Playing with food: the impact of marketing via online games on children's behaviour

Doctoral Thesis presented within the Doctoral Programme on Information and Knowledge Society of the Universitat Oberta de Catalunya

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Preface

This study was partly produced under the Consumer Programme (2007-2013) in the frame of a contract with the Consumer, Health, Agriculture and Food Executive Agency (CHAFEA) acting on behalf of the European Commission. This study has been partly funded under the Request for Specific Services No EAHC/FWC/2013 85 08 for the implementation of the Framework contract no EAHC/2011/CP/01/LSE for the provision of a "Study on the impact of marketing through social media, online games, and mobile applications on children's behaviour". It was the first European project that I participated on and developed my passion for this field.

The study results brought a lot of changes to the online marketing environment. The study drew policy makers' attention to the fact that many online marketing practices affect children, and an uneven protection of children across the EU affects consumer trust in cross-border providers of online content. Its results fed into the review of EU consumer and marketing law, in particular the Unfair Commercial Practices Directive (UCPD) and the Directive on Audio-visual Media services. It also led to subsequent enforcement action through the Consumer protection Cooperation (CPC) network. Authorities required platform providers such as Apple and Google as well as the association of games developers to stop misleading advertising of games as "free" if they involved in-app purchases and to avoid direct invitation to purchase directed at children.

Shortly after the project, also my personal circumstances have changed to let the project results appear in a different light: I became a mother myself. My now four-year-old son enjoys playing online games via a tablet or phone and my one-year-old daughter exhibits quite some interest for whatever her older brother is doing. This has given even greater personal relevance to the topic. I am aware that my children grow up in a media saturated environment and I will not always be able to prevent my children from being exposed to content that I would rather like them not to be exposed to. Naturally, I share the interest of every parent that I want my children to grow up as healthy citizens. This is why we need more research on effective ways to encourage healthy behaviours and promote healthier decisions for children and young people.

Acknowledgements

I would like to thank all those who provided me with the opportunity to conduct this research and their support during this long process of successfully completing my dissertation. In particular, I would like to thank Dr. Frans Folkvord for his guidance insightful feedback and continual encouragement. To my family and friends, thank you for your endless patience and love.

To my children.

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1   Introduction

The doctoral thesis investigates the impact of online marketing via online games and advergames and comprises different research methodologies. The document is structured as follows. This introductory chapter presents the study topic, objectives and research questions guiding this study. It also presents the justification of the research conducted within this thesis and its contribution within the larger body of work in this area. Chapter 2 presents the theoretical framework in which the study is embedded. Chapter 3 details the methods followed for the research conducted, starting with the methodology of the literature review, the content analysis, and lastly, the experimental design and procedures. Subsequently, the results of the research conducted are presented. Chapter 4 presents the results from the literature review; chapter 5 presents the results from the content analysis and chapter 6 presents the results from the experiment. In Chapter 7, the results of the research lines are discussed and reflected upon on in light of previous research and the theoretical framework discussed in this chapter. Chapter 8 presents the conclusions, including a brief summary of the findings, limitations of this study, as well as suggestions for further research.

1.1 Study context

The Internet undoubtedly has become an integral part of our everyday life and activities. Especially young people nowadays spend much leisure time using a variety of electronic media at the cost, some argue, of physical activity. And much of that time is devoted to the Internet and playing online games in particular (Paek et al., 2013). Being online, however, also means being exposed to highly commercialised spaces (Buijzen, Van Reijmersdal & Owen, 2010). As young people have become consumers of digital content (Rideout et al., 2010), marketers have moved to online environments and adopted new advertising venues to target children (Hudders, Cauberghe & Panic, 2015). The American Marketing Association (2020) defines marketing as "*a business practice that involves identifying, predicting and meeting customer needs*", with advertising.

Every year, enormous amounts of money are spent by marketers to reach children and adolescents (Powell, Harris & Fox, 2013). Digitalisation and technological advancements made it easier for marketers to reach this goal. The youth market is particularly important because young people spend money on their own right, have a say in family decisions about what to buy (pester power) (Harris, Brownell & Bargh, 2009) and potentially stay loyal to brands throughout life (Lapierre et al., 2017). Technological advancements and the Internet have resulted in an omnipresence of advertising in online environments and minimal exposure to online contents that remain uncommercialized (Smith et al., 2019; Buijzen, Van Reijmersdal & Owen, 2010). Online games, one of young people's favourite online activities (Paek et al., 2013), are no exemption, but are exploited for exactly this purpose. Therefore, it is of great importance to investigate in detail the impacts that these games may have on young people. Food products represent one of the most heavily advertised categories, and the food products advertised tend to fall into the category of High Fat, Salt and Sugar (HFSS) (Harris, Brownell & Bargh, 2009; Boyland et al., 2016; Lee et al., 2009). The "big five" products groups that are predominantly marketed to children are: pre-sugared breakfast cereals, soft drinks, confectionary and savoury snacks, and fast-food outlets (Hastings et al., 2006, p. 2).

Experts have raised multiple concerns about the impact of marketing of calorie-dense and nutrient-poor food products to children (Harris et al., 2009; Harris, Brownell & Bargh, 2009; Jain, 2010; Linn & Novosat, 2008; Montgomery et al., 2012; Montgomery & Chester, 2009; Schwartz, Kunkel & Delucia, 2013; Paek et al., 2013; Thomson, 2011), especially because it forms part of a much larger problem of unregulated, child-targeted advertising (Calvert, 2008;

Harris et al., 2009; Jain, 2010, Montgomery et al., 2012; Schwartz, Kunkel & Delucia, 2013; Thomson, 2011).

One of the main concerns is that it can trigger obesity-related problems. In fact, in many countries the media environment is held accountable for rising obesity rates among children (Flowers, Lustyik & Gulyás, 2010). While childhood obesity is a multifaceted problem that is driven by several factors (Sahoo et al., 2015; Reisch & Gwozdz, 2010), the marketing of food products of low nutritional quality has been established as one of the major contributors (Paek et al., 2013). This is worrying as eating habits of children and young people are serious concern nowadays. Many studies show that dietary intake patterns of children and adolescents are poor and do not meet international dietary standards (WHO, 2018a; Spence et al., 2018). Young children reportedly do not eat enough fruit and vegetables but instead consume too many energy-dense snacks and soft drinks (WHO, 2018a; Folkvord et al., 2016). Increased levels of caloric and fat intake may lead to obesity (Sahoo, 2015), and childhood obesity already poses a serious public health concern with an alarming increase in its global prevalence over recent decades (Karnik & Kanekar, 2015; Vandevijvere et al., 2015; Salvy et al., 2012). Moreover, these negative impacts may perpetuate through their lifetime, as research suggests that eating behaviours that have been established during childhood track into adulthood and contribute to long-term health and the development of chronic diseases (Kaikkonen et al., 2013; Patton et al., 2011; Story et al., 2002).

Compared to other media messages encountered on the Internet that may have a potentially negative impact on young people, the advertising of food may appear relatively harmless (Harris, Brownell & Bargh, 2009). Food advertising refers to "*any form of communication that is designed to increase the recognition, appeal, and/or consumption of particular food products, brands, and services*" (WHO, 2010, p. 7). However, the considerable amount of marketing that promotes palatable foods such as salty snack foods and high-sugar foods (Horwath, Hagmann & Hartmann, 2020) is considered a major factor of one of the most important public health issues faced by society today (Harris, Brownell & Bargh, 2009). In addition, academics have raised concerns that children can easily be misled or confused about the purpose and intent of advertising, especially in online environments. This is, in part, due to the fact that children today are likely to be exposed to online brand promotions that do not look like typical advertising. Marketing in newer media is qualitatively different from traditional advertisements (Lapierre et al., 2017), and takes various shapes. For example, online advertisements engage children actively through game platforms (e.g., company-sponsored

games in which brand images and messages are embedded), or through viral features for example by encouraging children to reach out to friends about a product via social networks or mails (Lapierrre et al., 2017; Harris, Bronwell & Bargh, 2009). Children are used as "brand ambassadors" themselves by disseminating marketing content to friends in social networks. One of the defining characteristics of the current media environment is the integration of commercial content into another media content (Buijzen, Van Reijmersdal & Owen, 2010). Instead of receiving messages passively as used to be the case, for example, with TV spots (Lapierrre et al., 2017), young people spend a significant amount of time engaging with highly entertaining advertising stimuli or cues that require their active participation (Harris, Brownell & Barg, 2009). Such food cues in advertising can take various shapes, including visual, mental, or auditory signals (Folkvord et al., 2016). Three types of integration of commercial and media content are distinguished in the literature, namely: format, thematic and narrative integration (Buijzen, Van Reijmersdal & Owen, 2010). Format integration refers to the integration of commercial message and editorial context (Ali et al., 2009). Examples are websites that seamlessly incorporate a marketed product or a brand into a web page using product logos, product package images or branded characters) (Alvy & Calvert, 2008). Thematic integration refers to the marketing that embeds a product within the central content of a website, of which product or advertisement placement constitutes a prime example (Alvy & Calvert, 2008; Gunter et al., 2000). Lastly, narrative integration is the most extreme example of embeddedness of commercial messages into media context (Russel, 2002). Most marketing in online games are examples of narrative integration, whereby it can take place in various shapes and forms.

The literature distinguishes between in-game advertising, advertising in social network games and advergames. In-game advertising refers to the inclusion of products or brands within a game, whereas the game itself is provided solely for entertainment purposes (Terlutter & Capella, 2013). The advertisement is integrated into gameplay in either a subtle or prominent manner, but the games do not depend on ad placements to provide the playing experience. Advertising in social network games refers to the placement of brands or products in digital games that are played via major social networks such as Facebook (Terlutter & Capella, 2013). These games offered on social networking sites are mostly casual games that enable social interaction and often include viral features which encourage the player to invite more friends to the game. The highest level of embeddedness of advertising into entertainment content is found for so called "advergames".

Advergames are free games that vary from short and simple games (e.g., puzzles or memory games) to longer and more complex, single or multi-player games that can be played in different languages (Flowers, Lustyik & Gulyás, 2010). They typically contain video-game features such as the possibility to play multiple levels and create personal avatars with the objective to prolong children's involvement with the brand (Nairn & Hang, 2012). Advergames represent a form of "*branded entertainment*" and of "*immersive advertising*" that feature "*advertising messages, logos, and trade characters in a game format*" (Mallinckrodt & Mizerski, 2007, pp. 87-88). Advergames are presented as entertainment, but in fact are designed almost exclusively to promote a brand or achieve a high traffic on brand websites (Terlutter & Capella, 2013).

The proliferation of advergames as a marketing technique primarily targeting children has become subject of concern and criticism (Paek et al., 2013; Folkvord et al., 2016; Smith et al., 2019). The goal of providing advergames for children is to immerse them into the brand (Nairn & Hang, 212) and increase their brand attitudes (Waiguny, Nelson & Terlutter, 2012). At the same time, advergames are found to create a context for associating the brand with positive feelings while playing (Culp, Bell & Cassady, 2010; Waiguny, Terlutter & Zaglia, 2011). For children, advergames are fun and appealing (Culp, Bell & Cassady, 2010), with the result that they may play an advergame repeatedly and potentially be exposed to brand identifiers such as logos or the product itself repeatedly. Children are considered to be particularly susceptible to advergames (Paek et al., 2013; Rifon et al., 2014), as the entertaining and immersive nature of advergames makes it difficult for children to identify the commercial purpose of these games (Paek et al., 2013; Van Reijmersdal, Rozendaal & Buijzen, 2012; Folkvord & van t' Riet, 2018). Children are likely to learn from their repeated exposure to marketing claims in these formats that consuming foods of poor nutritional value is "*fun, rewarding, and has no negative consequences*" (Harris, Brownell & Bargh, 2009, p. 18). Advergames are an example of how the Internet is used to establish a creative relationship with children as consumers (Lascu et al., 2013).

What is particularly problematic is that young people are often not aware that they are the subject of marketing (Lapierre et al., 2017) and that most of this marketing actually promotes unhealthy food products (Paek et al., 2013; Harris, Brownell & Bargh, 2009; Lee et al., 2009). This has created a "*pervasive and unhealthy food environment for young people that is almost impossible to resist* "(Harrris, Brownell & Bargh, 2009, p. 26).

1.2 Aims and objectives

This present study investigates one of the contributors to childhood obesity, namely advertising to children and young people in online environments. It seeks to apply current knowledge about marketing via online games to test its effectiveness to promote healthy food intake. In doing so, it takes an interdisciplinary perspective, drawing connections among diverse streams of theoretical and empirical research dedicated to study the research topic in-depth.

Literature on food marketing targeting young people reveals that in the last years, ever more sophisticated marketing techniques have been developed, including marketing via games played online. Games played online by children and adolescents often include promotional contents for palatable foods containing high levels of fat, salt and sugar (HFSS) foods (Henry & Story, 2009; Lee et al., 2009; Harris, Brownell & Bargh, 2009). Advergames may be exclusively designed to promote a product or brand while a child is at play. This is of great concern as children are primarily exposed to cues of HFSS foods during this leisure activity and the exposure to food promoting advergames is found to affect the eating behaviour of children. In particular, HFSS foods are found to have higher intrinsically rewarding properties than healthy food products, which means that they are more "wanted" and "liked" than healthier counterparts such as fruit and vegetables (Folkvord, 2019). While this makes the marketing of HFSS foods in online games particularly effective, it has negative consequences for children's health. The marketing of these products encourages rapid weight gain in early childhood and can even increase risk factors related to chronic diseases (Lobstein et al., 2015; Harris, Brownell & Bargh, 2012). Opposite to that, healthier foods, defined in the literature as "*comparably lower in calories, salt, sugar, cholesterol or far, and higher in nutrient density, such as vegetables, fruit and grain*" (Bauer & reisch, 2019, p.9) are generally less promoted and less demanded by children than unhealthy foods (Folkvord et al., 2016). Research suggests that there is a substantial burden of illness and disease resulting from poor diet (Russel, Croker & Viner, 2018). Eating fruit and vegetables on a daily basis helps protect against many illnesses and chronic diseases, and improve overall psychological well-being (Bazzano, Serdula, & Liu, 2003; Kaikkonen et al., 2013). Regular fruit intake can benefit to maintain a healthy body weight, because fruit are high in water and fibre and low in energy-density and suppress hunger for longer time than energy-dense snacks (Rolls, Ello-Martin, & Tohill, 2004). Increasing the consumption of fruit can help to improve overall diet quality due to their rich content in phytochemicals, vitamins, fibre and so on (Hu, 2003; Miller, Moore & Kral, 2011).

Multiple studies have shown that exposure to cues of palatable foods can lead to their consumption by activating automatic eating responses (e.g., Castellanos et al., 2009; Folkvord et al., 2016; Nederkoorn & Jansen, 2002; Stice et al., 2008; Stice et al., 2009; Marteau, Hollands, & Fletcher, 2012). If food marketing for unhealthy food products is so effective, the question remains if the same effects can be found for the promotion of healthier products, such as fruit. Most studies on food marketing have focused their research on the effects of traditional advertising formats, such as television food advertising, although the media landscape is rapidly changing to include novel digital and online media technologies as marketing tools to target young audiences (Folkvord et al., 2016). As evidence about how to increase children's fruit vegetable consumption remains sparse, this study builds on insights of currently deployed online marketing practices targeting children and aims to test whether advergames promoting healthy food can be used to increase actual intake of fruit.

The main objectives of this dissertation are as follows:

- To analyse the current state of knowledge about the impacts of online food marketing to children, in particular via online games and advergames.
- To analyse the characteristics of online marketing techniques directed at children in the most popular online games and advergames.
- To test the effect of an advergame that promotes fruit on children's subsequent fruit consumption.

With these objectives in mind, the following research questions are posed:

- RQ1: What is the current state of knowledge regarding the impact of online marketing targeting children?
- RQ2: What are the most prevalent marketing techniques and protective measures used in online games and advergames?
- RQ3: Does playing an advergame promoting fruit increase children's fruit intake?

In order to answer these research questions, different methods and insights are connected and integrated. First, a review of literature on online marketing directed at children and its impact has been conducted in order to answer research question 1. The literature review synthesizes current research along methodological approaches and perspective used and summarizes existing knowledge derived from experimental studies examining the impact of online marketing on children. Second, a snapshot of currently deployed online marketing in games targeting children and young people was conducted by means of a content analysis of most

popular online and advergames to answer research question 2. This snapshot consists of a content analysis of a purposive sample of games in social networking sites and popular advergames to identify and analyse the use of different marketing techniques and features, as well as protective measures. Third, an experiment was conducted to test whether an advergame can be used to encourage the intake of healthy food products. The experiment has been designed to find an answer to research question 3 and fill current knowledge gaps.

1.3   Justification

Overall, the current online advertising practices targeting children have raised multiple concerns about potential negative effects on vulnerable young consumers. A number of studies have investigated the effects of novel marketing techniques such as advergames, for different food products on children's subsequent food intake, but only a few have tested the effects for healthy food products. Generally, it is found that the exposure to food cues in advergames influences the immediate food intake of children. Some studies suggest that children consume the food products promoted in the advergame irrespective of whether they are healthy or not (e.g., Pempek & Calvert, 2009; Dias & Agante, 2011). The results for advergames promoting healthy food products on subsequent intake of healthy foods, however, still remain contested. For example, while playing food-branded advergames was found to increase general food intake by children, Harris et al. (2012) found that advergames containing cues for healthy products did increase fruit and vegetable consumption. Similar findings have been obtained by Pempek & Calvert (2009), who tested two versions of a Pacman advergame and found evidence that the advergame promoting healthy food and beverages encouraged the intake of these food products. Another study, however, found that exposure to food cues in the advergame increases general food intake, regardless of the advertised product. Testing the impact of exposure to food and non-food promotion in and advergame, Folkvord et al. (2013) found that the children who played the healthy version of the advergame did not eat significantly more fruit than those in the other groups. Instead, the authors came to the conclusion that playing an advergame promoting food increases the intake of energy-dense food. Clearly, it must be noted that experimental studies differ in the forms and types of advergames used, which may have an impact on the manipulation of the independent variable (the nature of the advergame) and may therefore explain different findings and results, as the gameplay and persuasive intent differ in each game. In addition, subsequent food intake has been tested with different types of food products, often presenting children with different combinations of food options, which also account for diverging results.

