reported by participants. Participants' answers suggest that publicity, mainly food commercials, encourages individuals to buy and eat the food advertised: *"Advertisement leads people to consume unhealthy products"* (MJTC22, 11 years old girl) and *"Fast food ads"* (RCCV25, 11 years old boy). This finding is consistent with other studies reporting that advertisement of high calorie dense food leads to higher energy intake among children, due to the appealing marketing and advertising strategies (Jordan et al., 2008; Hesketh et al., 2005).

Still in the Country Sphere, other emerging subcategory reported as a barrier to a healthy diet was "national food economy". Participants' answers suggest that national food prices influence food options; for example, participants mentioned that the price difference between unhealthy and healthy food is an important barrier to eat healthy: *"Fast food is faster and cheaper"* and *"Healthy products are more expensive"* (ABBC4, 11 years old girl). Participants also referred that discounts and promotions work as triggers to buy unhealthy food: *"Discounts in food that is bad for us"* (MAC19, 12 years old girl) and *"Go to a supermarket with cookies on sale"* (TMMCF30, 11 years old boy). This finding is consistent with several studies reporting that the high cost of healthy food makes it inaccessible for most people, turning it into a barrier to eating healthy (Beck et al., 2019; Rastogi et al., 2019)

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In this sphere, we only found nutrition barriers, distal and uncontrollable by the child, because this sphere represents national institutions and legislations capable of influencing children food choices. Participants expressed difficulty in achieving a healthy diet due to the impact of marketing and publicity on food, mainly unhealthy food, and consequently the influence of marketing upon children's preferences. This difficulty increases when unhealthy food has lower prices than healthy food.

Culture Sphere

We classified barriers as belonging to the *Culture Sphere* when participants indicated that they perceived as a barrier factors related to their cultural and societal characteristics. In this category, participants' responses demonstrated that "special occasions eating practices" was a barrier to a healthy diet. Participants' answers suggested that culture influences eating patterns, particularly in special moments or specific contexts, due to implicit food "rules" that encourages individuals to eat certain foods. For example, the cinema has sweet or salty popcorn and a vast array of soda options for sale. Thus, it is expected that when one goes to the cinema, he/she is going to eat popcorn, not other type of food: "*Candies and sodas in birthday parties*" (MCC20, 11 years old girl), "*At Easter they give us chocolate eggs*" (ROP27, 11 years old boy) and "*When we go to the cinema*" (FPFG8, 11 years old girl). Watts and colleagues (2015) reported that celebrations, holidays, and special occasions could be considered as a barrier to healthy eating, since there is a tendency to have a substantial amount of unhealthy food available in such occasions.

In this sphere, we only found a nutrition barrier, distal and uncontrollable by the child. For participants, it is difficult to resist the temptation of eating specific foods associated with special celebrations or special moments. Particularly, there is a tendency of these special occasions to have a wide range of food, which can be an encouragement to eat high quantities of unhealthy food (e.g., Christmas).

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Table 1

Categories, subcategories, and respective response frequency and representative quotes from a qualitative study on children's perceived barriers for a healthy diet