The inconsistencies in available research results, however, indicate that it still remains unclear whether children eat more fruit after playing an advergame that promotes fruit, and hence, could constitute as an effective means to encourage the consumption of healthy food products for children. As knowledge on the issue is dispersed over different fields of research, ranging from marketing perspectives to public health and regulation, it is important to synthesize current state of knowledge on the issue and identify knowledge gaps.

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The current marketing landscape is characterized by the presence of commercial messages and cues embedded in different types of media content, and that children often engage with this commercial content interactively (Tutaj & van Reijmersdal, 2012) as opposed to the passive exposure of traditional advertising formats. The level of integration of commercial and media content can vary significantly, and different features deployed in online games influence its appeal for different audience groups. This study therefore includes a content analysis of most popular online games and advergames and analyses the presence and characteristics of online marketing techniques directed at children and young people.

To date, evidence about the potential to effectively market healthy commercial products to young people remains severely limited (Lapierre et al., 2017), and has often focused on traditional marketing strategies such as TV or printed media. For example, a study by King & Hill (2008) investigating the effects of exposure to printed advertisements for healthy, less healthy and non-food products on children's responses such as product recall and food choice. They found that recall was significantly higher for less healthy foods, even when estimated prior exposure to advertisements was accounted for. This finding is of interest given that recall of foods is likely to influence children's food preferences and future requests. But it is far from demonstrating a direct impact on intake or food choice of healthy products. A review of research regarding the use of branded characters in child-targeted food marketing acknowledged that although particularly effective at promoting unhealthy foods, branded characters that are familiar to children can encourage fruit and vegetable consumption as well (Kraak & Story, 2015). A systematic review of interventions to promote fruit and vegetable intake by Knai et al. (2006) revealed that multi-component interventions, such as large-scale fruit and vegetable promotions and education and information approaches in school settings were the most effective in increasing fruit and vegetable consumption.

Apart from more stringent regulation in the field, interventions to increase children´s health-related behaviours has focused on improving knowledge on healthy nutrition and physical activity, or empowering children through media literacy initiatives to increase their awareness of advertising intentions have been proposed (e.g., Livingstone & Helsper, 2006; Harris et al., 2009; Van Cauwenberghe et al., 2010). Many of the approaches proposed in the past presume that enhancing knowledge about nutrition and the persuasive intent of food advertising would help counteract its effects on young people (Harris, Brownell & Bargh, 2009). However, research indicates that the mere possession of advertising literacy does not necessarily enable children to consciously and critically evaluate advertising (Rozendaal et al., 2011). Relying

solely on these types of interventions may not be enough to effectively mitigate the impact of exposure to the extent of HFSS advertising that young people face in online environments. Additionally, the overconsumption of unhealthy foods is not a result of lack of understanding healthy versus unhealthy food options (Harris, Brownell & Bargh, 2009). Finally, tackling the issue by means of increased parental oversight or self-regulatory measures by companies has so far only had limited success in mediating negative impacts of advertising so far (Lapierre et al., 2017).

A potential solution that has been put forward to counter the unhealthy effects of current online food marketing practices is the balancing of healthy messages and unhealthy messages to which young people are exposed (Harris, Brownell & Bargh, 2009). One way to achieve this is the marketing of healthy foods using the same food marketing technique for healthy products that appears so effective and difficult to resist. In light of increasing health problems related to obesity and extensive targeting of children by marketers, the effective marketing of nutritious foods and healthy behaviours remains a key challenge that should be investigated further.

Only few studies have investigated whether the positive affect transfer facilitated by advergames can be used to effectively market nutritious foods and healthy behaviours. The main purpose of an advergame is to enhance children's attitudes towards the brand or product featured in the game (Waiguny, Nelson & Terlutter, 2014). It is therefore worth investigating whether advergames as a marketing technique can be used in similar ways as they are used for the promotion of predominantly HFSS products to promote healthy food products. The utilization of currently deployed marketing techniques such as game formats has been proposed as an effective means to promote healthy diets to children and adolescents in the past (e.g., Lapierre et al., 2017; Folkvord et al., 2016). Its potential rests in the assumption that most of the most of these techniques rely on social cognitive processes that are difficult to defend against, particularly among children. This makes these marketing particularly problematic but also constitutes a significant opportunity for research (Harris, Brownell & Bargh, 2009). Using available insights from current food marketing practices may therefore hold unexploited potential for child-targeted marketing encourage positive eating behaviours (Lapierre et al., 2017; Folkvord et al., 2016, Harris, Brownell & Bargh, 2009).

Since the consumption of healthy foods such as fruit and vegetables have many health benefits (He et al., 2004; Liu et al., 2004; Rodriguez-Casado, 2016) it is important to examine, especially for children, if the promotion of healthier foods via advergames can increase the actual intake. This is particularly important as eating behaviours that have been established during childhood

track into adulthood help to sustain long-term health and prevent the development of chronic diseases (Kaikkonen et al., 2013; Patton et al., 2011; Story et al., 2002;). Scientific evidence on how to increase children's fruit and vegetable consumption using currently deployed online marketing techniques, however, is sparse (Hodders et al., 2018). Therefore, studies are needed that examine the effectiveness of interventions to increase the intake of fruit and vegetables in children. This study therefore tries to fill current research gaps and enhance current state of knowledge about the potential of current marketing practices that rely on psychological processes used by advergames to promote the intake of healthy food products.

The experiment conducted in this study examines the effects on intake of an advergame promoting fruit. The effects will be compared to other advergame experiments that used unhealthy food cues. The research responds to calls for more studies that investigate the problems associated with advertising in newer media (e.g., Lapierre, 2017), and possible interventions that could be used to increase the intake of healthy food by children as a means to counteract childhood obesity.

2 Theoretical framework

In this chapter, the theoretical framework is presented which will help to contextualize the current study and explain children's information processing and consumer development.

2.1 Understanding persuasive intents

The degree to which children understand and recognize the persuasive intent behind any marketing strategy depends largely on their "*persuasion knowledge*" (Friestad & Wright, 1994). The concept refers to a person being able to identify motives and tactics behind marketing techniques gained from personal past experiences. The knowledge gained from exposure to advertising content helps people to respond as "*persuasion targets*" with effective and appropriate responses towards marketing content, such as consumer skepticism (Friestadt & Wright, 1994, p.1). It is suggested that persuasion knowledge largely determines whether marketing attempts are effective or not.

Persuasion knowledge plays an important role within the research on child-targeted marketing effects, and the Persuasion Knowledge Model (PKM) developed by Friestad & Wright (1994) has established itself as one of the most widely adopted theory in the area of advertising. A fundamental assumption underlying the Persuasion Knowledge Model is that the outcome of a persuasion attempt depends on the interaction of three knowledge structures of a person, namely: 1) knowledge gained from exposure to advertising content (persuasion knowledge), 2) beliefs about the ultimate goal of the marketer (agent knowledge) and 3) beliefs about the marketed product (topic knowledge) (Friestad & Wright, 1994). The allocation of mental resources to each of the three knowledge structures can vary significantly, as it largely depends on how much knowledge the targeted person gained from past experiences. While persuasion knowledge can be applied by both adults and children as defence against persuasive marketing content, children first need to gain experience in applying this knowledge when processing advertisements, as it is strongly related to cognitive development (Waiguny, Nelson & Terlutter, 2012). The knowledge structures applied by children and adolescents can itself be distinguished along three different levels (Wright, Friestad & Boush, 2005), which are characterised by different levels of processing capacities. Older children are usually considered *strategic processors* who possess a quite large amount of knowledge based on their experiences and are able to retrieve information to active their persuasion knowledge.

Younger children in turn are considered *cued processors* who need support in the form of cues to activate their persuasion knowledge as their personal experience with commercial attempts is still restricted. Very young children in turn lack the capability to use storage and information retrieval strategies to process commercial information, even when cued (Roedder, 1981), and are therefore unlikely to activate their persuasion knowledge when exposed to marketing

attempts. Very young children are therefore considered *limited processors* (Wright, Friestad & Boush, 2005).

Most studies conceptualize children's persuasion knowledge as the ability to (1) recognize advertising, and (2) understand advertising's selling and persuasive intentions, which broadly corresponds to the concept of cognitive advertising literacy (Neyens, Smit & Boyland, 2017). Few studies also measured the attitudinal dimension of literacy, such as skepticism towards advertising (Hudders, Cauberghe & Panic, 2015). It is suggested that repeated exposure to advertisements helps children to understand that they are exposed to commercial content and therefore, to process it accordingly. However, this effect largely presupposes that children are able to distinguish advertisements from other media content, which would then enable them to critically assess the information. Young children reportedly lack this capacity and need to learn this throughout their childhood and adolescence. Research suggests that children's understanding of the purpose of advertisements is poor especially among younger children (Oates, Blades & Gunter, 2001). The most common perception among children is that advertisements exist to provide information about products, while the persuasive intent is often not understood (Oates, Blades & Gunter, 2001). Children without persuasion knowledge, however, develop a significantly more positive attitude towards brands than children with persuasion knowledge (Verhellen et al., 2014). Research suggests that by the age of 5 or 6 children develop some persuasion knowledge in the sense that they know how to differentiate between commercial and informational content (cf. Piaget 1936). They are nevertheless likely to believe that advertising is intended to provide them with information and commercials "*always tell the truth*" (Harris, Brownell & Bargh, 2009, p. 8). By the age of 8, children have developed an understanding of persuasive intents (Waiguny, Nelson & Terlutter, 2012; Roedder, 1981; Livingstone & Helsper, 2006; Harris, Brownell & Bargh, 2009).

The persuasion knowledge model is based on the assumption that consumers need the cognitive tools to recognize persuasion attempts (e.g., commercials or brand identifiers of any type) in order to be able to apply adequate responses or coping tactics (Friestadt & Wright, 1994). In the specific case of advergames, the integration of media and commercial messages do not allow the processor to distinguish between commercial and programme content. When a child is playing an advergame promoting a food product, persuasion knowledge is not likely to be activated due to the interactive and engaging gaming experience (Paek et al., 2013) that constrains the activation of any scepticism about the source of the persuasive message (Mallinckrodt and Mizerski 2007; An and Stern 2011; Evans & Grubbs Hoy, 2016). As

persuasion knowledge is not activated, the impact of an advergame on children's awareness of brands, preferences for the food brands and subsequent food consumption is considered stronger than that of traditional advertising (Paek et al., 2013; Folkvord & van t'Riet, 2018).

2.2 Allocating cognitive capacity

Age is not the only important variable affecting children's processing of commercial content. Another set of relevant variables are proposed in the Limited Capacity Model of Attention (Kahnemann, 1973), which rests on the assumption that attention is the process of allocating cognitive capacity to a specific object or activity, which can occur in different levels of intensity. As suggested by Kahneman (1973), the total capacity assigned to process all activities performed at a time can be divided into (1) the capacity allocated to process the primary task and (2) the remaining capacity a person has at her or his disposal to perform secondary tasks ("spare capacity"). This differentiation has important implications for the processing of commercial messages integrated into another media content. Drawing on the premise that consumers' processing of commercial content embedded in entertainment media is different from their processing of traditional advertising, Lee & Faber (2007) point out that when being exposed to commercial messages in entertainment media such as the case with advergames, consumer scepticism and persuasion knowledge are not always activated to limit the persuasive effects. This is due to the fact that a consumer playing an advergame is primarily concerned with processing the entertainment content; the processing of the commercial content requires additional attention resources (Lee & Faber, 2007). When children play an advergame, they are actually engaged in two tasks: gaming as the primary task and processing embedded advertisement information as secondary task. Following the Limited Capacity Model of Attention proposed by Kahneman (1973), children have to allocate their scarce cognitive resources to both tasks. The task of playing an advergame requires a considerable number of cognitive resources for children, with the result that children's processing capabilities for "secondary" tasks - in this case, the processing of commercial content - is limited (Janssen, Fennis & Pruyn, 2010; Panic, Cauberrgh & De Pelsmaker, 2013). The implication is that the lack of cognitive resources to process commercial content increases the difficulty to activate consumer defences such as persuasion knowledge.

Attentional processes form the basis of the concept of "flow", which builds on the work on the Psychology of Optimal Experience (Nakamura & Csikszentmihalyi, 2014) and refers to a state in which individuals are *"fully involved in the present moment"* (Nakamura & Csikszentmihalyi,

2014, p.89). A person in "flow" finds themselves in a state of intense and focused concentration on a particular action. This action is neither too challenging or too boring but considered as very pleasurable and enjoyable (Csikszentmihalyi & Lefevre, 1989). Anyone can experience flow, but people vary widely in frequency and quality of flow experiences. These subjectively valued experiences in turn depend largely on the attention dedicated to a limited stimulus.

One of the basic premises that the theory builds on is that the amount of attention a person can spare is limited; hence, also the amount of information that can be processed in consciousness is limited (Csikszentmihalyi & Csikszentmihalyi, 1988). People have to choose what to pay attention to, the intensity of attention dedicated to a particular task or activity and its duration, while staying in flow requires that the attention is targeted at a particular activity or task. In order to perceive a particular task as joyful, attention has to be directed exclusively on the stimuli involved (Csikszentmihalyi, 2014). Research has shown that online games facilitate players to enter the flow state (Waiguny, Nelson & Terlutter, 2012; Terlutter & Capella, 2013). In particular, the structure of a game provides motivational elements that help people to become immersed in the play (Nakamura & Csikszentmihalyi, 2014). Ideally, advergames are created to engage players in an immersive, fun environment that offers an optimal level of challenge for the player (Waiguny, Nelson & Terlutter, 2012). Players are actively engaged with commercial messages and find themselves "in flow" as they are optimally challenged.

As the degree to which children understand and recognize the persuasive intent behind a commercial message largely depend on their persuasion knowledge, advergames are considered particularly persuasive. Children are primarily concerned with playing the advergame and have limited capacity left for the processing of the commercial messages. They engage with the commercial message as an active game component but do not recognize that they are targeted with persuasive intent. Thus, when children become immersed in the game, this might distract them from processing the commercial messages. The persuasiveness of advergames, however, can result in positive brand evaluations. For example, Waiguny, Nelson & Terlutter (2012) find that optimal challenge flow state results in positive attitudes towards the brands promoted in an advergame. Results of their study show that brand attitudes are highest for those "*in the flow*" (p. 84) and lowest for under-challenged players and those who recognized commercial content. Furthermore, an entertaining game can lead to positive brand beliefs, brand attitudes and positive brand choice behaviour (Waiguny, Nelson & Terlutter, 2010; Ham, Yoon & Nelson, 2016).

2.3   Processing of commercial messages

The Processing of Commercialized Media Content (PCMC) developed by Buijzen, Van Reijmersdal & Owen (2010) explains why advergames as a marketing technique are so effective. The PCMC-model builds on the fact that most new forms of advertising are characterised by the integration of commercially related cues (such as brand logos or characters) in the media context (Reid, 2014) and that children automatically process these cues at a minimal level of cognitive elaboration. As a consequence, children playing an advergame are affected by persuasive attempts but are unaware that they are, or have been, targeted by advertisements. This means that most of the time, consumer defences and scepticism are not activated. The PCMC model integrates theoretical models of adult persuasion, consumer development and limited capacity processing to predict the level of processing of persuasive messages and its context. It identifies several specific characteristics of commercial media content that may affect children's processing of persuasive messages, focusing on universally applicable characteristics of the message and its context, such as prominence, interactivity and integration (Buijzen, Van Reijmersdal & Owen, 2010).

The model distinguishes between three levels of persuasion processing, namely systematic, heuristic and automatic. Each of them involves different levels of cognitive elaboration when exposed to a message (Buijzen, Van Reijmersdal & Owen, 2010). The level at which a persuasive message is processed depends on the available of cognitive resources. Building on the assumption of limited capacity model of mediated message processing (LCMP) introduced by Lang (2000), a recipients' level of message processing depends not only on the (cognitive) resources allocated (RA), but also the (cognitive) resources required (RR) to process the message, and hence, identify its commercial intent. The ratio between these two largely determines the processing route taken. In the commercial media environment, the recipient of a commercial message usually has as primary objective of watching a programme, using a website or playing a game, and therefore allocates resources to process it (Buijzen, Van Reijmersdal & Owen, 2010). The processing of a persuasive message is only a secondary task. Thus, when a recipient is watching a program, or playing a game, the resources that are left after this primary task can be allocated to processing of the advertisement or brand placement. If the resources required to process the persuasive message, however, are higher than the resources allocated, the recipient may face difficulties to process it.

Importantly, a number of message factors affect the resources allocated and resources required to process a message (Buijzen, Van Reijmersdal & Owen, 2010). For example, the resources

allocated to process a message can be determined by personal relevance and perceptual prominence of the message, i.e., advertising for dinosaur-shaped cookies with signal colours are more interesting for children than for middle-aged men. Also, saliency affects whether attention is dedicated to the commercial cue and are therefore likely to increase resource allocation (Lang, 2000). The resources required to process a commercial message in turn can be determined by the complexity and interactivity, which increases when the message is too complex or the degree of interaction is too high (Buijzen, Van Reijmersdal & Owen, 2010). If a commercial message is integrated into a game this could be the case. Both resources allocated and resources required are affected by the content style of the persuasive message, e.g., information-based (text) or entertainment-based (game). For example, whether it takes shape of a licensed character, a written statement or an active game component. Lastly, the type and level of integration between the persuasive message and its context has an impact on the persuasion process. Integration is directly related to conscious awareness of the marketing message and its inherent persuasive intent (Friestadt & Wright, 1994). Prominence, relevance, complexity, interactivity and content style of the context all affect the resources allocated/resources required ratio of the persuasive message (Buijzen, Van Reijmersdal & Owen, 2010, p. 441).

The varying levels of cognitive elaboration result in one of the three levels of persuasion processing, namely systematic, heuristic and automatic (Buijzen, Van Reijmersdal & Owen, 2010). Systematic persuasion processing requires high attention and awareness by the recipient and is based on extensive cognitive elaboration (Petty et al., 2005). The persuasion mechanism leading to an attitude change (e.g., liking) includes active learning mechanisms and formulation of cognitive responses (Petty et al., 2005). It is further characterised by high levels of brand recall of the persuasive message and the advertised product or brand (Buijzen, Van Reijmersdal & Owen, 2010). A recipient is fully conscious of the persuasive message and motivated to process it after giving it full attention (Petty et al. 2005). Heuristic persuasion processing requires less message attention and awareness and is based on moderate levels of cognitive elaboration. Within this process, the recipient looks for an easy way to evaluate what is promoted. The result of heuristic processing depends on simple heuristic cues, for example, number of persuasive arguments included, attractiveness and appeal of the source, and product symbolism (Buijzen, Van Reijmersdal & Owen, 2010). This can be, for example, in the form of a famous character promoting the brand in question. Many marketing strategies directed primarily at children rely on this type of processing. This is because of their focus on emotion-

and entertainment-based strategies in these formats as opposed to information and rational argumentation (Livingstone & Helsper, 2006; Nairn & Fine, 2008). Lastly, automatic persuasion processing is characterised by very low levels of cognitive elaboration (Buijzen, Van Reijmersdal & Owen, 2010). The result of the automatic processing is an attitude change that occurs without explicit attention to the source and often without even being aware of the persuasive message (Heath, 2000; Marteau, Hollands, & Fletcher, 2012).

The last form of processing is especially prominent among young consumers, who do not process persuasive messages systematically or even heuristically. Children only incrementally accumulate consumer and advertising-related skills through experience during their childhood and adolescence (Buijzen, Van Reijmersdal & Owen, 2010). As a result, children processing persuasive messages in low elaboration scenarios often do not have enough cognitive capacity available to activate scepticism regarding the intention of the commercial message. This makes children and young people particularly vulnerable. Interestingly, lower-level processing may be triggered by message characteristics, such as format integration, and entertainment-based content style, or a highly emotive medium context (Buijzen, Van Reijmersdal & Owen, 2010).

The highly embedded and hidden forms of marketing aim for automatic processing (Buijzen, Van Reijmersdal & Owen, 2010). Advergames are a prime example of this type of marketing. Children playing an advergame are first and foremost interested in playing the online game, which leaves the processing of a commercial message as a secondary task. Persuasion knowledge and scepticism are unlikely to be activated in the automatic processing of the advergame because recipients are often unaware that they are being targeted. Repeated exposure to brand logos or name leads to a fluent processing and creates a sense of familiarity. These fluency effects are found to increase brand attitudes (Janiszewski, 1993; Waiguny, Nelson & Terlutter, 2012). Playing an advergame may therefore result in positive affect transfer towards the promoted product or brand outside conscious awareness (Buijzen, Van Reijmersdal & Owen, 2010).

2.4 Explaining the effectiveness of food marketing

The Food Marketing Defense Model proposed by Harris, Brownell & Bargh (2009) extends traditional models used to explain advertising effects (e.g., information processing approaches or consumer development models) with insights from social cognitive theories (cf. Bandura, 1998), in order to explain many effects of current forms of marketing. Most importantly, it seeks to explain the health impacts arising from the promotion of highly palatable foods of poor

nutritional quality as is found in most food marketing targeting children and youth. According to the proposed model, a renewed research focus on the psychological processes underlying the food marketing effects is required in several key areas, as older models fail to explain the effectiveness of new, subtle forms of marketing that take advantage of effects occurring without conscious awareness of marketing stimuli.

Most importantly, the model builds on the premise that most food marketing appeals to emotions. In concrete terms this means that food marketers attempt to differentiate their products from other brands by creating positive brand images and affective responses from the target groups. All forms of marketing have as their ultimate goal the reinforcement of a specific brand image (Harris, Brownell & Bargh, 2009), which ideally leads consumers to prefer their products over others. In our current media environment, there exist many examples of how food marketers attempt to imprint a certain image on consumers (just consider Coca Cola, McDonalds and so forth). It is suggested that in addition to explicit attitudes (e.g., brand choice or preferences), the marketing effects of emotional marketing can also take shape of implicit attitudes that are reinforced. These implicit attitudes take shape of a "more generalized positive attitude associated with the brand" (Harris, Brownell & Bargh, 2009, p. 230). Newer marketing techniques, including advergames, product placements, licensed characters, celebrity endorsements and logo placements exemplify emotional marketing that intends to create positive affect towards the brand via implicit attitudes (Harris, Brownell & Bargh, 2009).

It is suggested that there is an affective transfer from media to the brand: if a highly attractive stimuli creates a positive feeling is coupled with a brand, it will lead to a positive brand attitude even if there is no obvious relation between the stimuli and the brand (Harris, Brownell & Bargh, 2009). This affective transfer from media to the brand has been demonstrated in a number of studies to be the case for advergames (Van Reijmersdahl et al., 2010; Redondo, 2010; Waiguny. Nelson & Terlutter, 2010). Social cognitive theories predict that positive affect may not even be required to create positive brand attitudes, but repeated exposure to brand names already results in more favorable brand attitudes over time, referred to as "*mere exposure effect*" (Harris, Brownell & Bargh, 2009, p. 15).

In light of the amount of advertising for HFSS foods, which is then associated with positive images that appeal to children and young people, this is particularly problematic. Marketing practices often seek to associate the food product promoted with desirable images that appeal to young people such as "cool", "sporty", "modern" or "sexy". The association with these types

of imageries may ultimately reduce young people's motivation to resist advertising claims (Harris, Brownell & Bargh, 2009).

The Food Marketing Defense Model proposes several mechanisms through which food marketing influences young people's health-related beliefs and behaviours. They include normative nutrition and health beliefs, expectancies about healthy and unhealthy food, and the direct priming of food consumption and attitudes. For example, research suggests that exposure to food marketing has an impact on normative beliefs as repeated exposure to food advertising claims gives young people the impression that everyone eats these products and that the consumption of these food products is the "normal" thing to do (Harris, Brownell & Bargh, 2009). As opposed to that, most media rarely ever educate about potentially negative impacts of unhealthy eating such as weight gain or long-term health effects (Harris, Brownell & Bargh, 2009). At the same time, normative believes are also likely to influence parents in their decision of what food products to buy. The second mechanism that is seen as having a significant impact on nutrition and health-related beliefs is related to the perceived taste of foods. Building on insights from expectancy theory, the food marketing defense model assumes that through affective conditioning or mere exposure effects, consumers may attend more to positive information about products and interpret information accordingly (Harris, Brownell & Bargh, 2009). These positive attitudes in turn may affect the taste perceptions of the advertised product in line with the expectations created by the advertisement. As a result, young people may end up liking the unhealthy food product according to the promises made in the advertisement (Harris, Brownell & Bargh, 2009).

Lastly, direct priming is supposed to influence health-related behaviours (Harris et al., 2009; Folkvord et al., 2016). As discussed earlier, research on the effects of priming reveals that certain behaviours - including food intake- can be activated by relevant cues without people noticing their own behavioural change. A variety of studies exist that found evidence that exposure to marketing stimuli primes the consumption of any available snack food (Folkvord et al., 2013; Folkvord et al., 2016; Harris, Brownell & Bargh, 2009b), including more caloric dense products not promoted in the advertisement. These studies suggest that food advertisement for unhealthy products may prime short-term hedonic goals and lead to the immediate consumption of food, even if it was not promoted (Harris, Brownell and Bargh, 2009).

The Food Marketing Defense Model assumes that the ability to resist marketing influence will differ with different forms of marketing and context. It suggests that even older children and

adolescents may continue to be considerably influenced by food marketing despite being aware of their exposure and understanding of its persuasive intent. In particular, marketing practices that influence social cognitive processes– a category to which online games and advergames can be added - are particularly difficult to defend against, because numerous obstacles are presented that make it difficult for young people to counteract these practices (Harris, Brownell and Bargh, 2009). These obstacles are also deployed in advergames. Advergames blur the line between advertising and media content and may transfer positive affect from the media to the brand without conscious awareness. As it is marketing disguised as a leisure activity, children are potentially exposed to commercial cues without even being aware but are most likely to be affected. Also, other current practices targeting young people, such as celebrity endorsements, viral marketing features, and image advertising are features that are particularly appealing to youth and are likely to deactivate cognitive defense processes among children and adolescents (Harris, Brownell & Bargh, 2009). Social cognitive theories therefore predict that exposure to this marketing will likely enhance brand attitudes or even prime the consumption of the products.

Another relevant model to explain the effect of food cues embedded in novel advertising techniques such as advergames is the Reactivity to Embedded Food Cues in Advertising Model (REFCAM) proposed by Folkvord et al. (2016). The model is based on three foundational assumptions. Firstly, it assumes that the level of cognitive elaboration of food cues embedded in the advertisement determines its effects. Secondly, these effects cause physiological and psychological responses that lead to a mutual relation with eating behaviour. Thirdly, it assumes that not all children are affected by the same extent, but that individual dispositional factors determine children's vulnerability to food cues in advertisements (Folkvord et al., 2016).

The model proves very relevant to explain the effectiveness of advergames and its impact on food intake. Research suggests that advergames promoting food or beverage products contain at least one food cue that can be considered a brand identifier in form of a logo or package image that is highly embedded in the game content (Culp, Bell & Cassady, 2010). As opposed to the exposure to passive food cues as occurs in advertising via TV, the cues embedded in advergames are an essential part of the game and hence, require children's full attention. As children are primarily concerned with playing, the food cues are processed at very low elaboration levels (automatic processing) as children need most of their cognitive capacity to play. This renders children exposed to the cues without critical processing for potentially much longer time intervals, as children can play the advergames over and over again. The repeated

exposure and reactivity to food cues, including craving, eating and overweight, may therefore contribute to persisting rates of obesity (Boswell & Kober, 2016).

The REFCAM suggests that the lower the level of cognitive capacity is that is used to process food cues, the stronger the reactivity to these cues is (Folkvord et al., 2016). This lower level of processing is then related to spontaneous and impulsive behaviour (Buijzen et al., 2010). The low elaboration scenario for food cues in advergames are assumed to trigger physiological responses, i.e., accelerated heart rate (Nederkoorn, Smulders & Jansen, 2000) and psychological responses, i.e., higher attention to food cues or cravings for the food advertised (Berridge, 2009), which can ultimately lead to unregulated food intake (Folkvord et al., 2016). When children are exposed to food cues in advergames, the automatic processing means that they will act more responsively to food immediately after game play without consciously being aware of this reaction. This entails that reactivity to food-related cues becomes a strong predictor of subsequent food intake. The consumption of this food in turn sensitizes the reactivity in future occasions of exposure to these cues, which stimulates this reciprocal relation between reactivity and food intake (Folkvord et al., 2016).

The effectiveness of the exposure to food cues suggests that the same techniques could be used to effectively promote healthy diets to children and adolescents (Harris, Brownell & Bargh, 2009). For example, previous studies showed that priming children with cues of healthier foods was found to stimulate them to select healthier food (Blanchette & Brug, 2005; Hoffman et al., 2009; Folkvord et al., 2017). This constitutes an opportunity for research to effectively market nutritious foods and healthy behaviours that warrants more investigation.

Building on these theoretical insights, the methodology followed for the different parts of research conducted in this thesis is presented in the next chapter.

3   Methods

This chapter addresses the methods used in the study. In line with its aims, the study included three different methodologies to study the issue of online advertising to children and its impacts. First, a systematic review of literature was conducted in order to synthesize what is known about the impacts of online food marketing to children. Second, a content analysis was performed on most popular online games and advergames in order to identify the characteristics of marketing practices together with protective measures that are available in these formats. Third, an experiment was conducted in order to test the effect of an advergame promoting fruit on children's subsequent fruit intake. Throughout the study, the term children and young people are often used interchangeably to refer to this population group, and this refers to people under the age of 18 years, as defined by Alderson & Morrow (2011). Whenever concrete ages of childhood or adolescence are considered, this is specified in the text. The methodologies followed for this research is in elaborated in detail in the remainder of this chapter.

3.1 Literature review

The main objective of this review was to identify relevant research on online marketing directed at children and synthesize current knowledge on the impact of such marketing techniques. It extends previous reviews on persuasive marketing to children via traditional advertising channels such as television (e.g., Jenkin et al., 2014), and complements previous literature reviews on online advertising (e.g., Terlutter & Capella, 2013) by providing a synthesis of literature concerning methodological approaches and perspective used, and summarising existing knowledge derived from experiments on the impact of online marketing techniques on cognitive, affective and conative responses of children. The literature considered in the present study was retrieved from the following academic article repositories: Business Source Complete (EBSCO), ISI Web of Knowledge, PubMed and SCOPUS. A preliminary scoping search allowed the identification of key terms used to develop a search strategy. Boolean logic was used as a subsequent step to allow the widest possible coverage by combining the search terms "child OR children OR kids OR youth OR young OR minors OR teens AND advertisement OR advertising OR marketing AND online OR online games OR advergames OR Internet AND impact or effect".

The search on these databases was performed in June 2015. Inclusion criteria comprised English-language primary research articles documenting new forms of online marketing techniques directed at children and their impacts published later than January 2008. The search was performed on four electronic databases just mentioned. A manual search of reference sections in eligible articles supplemented the formal electronic searches. The studies were selected in three steps. As a first step, the titles of the articles were screened for eligibility for the different inclusion criteria. Secondly, the abstracts were read against the inclusion criteria. Finally, all full text articles of all remaining publications were checked. Figure 1 shows the selection process.

Within the study, quality was generally assessed, but direct comparisons could not be drawn because study designs varied. General assessments of quality were undertaken between studies; however, rigorous appraisal was not possible owing to the variety of research objectives and methods between studies.

Figure 1 Selection process
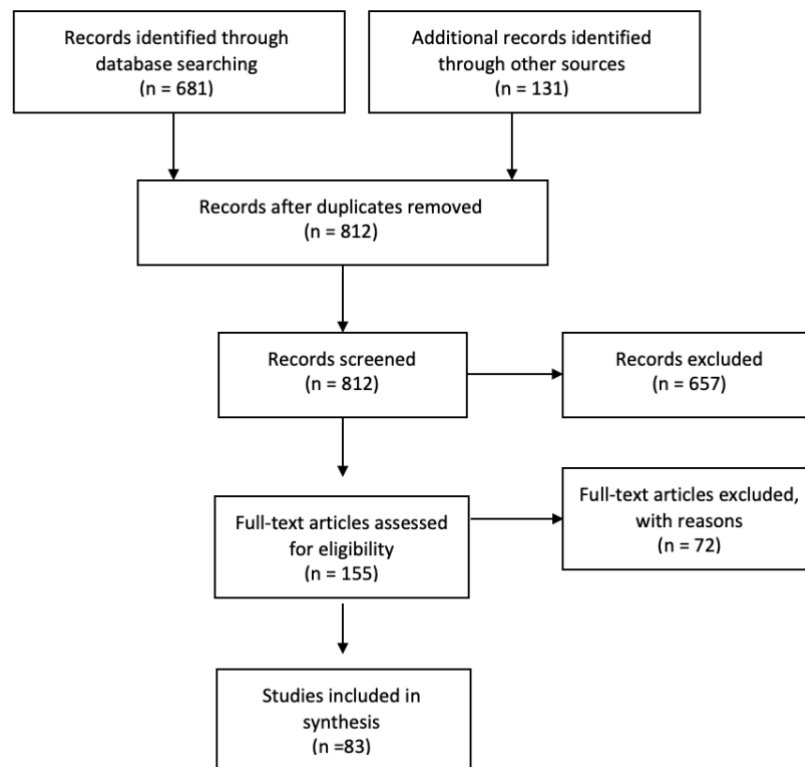
A total of 812 non-duplicate records was identified, of which 657 records were excluded after a title and abstract screen. The remaining 155 full-text articles were downloaded and critically reviewed against more stringent relevance and quality criteria for inclusion in a subsequent step, including the following: the articles (1) were published in peer-reviewed journals, (2) featured forms of online marketing/advertising, (3) featured children or youth as the target population, and (4) were written in English. The exclusion criteria applied include: (1) articles not focusing on online advertising, (2) articles not focusing on impact on children or young people, (3) number of publications on the topic by author (selection bias) and (4) accessibility.

This led to a total of 83 full-text articles meeting the inclusion criteria as subject for this review. A checklist for data extraction was established, including: the study field, the study design, objectives of study, type of artefacts handled (advergames, Internet/websites, games/SNS, mobile/apps, other media), participants and sample size (if applicable), and results. As for methods used, a differentiation was made between qualitative studies using obtrusive and non-obtrusive data collection methods. Hence, content analyses have been reported separately, while interviews and focus groups have been grouped and reported together. As for quantitative studies, a similar distinction has been made between experimental and quasi-experimental

designs and the reporting of surveys as a separate quantitative method. Further, the articles were categorized by type of marketing practice (online marketing, online marketing of food/beverage products, and mobile marketing). Lastly, the study fields have been reported, namely regulation, health and marketing. A narrative synthesis of these studies is provided in chapter 4.

3.2 Content Analysis

The objective of the content analysis is to investigate the presence and characteristics of online marketing techniques directed at children in the most popular online games and advergames. It thereby responds to calls for interdisciplinary-focused content analyses dedicated to quantifying and tracking youth exposure to marketing messages across new media platforms (e.g., Lapierre et al., 2017). It also investigates what protective measures are used in online games and advergames to increase consumer awareness about their exposure to commercial contents in these media. Lastly, it takes account of the differences that can be identified between online games and apps and advergames as concerns marketing techniques and presence of protective measures. The integration of commercial content in online games can take various shapes. Previous research in the field broadly distinguishes between in-game advertising, advertising in social networks and advergames, each of them differing in their respective stimulus characteristics and advertising (Terlutter & Capella, 2013). The content analysis of online games and advergames conducted as part of this research follows this distinction.