Theme	Code	Response Frequency <i>n</i> (%)	Quotes
Child			
		953 (71)	
	Dietary intake	603 (63)	<i>"Candies; Hotdog; Pizza; Bacon"</i> (GDC10, 11 years old boy); <i>"Pizza; Nutella; Oreo; French fries; Twix"</i> (EML10, 11 years old girl); <i>"Sodas; Candies; Cookies; Fast Food"</i> (EFD5, 11 years old boy);
	Perceived Risk	51 (5)	<i>"Eat salt in excess"</i> (BPEK2, 11 years old boy); <i>"Not reading the labels and ingest drinks with too much sugar"</i> (ROP27, 11 years old boy);
	Self-Regulation/ Emotionality	138 (14)	<i>"Seeing candy at stores"</i> (BGPRS3, 10 years old girl); <i>"Temptation to eat fried food"</i> (SLMF26, 12 years old girl); <i>"Smell of fast food"</i> (LFSCFM13, 10 years old girl);
	Habit Formed and Food Preferences	61 (6)	<i>"Disliking healthy food"</i> (DAPT5, 11 years old boy); <i>"Eating 10 candies per day"</i> (GFM11, 11 years old girl); <i>"...never had healthy eating habits"</i> (BGPRS3, 10 years old girl);
	Excessive Media Use	60 (6)	<i>"TV and publicity"</i> (AGBT3, 10 years old boy); <i>"Always being in front of the computer"</i> (DAPT5, 11 years old boy); <i>"Games in mobile phone"</i> (RASB26, 12 years old girl);
	Sedentary Behavior	40 (4)	<i>"Spending too much time with technology"</i> (SLMF26, 12 years old girl); <i>"Watching videos"</i> (GCL11, 11 years old boy); <i>"Not exercising"</i> (CGA4, 12 years old boy);
Clan			
		84 (6)	
	Meal Preparation	28 (33)	<i>"[having] No time to prepare a healthy meal"</i> (FPGGC8, 11 years old girl); <i>"Being lazy to make healthy food"</i> (MFS17, 12 years old girl); <i>"There is cheaper and faster food to prepare and consume"</i> (MJTC22, 11 years old girl);
	Family Media Use	21 (25)	<i>"Turn on the TV during mealtime"</i> (BPEK2, 11 years old boy); <i>"Playing with the mobile phone while we are eating"</i> (IFS12, 11 years old girl); <i>"... talking on the phone while we eat"</i> (ABM3, 12 years old girl);
	Parent Dietary Intake	17 (20)	<i>"Going to the restaurant too many times"</i> (TMMCF30, 11 years old boy); <i>"Little variation in food"</i> (AGNM4, 12 years old boy); <i>"Parents accustom their children to eating poorly"</i> (GDV14, 12 years old girl);
	Foods Available at Home	10 (12)	<i>"Having candy at home"</i> (GMC9, 11 years old boy); <i>"Meals with salty and fried foods"</i> (RPGM27, 11 years old boy); <i>"Quality of the food"</i> (JPMF12, 10 years old boy);
	Family Meal Climate	1 (1)	<i>"Talking a lot during meals instead of eating"</i> (ABM3, 12 years old girl);

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	Parent or Sibling Interaction	7 (8)	<i>"My father"</i> (AMPVR3, 11 years old girl); <i>"My brother"</i> (CFMS7, 12 years old boy); <i>"[My] Sister"</i> (RASB26, 12 years old girl);
Community		167 (13)	
	Accessibility and Proximity to Foods Outlets	137 (82)	<i>"Fast food restaurants"</i> (DA8, 12 years old girl); <i>"Passing through candy stores"</i> (FSA7, 12 years old boy); <i>"McDonalds; Burger King; Telepizza; Pizza Hut; KFC..."</i> (FVTN11, 12 years old boy);
	Peer Foods Choices	29 (17)	<i>"Watching someone eating candy..."</i> (AMJC3, 11 years old girl); <i>"Our friends inviting us to eat at McDonalds"</i> (SBR23, 11 years old boy); <i>"People who pull us towards bad eating patterns"</i> (AGBT3, 10 years old boy);
	Unhealthful School Meal Programs, Vending Options	1 (1)	<i>"The school bar having cakes"</i> (BVBL4, 10 years old girl);
Country		108 (8)	
	Media Food Marketing	78 (72)	<i>"Food TV commercials"</i> (GMC9, 11 years old boy); <i>"Magazines and newspapers that show pictures of food making us feel like eating it right away"</i> (MAV16, 10 years old girl); <i>"Looking at unhealthy food ads from international brands"</i> (ALVB6, 11 years old girl);
	National Food Economy	27 (25)	<i>"Discounts in unhealthy food"</i> (SBLB21, 11 years old girl); <i>"The worst foods are cheaper"</i> (ENFF10, 11 years old boy); <i>"Healthy products are more expensive"</i> (ABBC4, 11 years old girl);
	Food Marketing	2 (2)	<i>"Free samples at supermarkets"</i> (FAS29, 10 years old boy); <i>"Supermarkets put bad things [foods] right in front of us"</i> (MPP16, 10 years old girl);
	Pouring Rights Contracts, Permissive School Vending Policies	1 (1)	<i>"In entertainment establishments there is only unhealthy food for sell"</i> (AGBT3, 10 years old boy);
Culture		31 (2)	
	Special Occasion Eating Practices	29 (94)	<i>"Parties with candies"</i> (ESP5, 10 years old girl); <i>"Our family arranging a dinner at the mall"</i> (BPC3, 12 years old boy); <i>"Going on vacations"</i> (CFMS7, 12 years old boy);
	Norms for Oversized Portion	2 (6)	<i>"Excess food"</i> (AAARD1, 11 years old boy); <i>"Excess food"</i> (DHAG7, 11 years old boy);