Based on previous theoretical and empirical research, the following expectations (hypotheses) were raised:

H1: Marketing content in online games and advergames will be blended into another media content to differing degrees.

H2: Online games and advergames will deploy a large number of features that are appealing to children and intend to prolong gameplay or engage users.

H3: Online games and advergames will deploy limited protective measures that could serve to alert children about their exposure to commercial content.

3.2.1 Screening process

A preliminary screening process of most popular online games and advergames was conducted for the EU28 during the period of 20th June 2014 and 22nd June 2014. In this exercise, two different universes were considered to identify the games for the analysis. On the one hand, games provided within the three main intermediation platforms that allow customers to access or purchase different types of software applications or games, namely App Store, (iOS) Google Play (Android) and Facebook (Browser) have been screened. On the other hand, advergames provided in corporate websites have been searched.

Three different categories of online games were distinguished. The categorization was based on the price of the game and the revenue it can generate, namely "free", "paid" and "grossing". The category "free"' comprises most frequently downloaded apps free of charge; the "paid" category consists of the most frequently downloaded apps that require a fee. Lastly, the "grossing" category consisted of apps with the highest total revenue (price per quantity sold plus revenues from in-app purchases). The latter category also covers apps with the highest total amount of money spent on them. For each of these universes and categories, the "top" 100 games were identified for each of the EU member state. In the case of Facebook games, no separate top lists per country could be retrieved. Furthermore, only the categories "most popular" and "grossing" could be identified. Hence, for Facebook, only the overall top 100 "most popular" and top "grossing" entered the pool of games for the selection. Lastly, from this overall pool derived from the different platforms and countries, the most popular "free", "paid" and "grossing" apps were identified for each of the platforms. The figure below shows the screening process for the games and apps.

Figure 2 Screening process

The screening process for the advergames followed a different strategy. The reason why a different strategy was used to identify advergames is that they are usually provided on brand websites to increase traffic on these websites. Therefore, the world's most valuable brands as

reported in the Forbes list[1] were used as a source to identify relevant brands that provide branded advergames on their corporate websites. In total, 7 advergames were purposively sampled for the analysis as elaborated in more detail below.

3.2.2 Selection process

After the preliminary screening of the most widespread games in mobile application platforms and social media sites in EU Member States, 25 games and advergames ranked most popular across the EU were purposively sampled to be studied in-depth. The selection was limited to 25 games to ensure feasibility of the analysis. These games consisted of 6 games identified from the App Store (2 games per category), 6 games identified from Google Play (2 games per category), and 6 games from Facebook (3 games per category) as ranked most popular in each category across the EU28 member states, plus 7 branded advergames. The selection process is elaborated in more detail below.

3.2.2.1 App Store/iTunes

Table 1 shows the games ranked first in each category (paid, free, grossing) in the App Store for the EU28. Within each category, the first two games most popular in all countries were selected.

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[1] http://www.forbes.com/powerful-brands/list/

Table 1 Games ranked first in each category in the App Store EU28

Table 1 Games ranked first from the App Store/iTunes EU28			
Country	Paid	Free	Grossing
AT	Stickman Soccer 2014	TwoDots	Clash of Clans
BE	Geometry Dash	I.Q. Test®	Clash of Clans
BG	Card Wars - Adventure Time	Отговори на Въпроса	Clash of Clans
CY	Teenage Mutant Ninja Turtles: Rooftop Run	Beauty Piercing - Nose, Belly button,Ear	Clash of Clans
CZ	Blueprint 3D	Kdo chce být milionářem?	Clash of Clans
DE	Stickman Soccer 2014	Bubble Shooter! Kostenlos	Clash of Clans
DK	Geometry Dash	The Test: Fun for Friends!	Candy Crush Saga
EE	Geometry Dash	Angry Birds Epic	Secret Passages: Hidden Objects
ES	Geometry Dash	I.Q. Test®	Clash of Clans
FI	Geometry Dash	Bubble Witch 2 Saga	Clash of Clans
FR	Stickman Soccer 2014	Piano Tiles (Don't Tap The White Tile)	Clash of Clans
UK	Stickman Soccer 2014	TwoDots	Clash of Clans
EL	Τι είπαν	Fish Out Of Water!	Clash of Clans
HR	The Sims 3 Ambitions	Flick Soccer Brazil	Clash of Clans
HU	Need for Speed ™ Most Wanted	Fish Out Of Water!	Clash of Clans
IE	Minecraft – Pocket Edition	TwoDots	Candy Crush Saga
IT	Geometry Dash	Fish Out Of Water!	Clash of Clans
LT	Gangstar Vegas	Fish Out Of Water!	Clash of Clans
LU	Hänk Dech Op!	Head Soccer - Brazil Cup 2014	Clash of Clans
LV	King of Opera - Multiplayer Party Game!	Angry Birds Epic	The Simpsons ™: Tapped Out
MT	Super Hexagon	Fish Out Of Water!	Clash of Clans
NL	RollerCoaster Tycoon ® 4 Mobile ™	TapDot	Clash of Clans
PL	Godfire ™	Angry Birds Epic	Clash of Clans
PT	Pou	Fish Out Of Water!	Clash of Clans
RO	Need for Speed ™ Most Wanted	Think	Boom Beach
SE	RollerCoaster Tycoon ® 4 Mobile ™	Helix Game	Candy Crush Saga
SI	Angry Birds	Fish Out Of Water!	Slotomania - FREE Slots
SK	Godfire ™	Angry Birds Epic	MARVEL War of Heroes

3.2.2.2 Google Play

Table 2 shows the games ranked first and second place from Google Play for the EU28. Due to the distribution of games ranked in the top position in the grossing games category, games ranked second place had to be included for selection. Apart from this, the same procedure for games from the App Store was followed for the selection of games from Google Play. However, if a game was already included from the previous selection from the App Store, it was replaced with a game ranked next most popular.

Table 2 Games ranked first (and second) in Google Play EU28

Table 2 Games ranked first (and second) in Google Play EU28				
Country	Paid (1st game)	Free (1st game)	Grossing (1st game)	Grossing (2nd game)
AT	Minecraft – Pocket Ed.	Don't Tap The White Tile	Clash of Clans	Hay Day
BE	Minecraft – Pocket Ed.	Don't Tap The White Tile	Clash of Clans	Candy Crush Saga
BG	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Hay Day
CY	*[2]	*	*	*
CZ	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Hay Day
DE	Quizduell PREMIUM	Angry Birds Epic	Clash of Clans	Hay Day
DK	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Candy Crush Saga
EE	Minecraft – Pocket Ed.	Angry Birds Epic	Growtopia	Clash of clans
ES	The Sims™ 3	Angry Birds Epic	Clash of Clans	Candy Crush Saga
FI	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Hay Day
FR	Duel Quiz PREMIUM	Don't Tap The White Tile	Clash of Clans	Candy Crush Saga
UK	**[3]	Angry Cats	**	**
EL	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Candy Crush Saga
HR	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Castle Clash
HU	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Castle Clash
IE	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Candy Crush Saga
IT	The Sims™ 3	Angry Birds Epic	Clash of Clans	Candy Crush Saga
LT	Quizduell PREMIUM	Don't Tap The White Tile	Clash of Clans	Hay Day
LU	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Candy Crush Saga
LV	**	Angry Cats	**	**
MT	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Heroes of Camelot
NL	Minecraft – Pocket Ed.	Volg de Lijn	Clash of Clans	Hay Day
PL	Need for Speed ™ Most Wanted	Angry Birds Epic	Clash of Clans	Empire: Four Kingdoms (Polska)
PT	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Hay Day
RO	Minecraft – Pocket Ed.	Don't Tap The White Tile	Clash of Clans	Candy Crush Saga
SE	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Candy Crush Saga
SI	Minecraft – Pocket Ed.	Don't Tap The White Tile	Clash of Clans	Hay Day
SK	Minecraft – Pocket Ed.	Angry Birds Epic	Clash of Clans	Castle Clash

[2] *There are no publicly available exit nodes in Cyprus.

[3] ** Only free applications are available in Google Play Store UK store and Google Play Store Latvia

3.2.2.3 Facebook

Table 3 shows the Top 10 games in Facebook for the categories "most popular" and "top grossing". In order to select an equal number of games for Facebook as from the other two platforms, the first three top ranked games were selected in each category, excluding those games already selected previously from the other two platforms.

Table 3 Most popular and top grossing Facebook games

Table 3 Most Popular and Grossing Facebook games		
Rank	**Facebook Most popular**	**Facebook Top Grossing**
1	Candy Crush Saga	Candy Crush Saga
2	Farm Heroes Saga	DoubleDown Casino - Free Slots
3	Pet Rescue Saga	FarmVille 2
4	Bubble Witch 2 Saga	Slotomania Slot Machines
5	Dragon City	Farm Heroes Saga
6	Criminal Case	Texas HoldEm Poker
7	Preguntados	Battle Pirates
8	FarmVille 2	Pet Rescue Saga
9	8 Ball Pool	BINGO Blitz
10	Texas HoldEm Poker	War Commander

3.2.2.4 Advergames

The selection of advergames presented in Table 4 includes advergames of brands ranked in the Forbes list. All companies ranked in the list have individual corporate websites for each country. Relevant advergames were identified by searching in Google for the respective "name of the brand" AND "games" OR "online games". If the first page of Google results did not contain any link to the official advergame for the brand in question, the brand was dropped and replaced by another brand until seven advergames were identified to complete a selection of 25 games for the analysis.

Table 4 Branded advergames

Table 4 Branded advergames		
Forbes rank	**Brand**	**Game – URL**
3	Coca-Cola	Coke Recycling - www.cokerecycling.com/Coke-Recycling-Game
6	McDonald's	Happy Meal - www.happymeal.com
39	Nestle	Crunch - www.nestlecrunch.com/playground.aspx
40	Frito-Lay	Doritos - www.doritos.co.uk/dip-desperado/game.html
42	Danone	Trust Danone - http://trust.danone.com/
58	Kellogg's	Club Kelloggs - www.clubkelloggs.ca/en/games.html
61	Adidas	Fast or Fail - www.adidas.com/en/apps/fastorfail/

This selection process led to a total of 25 games that are subject to the content analysis presented in Table 5. For each online game it is indicated whether it includes paid downloads and in-app purchase options.

Table 5 Final selection of online games and advergames

Table 5					
Final selection of games and advergames					
Type	**Platform/ Brand**	**Game/App**	**Category**	**Paid downloads**	**In-app purchases**
Apps/ Games	App Store	Geometry Dash	Paid	Yes	No
		Stickman Soccer 2014	Paid	Yes	Yes
		Fish out of the Water!	Free	No	Yes
		Angry Birds Epic	Free	No	Yes
		Clash of Clans	Grossing	No	Yes
		Candy crush	Grossing	No	Yes
	Google Play	Minecraft	Paid	Yes	No
		The Sims ™ 3	Paid	Yes	Yes
		Don't Tap The White Tile	Free	No	Yes
		Angry Cats	Free	No	No
		Hay Day	Grossing	No	Yes
		Castle Clash	Grossing	No	Yes
	Facebook	Farm Heroes Saga	Most popular	No	Yes
		Pet Rescue Saga	Most popular	No	Yes
		Bubble Witch 2 Saga	Most popular	No	Yes
		DoubleDown Casino – Free Slots	Top Grossing	No	Yes
		FarmVille 2	Top Grossing	No	Yes
		Slotomania Slot Machines	Top Grossing	No	Yes
Advergames	Coca-Cola	Coke Recycling	n/a	n/a	n/a
	McDonalds's	Happy Meal	n/a	n/a	n/a
	Nestle	Crunch	n/a	n/a	n/a
	Frito -Lay	Doritos	n/a	n/a	n/a
	Danone	Trust Danone	n/a	n/a	n/a
	Kellogg's	Club Kelloggs	n/a	n/a	n/a
	Adidas	Fast or Fail	n/a	n/a	n/a

3.2.3 Conceptualisation

The content analysis of the selected games was performed through a direct observation of games using a framework of indicators appraising the presence and or absence of marketing features and protective measures.

These indicators, retrieved and adapted from relevant literature, were broadly divided into 4 dimensions recording relevant characteristics and features applied in the games, namely: advertisement features, game features, user engagement features and protective measures. In total, 72 indicators were collected based on relevant literature. The indicators within these dimensions were grouped into sub-dimensions. The first dimension, "advertisement features", includes indicators that describe in more detail the type of advertisement used, the advertisement attributes, as well as the type of embeddedness and saliency. The second dimension, "game features", includes indicators that refer to relevant game attributes, themes and revenue models used within games. Indicators grouped under the dimension "user engagement" includes features related to social media presence and community elements, viral elements or prompts to engage users. The last dimension, "protective measures", relates to indicators identified within games that serve a protective function, including ad breaks, parental control features or legal information.

Dichotomous variables (YES/NO) were used in the coding frame to minimize subjectivity in the data collection process. The different dimensions are described in more detail below, together with the indicators used in the checklist.

3.2.3.1   Advertisement features

The first dimension of marketing techniques relates to advertisement features, divided into sub-dimensions as adapted from relevant literature into "type of advertisement" (Jernigan & Rushman, 2014), "ad attributes" (Henry & Story, 2009) and "type of embedded ad" (Alvy & Calvert, 2008; Hang, 2012). The respective indicators for each of these sub-dimensions are included in the checklist in Table 6.

Table 6 Advertisement features

Table 6 Advertisement features	
Advertisement features	**Source**
Type of advertisement	*Jernigan & Rushman (2014)*
Embedded ad	
Contextual ad	
Ad attributes	*Henry & Story (2009)*
Picture of the product	
Logo or product symbol	
Link to product information	
Type of embedded ad	*Alvy & Calvert (2008) and Hang (2012)*
Sponsorship	
Pre-game ad	
Inter-game ad	
Post-game ad	
Product placement	
Advergame	

3.2.3.2 Game features

The second broad grouping of indicators relates to game features, sub-divided into "game attributes" (Culp, Bell & Cassady, 2010), "play themes" (Zhang, Sung & Lee, 2010) and "revenue model" (OECD, 2013). The respective indicators for each of these sub-dimensions are included in Table 7 below.

Table 7 Indicators for game features

Table 7 Games features	
Games features	**Source**
Games attributes	*Culp, Bell & Cassady, (2010)*
Genres	
Purchase requirements for moving to a higher level in the game	
Inducements to extend game play	
Game personalization options	
Play themes	*Zhang, Sung & Lee (2010)*
Activities that contribute to learning and provide educational value to users	
Activities that motivate users to learn and read more about the brand or its products/services	
Activities that help users pit their knowledge, skill, beauty, or any other type of competition against others	
Activities in which winner(s) are or will be clearly announced	
Activities in which scoring more points, being faster, gaining more buddies, having more contributions is important to users	
Activities which encourage users to perform to the best of their ability	
Activities that attempt to elicit imagery and creativity from users	
Activities that offer a sense of escape or adventure	
Activities that provide an opportunity to users to experience an imagery life	
Activities that contain beauty, objects, or goals to be dreamed of or fantasized about	
Activities that require users' full concentration and engrossing in order to enjoy	
Activities that have the highest control in users' hands and leader direct guidance or rules to follow	

Revenue Model	OECD (2013)
Paid downloads	
In-app advertising	
In-app purchases (games, digital content)	
Freemium (free-to-premium)	
Promotion of non-digital goods	
Resale of data collected via app use	

3.2.3.3   User engagement

The third group of indicators is divided into the sub-dimensions "Social media" (Winpenny, Marteau & Nolte, 2013), "Community" (Winpenny, Marteau & Nolte, 2013), "Viral elements" (Culp, Bell & Cassady, 2010) and "Prompts" (Brady et al., 2010). The respective indicators for each of these sub-dimensions are included in Table 8 below.

Table 8 Indicators for user engagement features

Table 8 **User engagement features**	
User engagement features	**Source**
Social Media	*Winpenny, Marteau & Nolte (2013)*
YouTube Facebook Twitter Others	
Community	*Winpenny, Marteau & Nolte (2013)*
Register or create an account Member sign-in	
Viral elements	*Culp, Bell & Cassady, (2010)*
Messages passed on via social networks Sending an e-mail greeting to a friend Inviting a friend to play or to join the website	
Prompts	*Brady et al., (2010)*
For repeat visits For prolonged visits For buying virtual goods For buying goods	

3.2.3.4 Protective measures

The last dimension in the checklist relates to protective measures applied within games, which are divided into the sub-dimensions "Presence of Ad break" (Paek et al., 2014), "Format of Ad break" (An & Kang, 2014), "Content of Ad break"(An & Kang, 2013), "Legal Information"(Cai & Zhao, 2010), "Age limitation" (Paek et al., 2014), "Parental Control"(Henry & Story, 2009), "Content rating and Labelling schemes"(Chen et al., 2013; OECD, 2013), and "Mechanisms to contact the firm"(Lascu et al., 2013). The respective indicators for each of these sub-dimensions are included in the checklist the table below.

Table 9 Indicators for protective measures

Table 9 Protective measures	
Protective measures	**Source**
Presence of ad break	*Paek et al., 2014*
Present only before game loads	
Present only while game is loading	
Present only after game loads	
Present before and after loading	
Present during loading (during playing game)	
Present before, during and after loading	
Present only before game loads	
Present only while game is loading	
Present only after game loads	
Present before and after loading	
Format of ad breaks	*An & Kang (2014)*
One-sentence ad break	
Multiple-sentence ad break	
Icon	
Combination	
One-sentence ad break	
Multiple-sentence ad break	
Content of ad break	*An & Kang (2013)*
Presence of an introductory explanation about the ad break itself	
Presence of advertising literacy components	
Presence of an introductory explanation about the ad break itself	
Presence of advertising literacy components	
Presence of an introductory explanation about the ad break itself	
Presence of advertising literacy components	
Legal information	*Cai & Zhao (2010)*

Privacy policy Terms of usage	
Age limitation	*Paek et al. (2014)*
Age limit suggested Present and age limit enforced (must enter birthdate)	
Parental control	*Henry & Story (2009)*
Parental permission required statement Parental section Parental warning	
Content rating and labelling schemes	*Chen et al.(2013), OECD (2013)*
Content rating Labelling schemes	
Mechanism to contact the firm	*Lascu et al. (2013)*
Forms Email Report a problem Phone	

3.2.4 Procedure

After a pilot test was conducted on three different games to check the indicators and the reliability of the coding, two researchers working independently coded the selected games and advergames on the 72 indicators in the period of 04/08/2014 to 11/08/2014 using a Microsoft Excel spreadsheet (indicator present = 1; indicator absent = 0).

Cohen's kappa coefficient (κ) was run to determine if there was agreement between the two appraisers on whether the indicator was present or not. Cohen's kappa coefficient is a statistic to measure inter-rater reliability for qualitative indicators. There was high agreement between the two appraisers, $\kappa = .998$, $p < .001$.

Before computing Cohen's κ, potential discrepancies arising from the analysis of the games were identified. If the game did not contain an embedded advertisement, relevant indicators were skipped (IF indicator 1=0, GO TO indicator 12 and SKIP from indicator 48 to 59). When the indicator was not applicable, it was coded as 99 (= not applicable). The indicators "genres" of the games and "content rating" were coded numerically and as a free text.

The results of the content analysis are provided in chapter 5.

3.3   Experiment

The main objective of the experiment was to examine the effect of an advergame promoting fruit on children's ad libitum fruit consumption. Previous studies have shown that increasing the availability and priming children with cues of healthier foods can stimulate them to select healthier food (Blanchette & Brug, 2005; Hoffman et al., 2009; Folkvord et al., 2017). A number of studies testing the impact of playing an advergame on subsequent food intake showed that children selected an ate healthier food products after exposure to relevant cues in the advergame (e.g., Pempek & Calvert, 2009; Dias & Agante, 2011). In addition, research suggests that children are significantly more likely to choose from advertised brands than non-advertised brands, which means that advergames may have the potential to influence food product choice (Hernandez & Chapa, 2010). Given the findings from previous studies, and since the consumption of healthy foods such as fruit and vegetables have many health benefits (Rodriguez-Casado, 2016), the promotion of healthier foods via advergames may hold the potential to increase the intake of fruit by children. The proposed experiment therefore tests the effectiveness of an advergame promoting fruit on children's subsequent fruit consumption if no unhealthy snacks are offered after playing the game. The figure below shows the conceptual model underlying the experiment.

Figure 3 Conceptual model
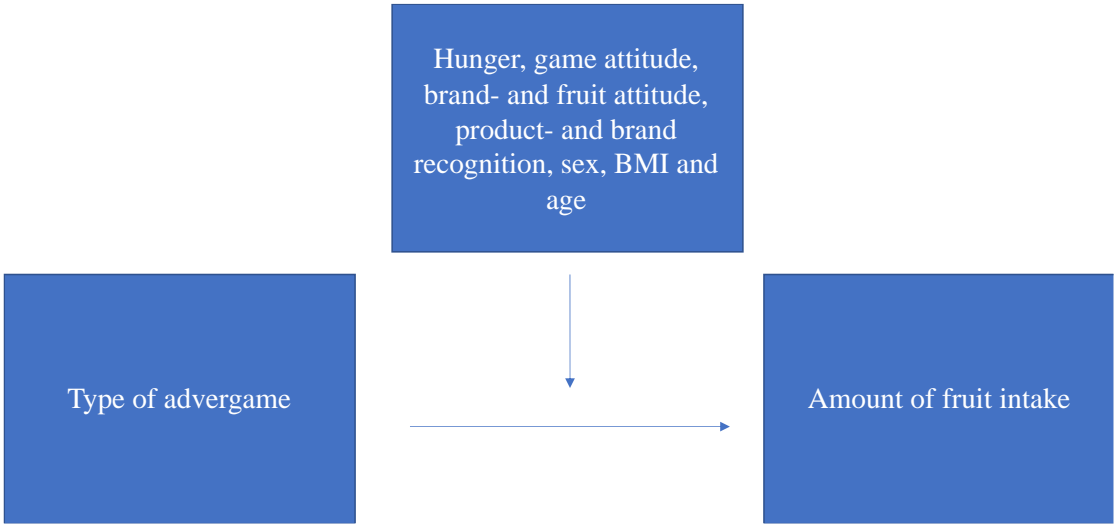
The conceptual model suggests that the type of advergame played affects the amount of fruit consumed after game play, which is moderated by hunger, game attitude, brand and fruit attitude, product and brand recognition, gender, BMI and age.

With this conceptual model in mind, the following hypotheses were proposed:

H4: Children who play an advergame promoting fruit will consume more fruit than (i) children who play an advergame promoting a toy or (ii) children who do not play an advergame in the control condition.

H5: Children who play an advergame promoting fruit will consume more fruit from the advertised brand than (i) the children who play the advergame promoting a toy brand and (ii) the children who do not play an advergame in the control condition.

H6: The effects in H4 and H5 are moderated by hunger, game attitude, brand and fruit attitude, product and brand recognition, gender, BMI and age.

To test the hypotheses, the experiment was carried out and a questionnaire was completed in a subsequent step. Factor and reliability analyses were performed, whereas several variables were recoded prior to the analysis. The overview of all variables can be found in Annex 3 Questionnaire Experiment.

3.3.1 Design and stimulus materials

The experiment was designed with the support of Dr. Frans Folkvord, who was then also working for the Vrije Universiteit Amsterdam. A professional game designer created the advergames (see Figure 4 and Figure 5), which was set up as a memory game. All games were identical, except for the advertised brands and products. The game involved a memory game with 16 cards, whereby the brands appeared on the back of the cards, and the individual products (fruit or toys) appeared on the front of the cards. These products clearly displayed the brand logos. Playing the advergame was the independent variable in this study. The children were randomly assigned to 1 of 3 conditions, which involved playing (1) the fruit advergame (i.e., promoting a popular fruit brand and 8 different fruit, fruit drinks, or cups with fruit from this popular brand); (2) the non-food advergame (i.e., promoting a popular Dutch toy brand and 8 individual toys from this popular toy brand); or (3) no game at all (control condition). The conditions were randomized within schools and the conditions were counterbalanced to start with a different condition every day, so that none of the conditions were tested more in the morning or just before or after the break. The order of conditions was also counterbalanced to avoid any order effects. Screenshots of the advergames are presented in the figures below.

Figure 4 Screenshot of the advergame promoting fruit

Figure 5 A screenshot of the advergame promoting non-fruit products

As it is common for advergames, specific advertisement and game features were integrated into a game to facilitate immersion. Characteristic of advergames, the promotional content was an active game component in the play. Secondly, the game played an unpleasant sound when a child selected a false pair and a pleasant sound when a child selected a correct pair. This was intended to encourage children to perform to the best of their ability. In addition, a digital timer appeared on the top left of the screen, and a time bar appeared in the top centre of the screen to exert time pressure on the children. All children were seated at a different table and were presented two bowls that contained different food snacks (bananas and apples) directly after they played the advergame. The bananas were also shown in the advergame and contained a sticker marking them from the same brand as the advergame.

3.3.2 Procedure

The experiment was executed with the support of a master's student from the Vrije Universiteit Amsterdam, who used part of the data generated for her Master Thesis. Ethical approval for the study was obtained from the committee for ethical concerns in the Faculty of Communication Science at the Vrije Universiteit Amsterdam because the student (R. Fink, MSc) collected data in the Netherlands. The data was collected in the period between April and July 2018. After obtaining consent from the schools to participate, a letter was sent to the parents of the children with detailed information regarding the study. It further included a request for permission that their child could participate in the experiment and inquired whether their child was allergic to any of the test foods. Children who were allergic to the test food were exempted from participating in the experiment.

Of the requests for parental permission for their child to participate in the study, more than 90% agreed. It was emphasized that all the data collected would remain confidential and that children could cease participation at any moment. The children were individually tested at their schools during regular school hours. The experimenter picked up one child at a time from the classroom. The teacher assigned the children (in alphabetical order) to the experimenter.

For those children assigned to the advergame conditions, the researcher brought each child to another classroom or office equipped with a computer running one of the advergames. The researcher read the instructions from the screen, which stated that the child would be playing a memory game for 5 minutes and that they should attempt to finish as many memory games as possible. Further instructions stated that after each game, the time bar would stop, and the final score would appear. The children were exposed to the advergame for 5 minutes, a similar

timeframe used in comparable studies (e.g., Folkvord et al., 2013). It was therefore considered that 5 minutes would be sufficient exposure to food cues in the advergames. To stimulate the motivation of the respondents, a timer ran on the screen and the children heard an annoying sound when they made the wrong choice and a nice sound when they made the right choice.

After reading the instructions for playing, the researcher went through the first questions from the questionnaire and the children started the gameplay. The researcher then left the room. When the five minutes of playing time were over, children advised the researcher that the game had ended. The total score appeared on the screen when the game ended and was noted down by the researcher. While the researcher recorded their scores, the children were seated at different table where bowls of fruit were placed. The researcher told the children that they had a break for 5 minutes and could eat as much as they liked. At this point, the researcher left the room again and returned after five minutes. Then the remaining questions from the questionnaire were read out loud by the researcher who recorded the answers.

For those children assigned to the control condition, each child directly started with the eating part of the experiment. It was reasoned that providing the children with a free task would result in too much variation of activities. Therefore, the children in the control condition were used as a baseline condition to estimate how much children would eat from the bowls containing fruit, but without playing an advergame. Because the children in the control condition did not play an advergame, they spent 5 minutes less in the room. The rest of the experiment was the same for the control group. The researcher placed a glass of water and 2 different pre-weighed bowls containing apples and bananas in front of the children on the table. The brand of the food was visible on all the food bowls. The experimenter read the questions and answer possibilities aloud, and the children gave their answers. The questionnaire contained questions about gender, age, hunger, advertising literacy, brand and product recognition and attitude towards the products and brands. After completing the questionnaire, the height and weight of the respondents was measured.

The children received a stamp as a thank you for participating in the study. The children were asked not to discuss the study with their classmates. The children were then accompanied back to their classrooms, and the researcher invited the next child to participate. After each session, the bowls were weighted in order to calculate the fruit intake of the participant. The researcher refilled and weighed the bowls before the next child entered the room.

3.3.3 Measures

3.3.3.1 Fruit intake

To measure fruit intake after playing the advergame, each child was allowed to eat ad libitum for 5 minutes. For each session, the fruit was weighted per respondents before the start and after the experiment, and the number of grams noted down. The number of grams a child had eaten was recalculated to be used as dependent measure. A professional balance scale was used to estimate to the nearest 0.1g in order to be as accurate as possible. A distinction has been made between intake of banana (Chiquita) and apple (Kanzi), added up to the total fruit intake. The amount of fruit that a child had eaten was calculated as the sum of the kilocalorie intake of bananas and apples.

3.3.3.2 Gender, Age, BMI

The questionnaire included questions inquiring about gender and age of the participants. The BMI was measured as weight (kg) divided by height (m). The weight was measured to the nearest 0.1 kg (without shoes). A child's height was measured according to standard procedures (no shoes) to the nearest 0.5 cm. It was calculated whether the children were underweight, normal weight, overweight, or obese using international cut-off scores.

3.3.3.3 Hunger

Individual differences in hunger were controlled by presenting the children with a visual analogue scale (VAS) to measure the extent to which they felt hungry before the experiment began. Hunger was assessed after the children played the game and ate, in order to avoid that demand characteristics would influence caloric intake and to approach a daily life situation as much as possible. VASs are widely used and are reliable and valid rating scales for measuring subjective experiences related to food intake (Folkvord et al., 2013). The anchors were "not hungry at all" (0.0) and "very hungry" (14.0).

3.3.3.4 Game attitude

Game attitude was measured in the questionnaire using visual analogue scales (VAS) ranging from 0.0 to 14.0. These were questions such as "How much do you like the game?", "How funny do you find the game?", "How boring do you find the game?". The questions were not included in the questionnaire presented in the neutral condition as these respondents did not

play the game. Factor and reliability analyses were performed for the variable game attitude. First, a principal component and a varimax rotation analysis was performed. The Kaiser-Meyer-Olkin test was not significant for the variable game attitude (SME=0.766) and thus showed that the sample was adequate. The Bartlett's test of sphericity was significant, indicating that variables correlated sufficiently. This satisfied the assumptions for the principal component analysis. The first factor for game attitude accounted for 43.1% of the variance, giving an eigenvalue higher than Kaiser's criterion of 1. Based on this data, it was decided to merge these seven variables into one variable called "game attitude" using the average. Subsequently, the reliability analysis was performed.

3.3.3.5 Fruit attitude

The variable fruit attitude was measured in the questionnaire using visual analogue scales (VAS) ranging from 0 to 14. These were questions such as "How much do you like fruit?", "How cool do you find fruit?", "How unappetising do you find fruit?". A principal component and a varimax rotation analysis were carried out. The Kaiser-Meyer-Olkin demonstrated the adequacy of the sample (SME = 0.71), the Bartlett's test of sphericity was significant. This satisfied the assumptions for the principal component analysis. 46.2% of the variance was explained by the first component, giving an eigenvalue higher than Kaiser's criterion of 1. On the basis of this data, it was decided to merge these six variables into one variable called "Fruit attitude" using the average. The reliability analysis showed that the "Fruit Attitude" scale has an acceptable reliability, Cronbach's alpha = 0.74.

3.3.3.6 Brand attitude

The attitude towards the brands was assessed in a similar way as the variable "fruit attitude" on the basis of six different items (nice, stupid, tasty, unappetising, cool, boring) on a VAS-scale in the questionnaire. A principal component and a varimax rotation analysis were performed. The Kaiser-Meyer-Olkin test and the Bartlett's test of sphericity could not be performed for the brand attitude due to a high correlation (determinant = 0). However, the factor analysis for the brand attitude showed that the first component explained 49.9% of the variance, which gives a higher eigenvalue than the Kaiser's criterion of 1. Based on this, it was decided to merge these six questions into one variable called 'Brand attitude', based on the average. The reliability analysis showed that the scale had good reliability with Cronbach's alpha = 0.83.

3.3.3.7 Brand/ product recognition

At the end of the experiment, whether there were differences in terms of recognizing the brands and products that were used in the two advergame versions was investigated. Brand or product recognition was measured by presenting the children with the logos or products from the advergame that they played together with comparable other brands or products that did not appear in the advergame. The children were asked to indicate whether they remembered each brand and product from the advergame. The correct answer was tabulated along with the false responses. False responses were the brands or products that did not appear in the game. No differences were found in brand or product recognition between the advergames.

3.3.3.8 Advertising literacy

The variable advertising literacy was not part of the hypotheses but was included in the additional analyses. Advertising literacy was measured on the basis of various questions. For example, the questions included "Was this game created to make you buy Chiquita?" The questions could be answered with one of four answers (1 = Yes for sure, 2 = Yes, maybe, 3 = I don't think so, 4 = For sure not).

Finally, at the end of the experiment, children were to indicate whether they were aware of the goal of the research, but no child gave the correct answer. The results are provided in chapter 6.

4   Results from the literature review

The majority of studies discuss online marketing to children from a health perspective (41 articles), followed by a marketing perspective (23 articles) and regulation and protective measures (19 articles). Table 10 Review dimensions depicts the categories of the included articles.

Table 10 Review dimensions

Table 10 Systematic Review dimensions	
Dimensions	**Number of articles**
Field	
Health	41
Marketing	23
Regulation and protective measures	19
Methods	
Miscellaneous: Theoretical approaches, discussions	14
Qualitative studies: Content analyses	34
Qualitative Studies: Interviews, focus groups	7
Quantitative studies: Survey	6
Quantitative studies: Experiments and quasi-experiments	22
Artefacts	
Advergames	25
Apps/mobiles	3
Games/Social Networking Sites	10
Internet/websites	30
Other Media	15

A majority of studies used content analyses (34), followed by experimental and quasi-experimental studies (22). Interviews and focus groups were grouped under qualitative studies (7), while surveys were grouped under quantitative studies (6). Theoretical frameworks, discussions or reviews were grouped under "miscellaneous" studies (14). Marketing practices in the Internet/websites are the focus in 30 articles; 25 deal with advergames as a distinct marketing technique; and 15 articles address advertising through other media, often comparing online marketing techniques with traditional advertising formats such as television. Ten sources deal with games and social networking sites and three references cover advertising in apps/mobiles.

In the following sections, a narrative synthesis of the literature along the methodological approaches applied in the studies is provided, starting with literature categorised as miscellaneous, followed by content analyses, qualitative studies, quantitative studies and experimental studies.

4.1 Miscellaneous studies

The studies grouped under the miscellaneous category include discussions, theoretical, and critical review articles on the topic of marketing to children mainly from a perspective of health and regulation and protective measures. Annex 1 Miscellaneous studies shows the summary parameters of the studies reviewed.

The majority of miscellaneous studies discuss online advertising to children from a health perspective, where it becomes apparent that new marketing formats and techniques directed at children may pose particular challenges to children's health because it can trigger behavioural responses that occur outside conscious awareness. A common denominator of the miscellaneous studies is that advertisers are making use of new marketing strategies to target children, which increasingly take place in an online context (Calvert, 2008; Jain, 2010; Linn & Novosat, 2008, Nairn & Fine, 2008, Harris, Brownell & Bargh, 2009). The growth of digital interactive technologies has opened pathways to reach larger audiences of children (Calvert, 2008), and with children's increased use of media technologies, marketers can target them through a range of innovative advertising approaches (Schwartz, Kunkel & Delucia, 2013). Unlike television, where children are exposed to commercials for a limited time interval during a program, digital marketing is not only integrated into media content, but also forms part of social and personal relationships (Montgomery et al., 2012). For example, viral marketing used commonly on social media websites has become increasingly popular. It consists of users sending and forwarding commercial messages to their friends or networks online. This marketing strategy take advantage of young people's motivation to project a desired image and fit in with their friends (Harris, Brownell & Bargh, 2009).