Note. N = 1343.

Sex and Family's Income Differences

For nearly all categories, we found similar results in response considering sex and family's income. This means that there are similarities in the perceived barriers to a healthy diet mentioned by

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boys and girls, and by children from low income and median/high income. One exception was the influence of the variable sex regarding *Child* and *Community* categories. Specifically, girls reported more barriers belonging to the *Child Sphere* compared with boys, and boys reported more barriers belonging to the *Community Sphere* compared with girls. Attribution theory could help shed some light over this result. According to Weiner (1985), individuals attempt to understand and explain the underlying causes for their successes and failures. These causal explanations include three dimensions: locus (internal or external to the individual), stability (stable or unstable, considering the permanency throughout time), and controllability (controllable or uncontrollable) (Weiner, 1985). Accordingly, when children had to write down “barriers to a healthy diet”, they possibly interpreted as “causes of failure to a healthy diet”. This means that when girls mentioned barriers from the child sphere, they were highlighting the internal nature of the barriers and the possibility of being under their control to change. Conversely, when boys mentioned barriers from the community sphere, they were highlighting the external nature of the barriers and the impossibility of being under their control to change barriers.

Table 2 systematizes information regarding the distribution of the responses per category considering the influence of sex and family income. Please note that percentages were calculated regarding the attributes, i.e. sex and family income, not by category, i.e. spheres. Otherwise the percentages would be proportional to the number of participants in each attribute.

Table 2

Response frequency by category considering the influence of participants' attributes, sex (girls vs boys), and family income (low vs median/high)

Category	Sex		Family Income	
	Girls <i>n</i> (%)	Boys <i>n</i> (%)	Low <i>n</i> (%)	Median/High <i>n</i> (%)
Child	506 (75)	447 (67)	325 (72)	628 (71)
Clan	53 (8)	31 (5)	19 (4)	65 (7)
Community	55 (8)	112 (17)	67 (15)	100 (11)
Country	51 (8)	57 (9)	35 (8)	73 (8)
Culture	13 (2)	18 (3)	8 (2)	23 (3)

Note. *N* = 1343. Percentages were calculated with respect to the sex attribute, and family income attribute.

Conclusion

To have a healthy diet is a protective factor against several health problems (Chan, 2017; Soskolne et al., 2018; Swinburn et al., 2004). However, children's diet still falls short the recommended international guidelines (Guenther et al., 2006; Kim et al., 2014). In this line of thought, the present study focused on understanding the perceived barriers to a healthy diet by children. Our findings show that children highlighted as barriers to a healthy diet factors that they can control and directly influence, as well as factors that they cannot control or directly influence. Considering the Six C's Model (Harrison et al., 2011), these barriers correspond to factors from the *Child Sphere* (e.g., "dietary intake") and *Community Sphere* (e.g., "accessibility and proximity of food outlets"). Furthermore, girls mentioned more barriers belonging to the *Child Sphere* compared with boys, and boys mentioned more barriers belonging to the *Community Sphere* compared with girls. Surprisingly, children seldom referred barriers related to parents' and family's characteristics and behaviors, i.e. the *Clan Sphere*. This finding was not anticipated by the authors since literature highlighting the active role of parents and family on the establishment and promotion of eating behaviors, and consequently influencing children's diet, is abundant (Hursti, 1999; Scaglioni et al., 2018; Sharif Ishak et al., 2020; Watts et al., 2015).