While a majority of the articles compare marketing practices in traditional media with new online formats, advergames have received special attention (Blades, Oates & Li, 2013; Jain, 2010; Thomson, 2011; Montgomery & Chester, 2009; Harris et al., 2009). Alongside the proliferation of online marketing techniques directed at children in the last years, and advergames in particular, concerns have arisen about the potential impacts of these practices on children. Of specific concern is the fact that children often lack proficiency to identify

advertising in branded online environments, a problem that undermines their consumer defences and makes children potentially more vulnerable than any other consumer group to these practices (Blades, Oates & Li, 2013; Jain, 2010). Although advertising is perceived as a nuisance by children (Sandberg, Gidloff & Holmberg, 2011), online marketing techniques, including advergames, manipulate consumer behaviour via implicit attitude change (Nairn & Fine, 2008). According to Nairn & Fine (2008), marketers link products with positive stimuli, which triggers a preference for, or choice of, products advertised through non-conscious, non-rational means. Not only do children lack sufficient cognitive control capacities to resist these forms of implicit persuasion, but even adolescents also lack these skills compared to adults (Folkvord et al., 2016). This is particularly important in light of the types of products frequently marketed in online environments. The vast majority of advertised products comprise calorie-dense, nutrient-poor food products (Harris et al., 2009; Linn & Novosat, 2008; Schwartz, Kunkel & Delucia, 2013; Montgomery et al., 2012).

4.2   Content Analyses

The majority of the studies using a content analysis design discuss online marketing from a health perspective and articulate concerns that children are easily misled about the commercial intent of entertainment content with potentially negative consequences for children's health. While one article reports on online marketing to children featuring a variety of different products, such as cosmetics and beauty products (Slater et al., 2012), most articles discuss online marketing of food or beverage products that are calorie-dense and nutrient-poor. Annex 1 Content Analyses shows the summary parameters of the content analyses studies reviewed.

These studies report that marketing material is often integrated in the overall content of websites or the promotion of a product takes place through fun experience and activity, thereby blurring the boundaries between entertainment and advertising content (Alvy & Calvert, 2008; An & Kang, 2014; Bucy, Kim & Park, 2011; Cai & Zhao, 2010; 2013; Hofmeister-Toth & Nagy, 2011; Jones, Wiese & Fabrianesi, 2008; Kervin, Jones & Mantei, 2012; Lee et al., 2009, Zhang, Sung & Lee, 2010). Researchers and practitioners appear highly interested in the marketing potential of branded entertainment as it may boost brand awareness and build strong consumer relationships with the promoted brands. It is suggested that the ubiquity of marketing content in media and the seamless integration of commercial messages into entertaining content makes online advertising potentially more effective than advertising on television (Alvy & Calvert, 2008; Cheyne et al., 2013; Hofmeister-Tóth & Nagy, 2011; Dahl, Eagle & Báez, 2009;

Sandberg, 2011). Children are exposed to marketing through various media and techniques, regardless of their preferred platform (Alvy & Calvert, 2008), and brand incentives are more elaborate than those used in TV commercials due to the Internet's interactive character (Sandberg, 2011). Beyond the structural similarity between advertising and entertainment content, a large number of advertising content on children's websites use prompt words and enticement to draw children in (Cai, 2008; Cai & Zhao, 2013) use prompts for repeated and prolonged visits (Brady et al., 2010) or other engagement features that make the advertisement a form of entertainment of its own right.

The majority of articles identified advergames as the most prominent marketing technique adopted by advertisers to integrate brands in entertainment content. Other marketing strategies include videos, site registration options, and viral marketing (Cheyne et al., 2013), free downloads (Culp, Bell & Cassady, 2010), competition, prizes & giveaways (Freeman et al. (2014), as well as graphical features and imagery particularly appealing to younger children (Alvy & Calvert, 2008; Bucy, Kim & Park, 2011; Hofmeister-Tóth & Nagy, 2011). Children are regarded as the most important target group of advergames (An & Kang, 2013; Hofmeister-Tóth & Nagy, 2011). Advertisers provide advergames on their websites so that children have a joyful time and spend more time on the site while being exposed to brand messages (Lee et al., 2009). The highly entertaining and motivating nature of advergames is assumed to affect children's cognitive system in such a way that brand recognition is reinforced and positive associations towards products are established (Culp, Bell & Cassady, 2010). Fears are raised that the result of this exposure may negatively impact children's natural development (Hofmeister-Tóth & Nagy, 2011).

Only few child-targeted websites make a distinction between games and advergames which reinforces the problems that prevail in terms of visibility, transparency and lack of explanation about the commercial intent of advergames (An & Kang, 2013). While Paek et al. (2014) found that 71% of the advergames reaching children included an ad break in form of a disclaimer informing that the content is advertising, they found that presenting ad breaks actually increases the odds of food advergames reaching children.

Advergames on food companies' websites tend to particularly feature products high in calories and low in nutritional value (An & Kang, 2014; 2013; Brady et al., 2010; Cheyne et al., 2013; Cicchrillo & Lin, 2011; Culp, Bell & Cassady, 2010; Flowers, Lustyik & Gulýas, 2010; Freeman et al., 2014; Henry & Story, 2009; Kelly et al., 2008; Potvin Kent et al., 2013; Lee et al., 2009; Paek et al., 2014; Weatherspoon et al., 2013). Children may therefore adopt and get

used to a potentially unhealthy nutritional logic through play (Thomson, 2010), or find their susceptibility to advertising otherwise exploited (Cheyne et al., 2013, Lee et al., 2009; Weatherspoon et al., 2013). Furthermore, very few food advergames educate children about nutritional and health issues (Lee et al., 2009, Paek et al., 2014) or attempt to steer children towards healthier lifestyles (While Dahl, Eagle & Báez, 2009). Ciccrillo & Lin (2011) find that a majority of non-profit advergames focus on health-related messages regarding food intake, while for-profit advergames offer little or no nutritional information in the advergames.

A rather counterintuitive finding related to marketing messages delivered through advergames promoting food has been derived by Quilliam et al. (2011). In their study examining self-regulatory practices by the food industry and the level of consumer protection provided in their marketing practices, it was found that advergames by food companies, who committed themselves to voluntary self-regulatory pledges were more likely to include greater proportions of unhealthy foods compared to healthy foods than advergames sponsored by companies who did not sign voluntary pledges. Companies that did not sign voluntary pledges in fact incorporated three times as many healthy foods in their advergames. These inconsistencies between food industry's expressed intention and actual behaviour shows that voluntary pledges related to the marketing of food products are often are often designed as "*attempts to deflect attention and quiet industry's critics*" (Quilliam et al., 2011, p. 244).

Marketers are also highly active in providing branded entertainment for food and beverage products in social networking sites such as Facebook (Freeman et al., 2014; Jernigan & Rushman, 2014; Winpenny, Marteau & Nolte, 2013; Zhang, Sung & Lee, 2010), YouTube and other social networking sites (Griffiths & Casswell, 2010). The interactive nature of these marketing formats makes it particularly receptive to young consumers. A rather contested issue remains children's exposure content promoting alcoholic beverages in these social networking sites. While Facebook pages cannot be accessed by underage users due to the systematic use of age restrictions, gaps remain in ensuring underage access in other social networking sites (Winpenny, Marteau & Nolte, 2013). Griffiths & Casswell (2010) even speak of "*intoxigenic social identities*" as well as "*intoxigenic digital spaces*" (p. 528) in social platforms that contribute to the normalisation of unhealthy consumption habits such as consumption of alcohol.

Only a few studies conducted cross-country comparisons of online marketing directed at children to compare exposure to online food marketing strategies and government responses. One of them has been conducted by Flowers, Lustyik & Gulyás (2010), who studied junk food advergames in the UK, a country with the highest Internet usage by children and the most

developed online advertising market in Europe, and Hungary, an emerging market, where young people have less access to the Internet, but nevertheless constitutes an important entry point for food marketers. It was found that advergames in both the UK and Hungary shared many similarities, and the most noteworthy differences were the application of latest technological features, the use of branded characters and educational value, which was clearly more developed for the UK. No cross-country differences in terms of food products advertised in advergames were found, and both government approaches for the UK and Hungary described as reluctant to impose more stringent regulation to regulate new media (Flowers, Lustyik & Gulyás, 2010). Significant differences across France, Spain and the US were identified in terms of food products marketed to children online (Lascu et al., 2013). The authors attribute this to the different policy environments of the three countries, which reflects companies' understanding of consumers in each of the countries and the respective enforcements of legal restrictions related to online communications targeting children.

For example, the websites of French food companies were found to put greater emphasis on nutrition-related features and features that allow interaction compared to Spanish and American food company websites. Food company websites in the US and Spain in turn placed greater emphasis on games-related, rewards-related, attributes-related and brand-related features compared to food company websites in France (Lascu et al., 2013). While it is suggested that online media in general is much less monitored than conventional media (Lascu et al., 2013; Flowers, Lustyik & Gulyás, 2010), only two studies indicate that improvements have been made in terms of advertisement labelling (Cai & Zhao, 2013), and the hosting of advertisement on not-for-profit websites (Cai, 2008), which the authors interpret as efforts to limit children's exposure to advertising at least to some extent in the past years.

4.3   Qualitative studies

The studies that use a qualitative method address online marketing either from a health (Brady et al., 2008; Metha et al., 2014; Owen et al., 2012; Snyder, Henderson & Beale, 2011) or regulation and protective measures perspective (Martinez, Jarlbro & Sandberg, 2013; Spliteri Cornish, 2014; Nairn, 2008). Articles from a health perspective explore the general understanding and perceptions of online marketing by parents and children, but also its effect on children. Articles from the perspective of regulation and protective measures predominantly provide insights into how the impact of online marketing on children could be mediated according to the view of children and/or parents. Both children and parents are found to share

a number of concerns about the impact of online advertising. Annex 1 Qualitative studies shows the summary parameters of the qualitative studies reviewed.

Qualitative evidence suggest that children have rather ambivalent or negative feelings towards online advertising in general (Martinéz, Jarlbro & Sandberg, 2013; Nairn, 2008, Snyder, Henderson & Beale, 2011). Children indicate that they feel irritated by the frequency of advertising on websites (Martinéz, Jarlbro & Sandberg, 2013), perceive advertising on websites as unfair and deceptive, and report being upset by intimate dating material that they encounter involuntarily (Nairn, 2008). Children are found to have a better understanding of traditional advertising compared to non-traditional advertising, which makes online advertising more effective (Spliteri-Cornish, 2014). For example, children report to make frequent use of advertisements as sources of entertainment and information, or social interaction (Snyder, Henderson & Beale, 2011).

Studies frequently reported that most children lack understanding and awareness of online persuasive techniques (Snyder, Henderson & Beale, 2011; Brady et al., 2008; Owen et al., 2012). This persuasion knowledge is found to increase only successively with age. Particularly younger children appear to have only limited knowledge of the persuasive intent behind novel marketing practices such as advergames, and therefore lack cognitive skills to evaluate them critically (Owen et al., 2012). For example, it is suggested that children of up to 16 years of age do not understand the true persuasive intention of advergames (Nairn, 2008). Children themselves also become brand advocates who distribute commercial messages to others within their social networks and thereby increase brand awareness for food, drinks, and candy products among this target group (Brady et al., 2008). It is suggested that viral marketing practices like these appear to be spontaneous and try to convey authenticity in order to avoid cynicisms that confront other forms of hidden marketing (Snyder, Henderson & Beale, 2011). Through their engagement in viral marketing, however, children appear to absorb the commercial message and lose judgment about the commercial purpose (Snyder, Henderson & Beale, 2011).

Of primary concern for parents in turn is the promotion of energy-dense and nutrient-poor foods (Metha et al., 2014), but also the large number of advertisements deemed unsuitable for children, such as for loans and gambling (Nairn, 2008). Parents tend to underestimate the effectiveness of online advertising and are often unable to appreciate subtle marketing techniques, such as advergames, in their persuasive capacity (Spliteri Cornish, 2014). For example, the interviews with parents conducted by Spliteri-Cornish (2014) showed that parents' beliefs and opinions fluctuated when they considered other people's children as opposed by to their own: when

informed about the fact that children are likely to want the unhealthy food products advertised in online advertising, they insisted that this would not be the case for their own children.

Parent's ability to protect or educate their children about the persuasive intent of sophisticated strategies that go beyond conventional advertising is considered rather low (Snyder, Henderson & Beale, 2011). Children in turn, adopt a number of avoidance tactics to deal with unwanted advertisements (Martinéz, Jarlbro & Sandberg, 2013). Especially when advertisements are shown before online games, children look for another engagement or turn to other media, such as television to avoid exposure to commercial content.

A number of measures are proposed in the literature to mediate the impacts of online advertising, ranging from educative responses to develop critical literacy skills among children (Snyder, Henderson & Beale, 2011), to increased parent's awareness and involvement (Spliteri Cornish, 2014), and more stringent legal regulations (Brady et al., 2008, Metha et al., 2014).

4.4 Quantitative studies

A majority of articles using a quantitative (survey) design discuss online (and mobile) marketing from a marketing perspective, often with the objective of identifying consumer attitudes towards marketing practices. Annex 1 Quantitative studies shows the summary parameters of the studies using a survey design reviewed. Among these, parent's attitudes (Evans, Carlson & Hoy, 2013) and children's attitudes (Shin, Huh & Faber, 2012) towards online advertising are explored, and two studies focus on teenager's attitudes towards mobile advertising strategies (Martí-Parreño et al., 2013; Okazaki, 2009). Two studies address online marketing from the perspective of regulation and protective measures, analysing parent's mediation strategies of their children's online activities (Martí-Parreño et al., 2013) and the policy environment of food marketing in different countries (Hawkes & Lobstein, 2011). One study (Pettigrew et al., 2013) analyses the impact of television and Internet food advertising on parents and children from a health perspective. The same study reveals an equal influence of non-traditional and traditional marketing communication techniques on parents and children. Participants in the survey from both groups evaluated products more favourably and had a greater desire to consume products after a single exposure to both television and online advertisement (Pettigrew et al., 2013).

Findings by Evans, Carlson & Hoy (2013) show that parents are often lack knowledge about advergames as a new form of advertising to children. However, once confronted with

background information about the commercial nature of this technique, parents show an overall negative attitude towards advergames. This attitude varies according to parenting style in its degree of negativity (Evans, Carlson & Hoy, 2013).

It is suggested that for children, a high level of scepticism towards advertisement as a cognitive defence is likely to trigger a more negative attitude towards online advertising, with the result that may make "wiser" decisions when exposed to various forms of brand promotions on the Internet, in the sense of engaging in potentially risky behaviours such as disclosing information online (Shin, Huh & Faber, 2012). For mobile marketing, it is found that teenagers' attitude towards marketing messages can be improved through message personalization, content relevance and inclusion of entertainment features (Martí-Parreño et al., 2013), while informal communication in social networks regarding characteristics of a product may have persuasive effects even when the information recipients are not motivated or interested in the content of marketing messages (Okazaki, 2009). Parents are attributed an important mediating role of risky online behaviour of their children, but results are contested as to the extent to which their mediation efforts are effective in protecting their children from marketing efforts in online environments. While parental mediation involving communication with children is assumed to reduce advertising effects on children, it appears less useful when parents are themselves vulnerable to advertising and underestimate its effects (Pettigrew et al., 2013). This appears to be the case for advergames (Evans, Carlson & Hoy, 2013).

Although the findings of the survey by Hawkes & Lobstein (2011) indicate that the policy environment around online food advertisement has made significant movements towards greater restriction with regard to promotional marketing to children, the degree of restrictions differs considerably across countries. The lack of a uniform policy environment in turn calls for increased government or self-regulatory initiatives designed for parents (Evans, Carlson & Hoy, 2013).

4.5   Experimental studies

The results reveal that a majority of the studies using an experimental design focused on advergames as a persuasive online marketing technique affecting children's behaviour. All but four experiments were conducted in school settings. One study was conducted in a laboratory (Bailey, Wise & Bolls, 2009), one in a research centre (Harris et al., 2012) and two experiments were conducted online (Redondo, 2012; Van Reijmersdal et al., 2010). Annex 1 Experimental studies shows the summary parameters of the studies using a survey design reviewed.

Several articles tested children's persuasion knowledge (e.g., An & Stern, 2011; Panic, Cauberghe & De Pelsmaker, 2013; Rifon et al., 2014; Rozendaal et al., 2013; Verhellen et al., 2014; Waiguny, Nelson & Terlutter, 2014). Three articles compare children's persuasion knowledge for traditional and new advertising formats (Panic, Cauberghe & De Pelsmaker, 2013; Verhellen et al., 2014; Waiguny, Nelson & Terlutter, 2014). Two studies tested protective measures such as ad breaks in order to reduce the susceptibility to embedded marketing attempts (An & Stern, 2011; Miyazaki, Stanaland, Lwin, 2009). The impact of online advertising on children has been measured through a variety of different response variables, including cognitive, affective and behavioural measures. Annex 1 Experimental studies shows the summary parameters of the experimental studies reviewed.

Cognitive measures include brand recall (e.g., An & Stern, 2011; Hang & Auty, 2011; Hang, 2012; Rifon et al., 2014; Van Reijmersdal, Rozendaal & Buijzen, 2012; Verhellen et al., 2014) which refers to the ability to remember the brand or product after being exposed to advertisement, and recognition (Ali et al., 2009; Hernandez & Chapa, 2010; Van Reijmersdal, Rozendaal & Buijzen, 2012). Affective measures as response variables to advertising exposure include attitude towards the brands (e.g., Redondo, 2012; Rifon et al., 2014; Verhellen et al., 2014; Waiguny, Nelson & Terlutter, 2012), and attitude towards the advertising format (e.g., Bailey, Wise & Bolls, 2009; Hernandez & Chapa, 2010; Pempek & Calvert, 2009; Panic, Cauberghe & De Pelsmaker, 2013).

In terms of behavioural measures, studies include responses such as purchase request (e.g., Panic, Cauberghe & De Pelsmaker, 2013; Rifon et al., 2014) and pester intentions, the latter referring to persistent demands by children to purchase the advertised product or brand to parents or caregivers (e.g., Waiguny, Terlutter & Zaglia, 2011; Waiguny, Nelson & Terlutter, 2014), brand choice (e.g., An & Stern, 2011; Hang & Auty, 2011; Hang, 2012), and food intake (e.g., Folkvord et al., 2016; Harris et al., 2012; Hernandez & Chapa, 2010).

Two studies collect physiological measures, such as skin conductance levels to measure sympathetic arousal during game play (Bailey, Wise & Bolls, 2009), task accuracy and visual processing to assess the impact of different advert saliency conditions on children's attentional behaviour during task-oriented Internet use (Holmberg, Sandberg & Holmqvist, 2014).

4.5.1 Cognitive responses

A number of studies reports on the influence on children's brand recall and recognition for brand placements in online games (e.g., Van Reijmersdal et al., 2010) and advergames (e.g., An & Stern, 2011; Hernandez & Chapa, 2010; Rifon, et al., 2014). It is suggested that brand recall levels are higher for brands advertised via an advergame compared to other marketing methods, which is due to the engagement with a brand in a game (Van Reijmersdal et al., 2010), the level of brand integration and brand prominence (Rifon et al., 2014; Van Reijmersdal, Rozendaal & Buijzen, 2012), the outcome of higher concentration levels and more active experience (Waiguny, Terlutter & Zaglia, 2011). Higher brand recall levels are also found to be related to positive attitude towards game that is reflected on the featured product (Hernandez & Chapa, 2010). Van Reijmersdal, Rozendaal & Buijzen (2012) demonstrate that prominence leads to cognitive processing, with the result that brand memory is influenced positively. Thus, the more prominent the brand is placed within the advergame in terms of visibility and centrality to game play, the higher is children's brand recall and recognition. The study by Rifon et al. (2014) shows that brand recognition is a not only a function of brand integration in the game, but also a function of age.

Challenging Van Reijmersdal, Rozendaal & Buijzen's results, the experiment with children conducted by Rifon et al. (2014) demonstrates that older children in the sample exhibited poorer recognition accuracy when the brand is integrated into gameplay as compared to conditions where the brand is displayed less prominently. It is suggested that through integration of brand or product cues, children may become habituated to the presence and increase their focus on the game task, rather than the brand or the products. The presence of brand in the background in turn may be perceived as intrusive and thereby trigger a momentary focus of attention with the result of an increased brand recognition rate. Other studies report that children appear to experience difficulty to recall a brand when exposed to promotional content in an advergame (Verhellen et al., 2014) or a video game (Hang, 2012). It is suggested that children's difficulty to recall a brand in an advergame is due to the fact that children engage actively with the branded content when playing the game (An & Stern, 2011), rather than being exposed passively to brand identifiers as occurs in traditional advertising formats, such as TV. However, even if children do not consciously process the advertisement, they may nevertheless be influenced by it (Hang & Auty, 2011; Hang, 2012).

More than 80% of the children in the experiment conducted by Hang (2012) failed to recall the brand placement in a video game. However, exposure to the brand placement made children in

this experiment more likely to choose the advertised brand after game play, which is a sign of subliminal effects. An & Stern (2011) demonstrate in an experiment with children that advertisement breaks (ad breaks) can effectively mitigate cognitive responses. Those children who played an advergame with different formats of an advertisement break were significantly less likely to recall the advertised brand.

4.5.2 Affective responses

Children in general tend to share positive attitudes towards games and online games (Pempek & Calvert, 2009; Rifon et al., 2014; Bailey, Wise & Bolls, 2009; Van Reijmersdal et al., 2010). Experimental results show that playing an advergame can lead to a transfer of positive affect from the game towards the advertised brand with the result of enhanced brand attitudes (e.g., Panic, Cauberghe & De Pelsmaker, 2013; Rifon et al., 2014; Waiguny, Nelson & Terlutter, 2012; Redondo, 2012).

The positive influence on brand attitude stems from the process of interaction and active gameplay with a brand compared to the passive watching of commercial content (Rifon et al., 2014; Verhellen et al., 2014). According to Redondo (2012), the transfer of positive affect from the game to the brand only occurs if it is not inhibited by a negative reaction towards the brand placement in the advergames. A prominent placement of a brand within an advergame can arouse negative reactions towards the brand as the user may feel annoyed by it. A complete, subtle integration of a brand into the entertaining experience, however, facilitates a positive affect transfer. The enjoyable experience related to advergames as an advertising medium (Bailey, Wise & Bolls, 2009; Waiguny, Terlutter & Zaglia, 2011; Van Reimerdal et al., 2010) is held responsible for the absence of a negative reaction towards the brand placement itself (Redondo, 2012).

For example, the findings by Waiguny, Nelson & Terlutter (2012) show that attitude toward the brand is related to the level of absorption in the game, which triggers a pleasurable experience that is transferred to the embedded brand. They find that attitude towards the brand promoted in an advergame is lowest for under-challenged children and highest for children who are in a state of flow when playing the advergame, hence, neither over-challenged or under-challenged. This suggests that children who are in a balance between challenge and skills enter a flow-like state in which they experience fluency and pleasure. This ultimately results in a transfer of this positive attitude to the brand or product embedded in the advergame. From a marketing perspective, increased brand attitude is clearly desirable; from the perspective of

health and child protection, enhanced brand attitude may be problematic if this leads to behavioural responses such as actual intake of the advertised product.

4.5.3   Behavioural responses

Experimental results show that exposure to embedded advertising in advergames influences children's behavioural responses in terms of brand choice (e.g., Hang, 2012; Van Reijmersdal et al., 2010), purchase requests (e.g., Panic, Cauberghe & De Pelsmaker, 2013; Rifon et al., 2014) and pester intentions (Waiguny, Terlutter & Zaglia, 2011; Waiguny, Nelson & Terlutter, 2014). Food-branded advergames are also found to directly influence children's consumption behaviour (e.g., Dias & Agante, 2011; Folkvord et al., 2013; Harris et al., 2012; Hernandez & Chapa, 2010; Pempek & Calvert, 2009; Waiguny, Terlutter and Zaglia, 2011).

A number of studies indicate that children select and consume the food products that are advertised in advergames, irrespective of whether they are healthy or unhealthy (e.g., Dias & Agante, 2011; Hernandez & Chapa, 2010; Pempek & Calvert, 2009).

Hernandez & Chapa (2010) find that the promotion of snack brands in advergames can influence both memory and food product choice. Results of their experiment with 128 adolescents aged between 10 to 15 years indicate that children exposed to advergames were significantly more likely to choose from promoted snack brands than products not promoted in the advergame.

As Pempek & Calvert (2009) show, when an advergame promoted healthy food and beverage products, children selected and consumed snacks of better nutritional quality. By the same token, they were found to consume more unhealthy food products if these were promoted in the advergames. Similar results have been found by Dias & Agante (2011). Children exposed to the less healthy version of the advergame selected nutrient-poor snacks more frequently. Preference for healthy products was higher for those children who played the healthy version of the advergame. In the experiment conducted by Harris et al. (2012), children who played an advergame promoting healthy food consumed 50% more healthy food compared to children who played an advergame promoting an unhealthy product. However, children in the unhealthy advergames condition consumed most unhealthy food. Therefore, it is suggested that playing food-branded advergames affects the amount of both healthy and unhealthy snack foods consumed by children. These results support the belief that the persuasive effects evoked by advergames could be used to promote healthier food and beverage products through advergames as children appear to select and consume those products promoted in the

advergames. However, not all experimental results come to the same conclusion, which is why the potential of advergame to increase healthier food intake remains up to now inconclusive.

While Harris et al. (2012) reach the conclusion that advergames do not increase generalized snacking behaviours, but rather trigger children to select unhealthy or healthy products as promoted in advergames, Folkvord et al. (2013) demonstrated that exposure to food-related advergames does result in greater energy-dense caloric intake rather than product-type related food intake. More concretely, the results of the experiment conducted with 270 children aged 8 to 10 years showed that children playing an advergame promoting fruit consumed more energy-dense food rather than fruit after playing an advergame promoting fruit. Thus, the results derived by Folkvord et al. (2013) challenge the premise that advergames can be used to stimulate healthy food intake as proposed in other studies (e.g., Pempek & Calvert, 2009; Dias & Agante, 2011).

The inconsistencies across the findings of these studies indicate that the effectiveness of advergames to promote healthy food remains contested, which renders further investigation necessary.

5 Results from the content analysis of popular online games and advergames

5.1 Results by dimension

Advertising in online games can take place in various shapes and forms. The literature distinguishes broadly between in-game advertising, advertising in social network games and advergames (Terlutter & Capella, 2013) which distinguishes in between stimulus characteristics of the game and the featured advertising. In-game advertising refers to the inclusion of products or brands within a game, while advertising in social network games refers to the placement of brands or products in digital games that are played via major social networks such as Facebook. Advergames include messages, logos, and trade characters as interactive features, and are typically designed exclusively to promote a product. In the following, the results from the content analysis of the purposive sample of popular online games and advergames are presented. Relevant dimensions recording particular characteristics and techniques applied in online games were distinguished as advertisement features, game features, user engagement features and protective measures. The first dimension, "advertisement features", includes indicators that describe in more detail the type of advertisement used, the advertisement attributes, as well as the type of embeddedness and saliency. The second dimension, "game features", includes indicators that refer to relevant game attributes, themes and revenue models used within games. Indicators grouped under the dimension "user engagement" includes features related to social media presence and community elements, viral elements or prompts to engage users. The last dimension, "protective measures", relates to indicators identified within games that serve a protective function, including ad breaks, parental control features or legal information. Annex 2 Data Collection Content Analysis provides a full summary of the results for the online games and advergames.

5.1.1 Advertisement features

With regard to type of advertisement, less than half of the game sample from iTunes and Google contained embedded advertisements, and embedded advertisement was even less frequent in Facebook games, while it was present in all of the advergames. As regards contextual advertisements, all games sampled from Facebook and all advergames contained this form of advertisement, but contextual ads were not frequently present in the sampled games from Google Play.

About 33% of the games from iTunes and Google Play depicted the picture of a product within the game. About 17% of the games on Facebook depicted a product picture, while this was the case for 86% of the advergames. In about 42% of the games from iTunes and Google Play a logo or product symbol was depicted, while it was present in about 17% of the games on Facebook. In all advergames a logo or product symbol was present. In 33% of the games from iTunes and Google Play a link for product information was provided, while only about 17% of the games from Facebook contained a link. A link for product information was provided to users in 71% of the advergames.

Contextual ads were found in all Facebook games (100%), but only in about 8% of the sampled games from the other two platforms. None of the games under analysis include embedded advertisement in the form of sponsorship or post-game advertisement.

The most frequently identified types of embedded advertisement found in the advergames under analysis were in the form of interactive components typical for advergames (100%) and product placement (71%). Inter-game advertisement was present in 25% of the games from iTunes and Google Play, but none of the games analysed contained embedded advertisement qualified as sponsorship. In about 17% of the games from iTunes, embedded advertisement occurred as a pre-game advertisement. In none of the games from Google Play this type of embedded advertisement was identified. In one advergame, embedded advertisement was also present in the form of pre-game advertisement. In 25% of the games from iTunes and Google Play, embedded advertisement was present as Inter-game advertisement. Inter-game advertisement was not present in any of the games from the Facebook Platform or in any advergame. In addition, embedded advertisement designated as post-game advertisement was not present in any of the sampled games and advergames. Product placement was present in about 17% of the games from iTunes, Google Play and Facebook, respectively.

5.1.2 Game features

All the games sampled from the different platforms fall into distinct genres, and most of them can be considered casual games. As regards distinct attributes of Facebook games, all of the sample gamed included purchase requirements for moving to a higher level in the game, inducement to extend game play and game personalization options. For play themes, the games from the three platforms and the advergames under study exhibited a range of different game features. The main revenue model for games from the three platforms relates to in-app purchases (83%), while for advergames, the main revenue model included the promotion of

digital goods (100%). Freemium (free-to-premium) and the resale of data collected via app use was not identified as revenue model in any of the games and advergames under study.

In 75% of the sampled games from iTunes and Google Play, as well as all of the games on Facebook, purchases were required in order to move to a higher level in the game. This attribute was not present in any of the advergames. In about 67% of the games in iTunes and Google Play, and in all games from Facebook, inducements to extend gameplay were present. In about 71% of the advergames, inducements to extend user's gameplay were identified. Game personalization options were provided in about 41% of the sampled games from iTunes and Google Play. All Facebook games provide this option, while it was provided in about 14% of the advergames.

In only about 8% of the games across the three platforms, activities that contribute to learning and provide educational value to users were identified. In about 29% of the sampled advergames, this educational element was found present. In none of the sampled games from in any of the three platforms, activities that motivate users to learn and read more about the brand or its products/services were identified as play theme. In about 29% of the advergames, this play theme was identified. In only about 8% of the sampled games from any of the three platforms, activities that help users pit their knowledge, skill, beauty, or any other type of competition against others were identified. None of the advergames under study shared this play theme. In all but one game from the iTunes platform, activities in which winner(s) are or will be clearly announced were identified. All sampled Facebook games presented this play theme, while none of the advergames and none of the games provided in Google Play presented this theme. In about 83% of the games sampled from iTunes and Google Play, and in all Facebook games, play themes included activities in which scoring more points, being faster, gaining more buddies, or having more contributions is important to users. This play theme was also present also in about 71% of the sampled advergames.

In all but one of the sampled games and advergames, activities which encourage users to perform to the best of their ability were present. The exception was one game in Google Play, which did not present this play theme. In about 33% of the games in iTunes and Google Play, activities that attempt to elicit imagery and creativity from users were identified as play theme. In none of the sampled games from Facebook and in none of the advergames this play theme was present. Activities that offer a sense of escape or adventure were identified in about 28% of the games from in the three platforms iTunes, Google Play and Facebook. In none of the advergames this play theme is identified.

In 25% of the sampled games from iTunes and Google Play, activities that provide an opportunity to users to experience an imagery life were present. In none of the Facebook games and none of the advergames these activities were identified. In 25% of the games from iTunes and Google Play activities that contain beauty, objects, or goals to be dreamed of or fantasized about are identified as play theme. In Facebook, this play theme is present in 17% of the sampled games. In none of the advergames this play theme was present. About 75% of the sampled games from iTunes and Google Play, and all Facebook games, presented activities that require users' full concentration and engrossing in order to have a joyful experience as play theme. In 43% of the advergames this play theme was identified.

In about 33% of the games from the three platforms iTunes, Google Play and Facebook, activities that have the highest control in users' hands and leader direct guidance or rules to follow. For advergames, these were identified in about 29% of the games under study. Only about 6% of the sampled games analysed from the three platforms included activities that involve the formation of interest-groups or community with a specific group name. In none of the advergames this play theme was present.

In about 33% of the games from iTunes and Google Play, paid downloads were identified as revenue model. This revenue model was not present in any of the games from Facebook. In addition, about 50% of the sampled games provided in iTunes and Google Play, in-app advertising is identified as revenue model, while in-app advertising was identified in only about 17% of the Facebook games. In-app purchases were present in about 75% of the sampled games from iTunes and Google Play, and in all Facebook games. The promotion of non-digital goods was present in only about 17% of the sampled games from iTunes, Google Play and Facebook, while it was identified as the revenue model for all of the sampled advergames. Freemium and the resale of data collected via app use was not identified in any of the sampled games or advergames as features.

5.1.3 User engagement features

In most of the games, user engagement through social media takes place via the Facebook. In only about 22% of the sampled games on the three platforms users have to register or sign-in as members in order to play, which means that most games are accessible to any user. Viral elements were particularly prevalent in Facebook games, so as are prompts for repeat or prolonged visits and prompts for buying virtual goods in games. In advergames, user engagement dimensions were generally less present than in games from the three platforms,

with the exception of community dimensions such as registering or member sign-in and the use of prompts for buying goods.

In only about 8% of the games from iTunes and Google Play, user engagement through social media takes place via YouTube, while this social media was used in about 50% of the games analysed from Facebook. None of the advergames included YouTube as a user engagement component. In about 67% of the games analysed from iTunes and Google Play, user engagement with social media is via Facebook. Naturally, this social media was used in all games on Facebook. In 43% of the advergames, user engagement took place via Facebook. In about 50% all games analysed from the three platforms Twitter was used for user engagement. For Facebook, this holds for even 67% of the games. For advergames, Twitter was identified as social media component for user engagement in about 29% of the advergames. In none of the games analysed from iTunes and Google Play, user engagement took place through other social media. In half of the games on Facebook, user engagement through social media took place via Instagram, and 29% of the advergames, user engagement was via Android/ iPhone or Google+.

In about 33% of the games from iTunes and Google Play, engagement of users took place via registration or account creation. In none of the Facebook games this sub-dimension was identified. In 43% of the advergames, engagement of users was via registration or account creation. In about 33% of the games from iTunes and Google Play, engagement of users took place via member sign-in. This community feature has not been identified in any of the Facebook games. In 57% of the advergames, users have to sign-in as members in order to play.

In about 50% of the games analysed from iTunes and Google Play, viral elements in the form of messages passed on via social networks were present. For Facebook games, this was the case for 83% of the games of this platform. For advergames, messages passed on via social networks as viral element was identified in 29% of the sample. Viral elements in the form of sending an email greeting to a friend was identified in all Facebook games, but only in 8% from the other two platforms and in 14% of the advergames. Inviting a friend to play or join the website was present in all Facebook games, but only in 8% of the games from the other two platforms, and in 29% of the advergames.