Additionally, our findings lead to a new barrier that was not incorporated in the Six C's Model (Harrison et al., 2011), i.e. "meal preparation". Although the Six C's Model is a summary of factors influencing childhood obesity, in the present study we used it as a model for categorizing the barriers to a healthy diet. We believe the model could benefit with the incorporation of this new factor. Since parents lack the time to prepare and cook a healthy meal due to their busy schedule, they tend to opt for unhealthy food. Thus, meal preparation may not only be a barrier to a healthy diet, but also a factor contributing to childhood overweightness and obesity.

A possible limitation of the present study relies on the methodology adopted. Even though the "Top 5 Barriers to a Healthy Diet" is an open-ended question, most answers were short, consisting of one or two words. This limited amount of information does not allow us to draw conclusions about the answers provided (Creswell, 2012). Considering this, future studies could include a different methodology for data collection; for example, semi-structured interviews or focus group could lead to richer data allowing to elaborate interpretations of children's conceptions. In terms of implications for practice, the identification of perceived barriers to a healthy diet could be helpful when devising future interventions. For example, considering that the majority of barriers formulated were within the *Child Sphere* and barriers within the *Clan Sphere* were seldom referred, interventions based on the promotion of self-regulation strategies towards a healthy diet could be an effective approach. In fact, Pereira and colleagues

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(2018) showed that a healthy eating promotion campaign inspired in self-regulated learning was effective in increasing knowledge of healthy eating in children due to the appropriate strategies used. Children participated in activities related to healthy eating devised in such a way that children had an active role in building the knowledge instead of being passive recipients of knowledge. Additionally, considering that girls mentioned more barriers belonging to the *Child Sphere*, and boys mentioned more barriers belonging to the *Community Sphere*, interventions that tackle internal and controllable barriers in girls, and external and uncontrollable barriers in boys could be more effective in promoting changes in their diets.

In sum, the current study provides a comprehensive ecological perspective of barriers to a healthy diet perceived by children. This may help deepen our understanding on the health eating processes and contribute to develop more effective interventions and campaigns to promote a healthy diet among children.

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Appendix



Universidade do Minho
Conselho de Ética

Comissão de Ética para a Investigação em Ciências Sociais e Humanas

Identificação do documento: CEICSH 032/2019

Relatores: Emanuel Pedro Viana Barbas de Albuquerque e Marlene Alexandra Veloso Matos

Título do projeto: *In-person and Online Healthy Eating Promotion through Self-regulation (HEP-S): Assessing the Efficacy of a Narrative-based Intervention*

Equipa de Investigação: Paula Cristina Soares de Magalhães da Silva Correia, Investigadora de pós-doutoramento, Centro de Investigação em Psicologia, Escola da Psicologia, Universidade do Minho; Pedro Rosário (PhD), Professor Associado, Departamento de Psicologia Aplicada, Escola de Psicologia, Universidade do Minho; Paulo P.P. Machado (PhD), Professor Catedrático, Departamento de Psicologia Aplicada, Escola de Psicologia, Universidade do Minho; Sónia Gonçalves (PhD), Professora Auxiliar, Departamento de Psicologia Aplicada, Escola de Psicologia, Universidade do Minho

PARECER

A Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) analisou o processo relativo ao projeto de investigação acima identificado, intitulado *In-person and Online Healthy Eating Promotion through Self-regulation (HEP-S): Assessing the Efficacy of a Narrative-based Intervention*.

Os documentos apresentados revelam que o projeto obedece aos requisitos exigidos para as boas práticas na investigação com humanos, em conformidade com as normas nacionais e internacionais que regulam a investigação em Ciências Sociais e Humanas.

Face ao exposto, a Comissão de Ética para a Investigação em Ciências Sociais e Humanas (CEICSH) nada tem a opor à realização do projeto, emitindo o seu parecer favorável, que foi aprovado por unanimidade pelos seus membros.

Braga, 26 de junho de 2019.

O Presidente da CEICSH

Assinado por: **ACÍLIO DA SILVA ESTANQUEIRO**
ROCHA
Num. de Identificação Civil: BI042754054
Data: 2019.07.05 14:45:37 Hora de Verão de GMT



Anexo: Formulário de identificação e caracterização do projeto