In all Facebook games, prompts for repeat visits and prompts for prolonged visits were present in order to engage users. For games from iTunes and Google Play, these prompts were identified in about 25% of the games. In only 14% of the advergames, prompts for repeat visits were included, while prompts for prolonged visits were present in 29% of the advergames. Prompts

for buying virtual goods were present in about 50% of the games from iTunes and Google Play. All Facebook games included these types of prompts, but none of the advergames included prompts for buying virtual goods. None of the games from the three platforms included prompts for buying (non-virtual) goods, these prompts were identified in 29% of the advergames.

5.1.4 Protective measures

As regards protective measures, none of the sampled games from the platforms included ad breaks/ ad alerts, while they were commonly used in more than half of the advergames before, during or after loading. Legal information, age limit suggestion and content rating were frequently present in games from the three platforms, and a majority of these games further provide mechanisms to contact the firm. The most frequent protective measures identified in advergames include the provision of legal information, mechanisms to contact the form and the inclusion of ad breaks/ad alerts. Ad breaks/ ad alerts included only before game loads were present in only one 14% of the advergames, while 57% of the advergames included an ad break/ ad alert before, during or after loading. None of the advergames containing an ad break/ ad alert used a one-sentence ad break, multiple-sentence ad break, an icon or a combination of these. In terms of content, none of the ad breaks included in the advergames applied an introductory explanation about the ad break itself or advertising literacy components present.

All Facebook games provided a link to the privacy policy and terms of usage. In addition, 83% of the sampled games from iTunes and Google Play included a link to the privacy policy, and 86% of the advergames provided this link. As regards a link to the terms of usage, 71% of the games from iTunes included this measure and about 50% the games from Google Play provide this link. For advergames, a link to the terms of usage was identified in 71% of the sample.

All Facebook games included an age limit suggestion, and about 92% of the games from the other two platforms provided this measure. For advergames, an age limit suggestion was present in about 29%. The presence and enforcement of age limit by means of a birth date that has to be entered before gameplay was identified in 33% of the games on Facebook. None of the games from the other two platforms, nor any of the advergames, include this measure.

None of the games from the three platforms included a statement in which parental permission to continue gameplay was required. For advergames, a statement was included in 14% of the sample. None of the games from the three platforms included a parental section, while in the case of advergames, a parental section was present in 14% of the sampled advergames. None of the games and advergames contained a protective measure in the form of parental warning.

All games from iTunes and Google Play included a content rating, but none of the games on Facebook and no advergames provided this measure. For games from iTunes, the content rating was indicated as "4+" in 5 out of 6 games, and as "9+" in one game. For games from Google Play, content rating was indicated as "low" in 4 out of 6 games, and as "medium" in 2 out of 6 games. None of the sampled games and advergames contained a protective measure in the form of labelling schemes.

In 17% of the games from iTunes and Google Play mechanisms to contact the firm included forms and a phone number. For games from Facebook, about 33% of the games provided forms as a mechanism to contact the firm, while for advergames this mechanism was present in 43% of the sampled games. About 67% of the games from iTunes and Google Play, and about 83% of the games from Facebook provided an email address as a mechanism to contact the firm. For advergames, an email address to contact the firm was provided in 71% of the advergames. For all games from Facebook, a mechanism to contact the firm in the form of "report a problem" was present. This feature was shared by abut 67% of the games from iTunes and Google Play but was present in only about 14% of the advergames. None of the games from Facebook included a phone number as mechanism to contact the firm, while this mechanism could be identified in 17% of the games from iTunes and Google Play. A phone number to contact the firm was included in 57% of the advergames.

5.2 Results by platform

The sampled games from AppStore/iTunes, Google Play, Facebook and also advergames share a number of similarities, but also deploy distinct advertisement, game, user engagement and protective features. In the remainder, the results of the content analysis are presented by platform in order to highlight the peculiarities.

5.2.1 AppStore/iTunes and Google Play

As concerns ad features in the games from iTunes and Google Play, embedded ads were more often used (42%) compared to textual ads (8%). For those games that included embedded advertisement, a logo or product symbol was most frequently used (42%), followed by a picture of the product or link to product information (33%).

As concerns game features, a majority of games contained purchase requirements for moving to a higher level in the game and inducements to extend gameplay. Game personalization options were less frequent. Most common play themes in the sampled games from iTunes and Google Play were activities which encourage users to test their skills; activities in which scoring more points, being faster, gaining more buddies and having more contributions is important to users; and activities that require user's full concentration and engrossing in order to enjoy. In-app purchases were by far the most frequent revenue model identified in these games, followed by in-app advertising and paid downloads. In none of the games, Freemium or the resale of data collected via app use was identified as revenue model.

In terms of user engagement, Facebook and Twitter were used in all games from iTunes as social media component, with the exception of one game that engaged users via Facebook. User engagement via social media was less frequently used in games from Google Play. While community elements were not frequently applied in games from iTunes and Google Play, viral elements in the form of messages passed on via social networks were identified in about 50% of the games from both platforms, which demonstrates its importance as an engagement mechanism. Prompts for repeat or prolonged visits and for buying virtual goods were present on a more frequent basis in games from iTunes than Google Play.

In terms of protective measures, none of the games from both platforms made use of ad breaks/ ad alerts. Protective measures in the form of privacy policy and terms of usage were identified in most of the games, while all but one game provided an age limit suggestion. None of the games applied, however, enforcement mechanisms for these age limitations, nor features for

parental control. For all games from both platforms a content rating was provided, and all but one game from iTunes a mechanism to contact the firm either via forms, email, phone, a "report a problem" section, or a combination of these was provided.

5.2.2 Facebook

In terms of advertisement features, it is worth noting that all Facebook games contain contextual advertisements, while only one game contains embedded advertisement, in which a picture of the product, a logo or product symbol and a link for product information was depicted.

As regards game features, all Facebook games included purchase requirements for moving to a higher level in the game; inducements to extend game play; and game personalization options. In addition, all games featured play themes that include activities in which winner (s) are or will be clearly announced; activities in which scoring more points, being faster, gaining more buddies, having more contribution is important; and activities which encourage users to test their skills; and activities that require user's full concentration and engrossing in order to enjoy. For all Facebook games, the revenue model included in-app purchases. For only one game from this platform, in-app advertising and the promotion of digital goods were identified as additional revenue model.

As concerns user engagement, Facebook games demonstrated a considerable reliance on viral elements such as messages passed on via social networks, sending emails to greet friends and inviting friends to play or join the website. These elements were present in all games with the exception of one game, in which no messages were passed on via the social network. In addition, all Facebook included prompts for repeat and prolonged visits and for buying virtual goods.

In all but one Facebook game fell short of protective measures in the form of an ad break/ ad alert, while it has to be noted that the very same game that contained the embedded advertisement included an ad break/ ad alert that was present during loading. All games provided legal information in terms of privacy policy and terms of usage and made use of age limitation as protective measure. In these terms, in all Facebook games an age limit was suggested and enforced through the requirement that users had to enter a valid birthdate. No content rating or labelling schemes were identified in Facebook games. All but one game provided mechanism to contact the firm in the form of an email address, while the mechanism "report a problem" was provided for all sampled games from the platform.

5.2.3 Advergames

As concerns advertisement features, all advergames included embedded advertisement, while also contextual advertisements were frequently used. Advergames typically promoted certain products and feature the respective product as an active game component. The majority of the embedded advertisements included a picture of the product, a logo or product symbol and a link to product information and qualify as product placement or advergame. In one game (Happy Meal), the embedded advertising was neither identified as product placement nor advergame, but as a pre-game ad.

In terms of game attributes, the most frequent attributes that applied to the advergames under study were inducements to extend game play, while one game also provided game personalization options. All advergames included activities which encourage users to test their skills, and frequently included activities in which scoring more points, being faster, gaining more buddies, or having more contribution was important to users. The promotion of digital goods was identified as the only revenue model for all advergames under study. This was unique to advergames and clearly relates to its overall purpose to promote a certain brand or product.

User engagement with social media, by means of viral elements or prompts was generally less present in advergames compared to games from the other two platforms. However, community features such as registration or account creation, as well as member sign-in were frequently identified. More than half of the advergames included an ad break/ ad alerts present before, during or after loading as protective measure. None of these ad breaks/ ad alerts were in the format of a one-sentence ad break, multiple-sentence ad break, icon, or a combination of these. Furthermore, none of the advergames provide an introductory explanation about the ad break itself or advertising literacy components. The majority of advergames provided legal information in the form of a privacy policy or terms of usage. In one advergame, neither a privacy policy nor terms of usage were identified. Few advergames suggested an age limit – however, none of the advergames provided mechanisms to enforce the suggested age limitation. One advergame (Happy Meal) included both a statement indicating that parental permission is required and a parental section. In all other advergames, this parental control mechanism was absent. No content rating or labelling schemes were identified in any of the sampled advergames. The majority of advergames provided mechanisms to contact the firm in the form of specific forms, email address, "report a problem" section or phone. Mechanisms to contact the firm were not frequently provided in advergames.

6 Results from the experiment testing the effectiveness of an advergame to promote fruit intake

6.1 Participants

A total of 124 children participated (grades 2-6) from 3 primary schools in the Netherlands, of which about 60% were girls. One child was removed from the analyses because the experiment was interrupted while she was playing the advergame. Thus, the final sample included 123 children. The mean ($\pm$ SD) age of the children was 10.4$\pm$1.79 years. The average BMI was 17.2.

Before testing the hypotheses, randomization checks were conducted. Separate Analysis of Variance (ANOVA) were performed with the independent advergame variable and as dependent variables gender, age, BMI and hunger. The separate ANOVAs showed that none of these variables differed significantly between the three conditions (p> 0.05), so randomization was successful. Subsequently, a correlation analysis was performed to determine which moderating variables were to be included in the subsequent analyses as covariates. The correlation was checked with the dependent variable, the total eaten fruit (in grams). Based on the correlations, the variables hunger (r = .45, p <.01) and fruit attitude (r = .3, p <.01) were included as covariates in the causal tests. No differences were found between the three groups for attitude to the fruit brand or fruit products (P > 0.05).

Table 11 presents the means and standard deviations for all variables separately for each condition. Residual scores were computed and tested for Mahal's distance, Cook's distance, and leverage scores. No indication was found to assume outlying scores.

Table 11 Variables measured by the condition

Table 11 Variables measured by the condition [a]	Fruit Advergame (n = 43)	Nonfood Advergame (n = 40)	Control (n =40)
Gender (boy)	44 %	40 %	37%
Baseline hunger (cm on VAS)	3.5 ± 2.7	4.8 ± 1.8	3.7 ± 3.3
BMI (kg/m^2)	17.3 ± 2.1	17.2 ± 3.2	17.0 ± 2.2
Age (y)	9.9 ± 1.7	10.1 ± 1.8	10.3 ± 1.9
Intake Bananas (g)	94.9 ± 70.6	97.1 ± 68.8	91.0 ± 72.0
Intake Apples (g)	47.3 ± 53.9	39.2 ± 51.0	33.4 ± 41.7
Total Fruit intake (g)	47.6± 36.1	57.9 ± 40.6	57.6 ± 42.8

[a] Mean ± SD (all such values). VAS, visual analogue scale.

In a subsequent step, a correlation analysis was performed to determine which variables would be included as covariates in subsequent analyzes. Based on the correlations, see Table 12 the variables hunger [r = .45, p <.01] and fruit attitude [r = .3, p <.01] were included as covariates in the causal tests.

Table 12 Pearson's correlation between the moderator variables and the dependent variable

Table 12 Pearson's correlation	Sex	Age	Hunger	BMI	Game attitude	Brand attitude	Fruit attitude	Brand-recognition - Bart Smit	Brand recognition -Chiquita	Product recognition	Total fruit intake (gram)
Sex	-										
Age	.067	-									
Hunger	-.031	.001	-								
BMI	.012	.4143	.015	-							
Game attitude	.048	-.4343	.2322	-.212	-						
Brand attitude	.006	-.046	-.125	-.158	.178	-					
Fruit attitude	.054	-.2062	-.011	-.006	.2973	.3003	-				
Brand recognition – Bart Smit	.037	.2372	.084	.017	-.085	-.057	-.010	-			
Brand recognition – Chiquita	-.058	.144	.098	.161	-.087	.018	0.13	.4763	-		
Product recognition	.205	-.006	.006	.044	-.015	-.096	-.041	.135	-.020	-	
Total fruit intake	-.058	-.066	.4453	.074	.153	.058	.2993	-.125	.098	.061	

Note: [1] N=123, [2] *p= < .05,* [3] *p= ⟨ . 01*

6.2 Advergame effect

Univariate analysis of covariance (ANCOVA) tested the advergame effect on total fruit intake and multivariate analysis of covariance (MANCOVA) tested the advergame effect on intake of the two types of fruit. To further test for the (non-) existence of the main effects of the experimental condition, Bayesian ANCOVA was performed with the statistical program JASP (Love et al., 2015). Evidence for each model in this analysis was evaluated against the null hypothesis. Following conventional interpretation, a value of BF10 above 3 is considered as substantial support for the alternative hypothesis, and a value of BF10 less than .33 as substantial support for the null hypothesis. BF10 values between .33 and 3 suggest the data are insensitive to the hypothesis put forth (e.g., Dienes, 2014). In addition, the interaction effects for gender, hunger, BMI, and age were measured, as earlier research suggested that these factors can have a combined effect with food cues on intake (Folkvord et al., 2014; Folkvord et al., 2016). The adjusted one-sided P value that was considered significant was .05. The effect sizes for Cohen's f were calculated, with values of .02, .15, and .35 indicating small, medium, and large effect sizes, respectively.

The first hypothesis posed in this experiment stated that children who played the advergame promoting fruit would consume more fruit than the children from the other conditions. To test hypothesis 4, an Analysis of Covariance (ANCOVA) was performed with the total amount of grams of eaten fruit as a dependent variable and the different advergames as an independent variable checked for hunger and fruit attitude. The ANCOVA results show that there is no difference between the groups [F (2,118) = .400, p = .671]. Therefore, the first hypothesis was rejected.

The second hypothesis predicting that the children playing the advergame promoting fruit would eat more fruit from the advertised brand (Chiquita) than the children from the other conditions. To test hypothesis 5, also an ANCOVA was carried out, but this time with the number of grams of banana eaten as a dependent variable, which was also checked for hunger and fruit attitude. The ANCOVA results show that there is no difference between the groups in the amount of banana eaten [F (2,118) = 1,787, p = .172]. Therefore, the second hypothesis was rejected.

The last hypothesis predicted that the effect of H4 and H5 was expected to be moderated by hunger, game attitude, brand and fruit attitude, product and brand recognition, gender, BMI and age. To test hypothesis 6, several MACOVAs have been performed.

A separate MANCOVA was put for each moderator, with the various conditions checked as an independent variable for hunger and fruit attitude. The amount of banana eaten, and the total amount of fruit eaten formed the output (dependent) variables within this test. The analyses showed no significant interaction for either gender (total fruit p = .949, banana p = .675), age (fruit total p = .886, banana p = .834), BMI (fruit total p = .691, banana p = .907), hunger (fruit total p = .492, banana p = .679), game attitude (fruit total p = .497, banana p = .403), fruit attitude (fruit total p = .348, banana p = .785), brand attitude (fruit total p = .807, banana p = .239), brand recognition (fruit total p = .935, banana p = .704) or product recognition (fruit total p = .688, banana p = 302). This means that, given the moderators, there is no difference between the conditions for the number of grams of fruit eaten in total and the number of grams of banana eaten. The results of the MANCOVA analysis with gram of banana intake and gram of total fruit intake as dependent variables are presented in Table 13 below.

Table 13 Results from MANCOVA

Table 13 Results from MANCOVA		
Variables	**Intake of Banana (In Gram)**	**Total Fruit Intake (in Gram)**
Sex (Boy= 0, Girl = 1)[2][3][4]	$F(2,115) = .394$	$F(2, 115)=.052$
Age [2][3][4]	$F(2,115) = .182$	$F(2,115) = .121$
BMI [2][3][4]	$F(2,112) = .098$	$F(2,115) = .371$
Hunger [2][3][5]	$F(2,116) = .388$	$F(2,116) = .714$
Game-Attitude [2][4]	$F(1,89) = .706$	$F(2,116) = .465$
Fruit Attitude [2][3][6]	$F(2,116) = .242$	$F(2,116) = 1.066$
Brand Attitude [2][3][4]	$F(2,115) = 1.448$	$F(2,115) = .215$
Brand Recognition [2][3][4]	$F(1,77) = .111$	$F(1,77) = .007$
Product Recognition [2][3][4]	$F(1,77) = 1.081$	$F(1,77) = .162$
Advergame	$F(2,118) = 1.787$	$F(2,118) = .400$

Note. None of the results were significant ($p > .05$)

[1]N=123

[2] Calculated with high/low based on advergames

[3] Interaction with advergames

[4] checked for hunger and fruit attitude

[5] checked for fruit attitude

[6] checked for hunger

6.3   Advertising literacy

A number of additional analyses were performed. When children were asked "Who made the game?", most children (41%) answered "the one who fills out the questionnaire with me", followed by "the company that is displayed on the cards" (36.1%). Most children answered "Yes, maybe" to the questions relating to advertising literacy (the questions were "Was this game created to make you buy/ want/ like 'the brand'?).

Table 14 provides an overview of the percentages per answer.

Table 14 Advertising literacy, percentage per answer[1]

Was this game created to make you … the brand?	To want	To buy	To like
Yes, definitely	24.1%	24.1%	18.1%
Yes, maybe	41%	49.4%	49.4%
No, I don't think so	22.9%	16.9%	28.9%
No, definitely not	12%	9.6%	3.6%

Note. [1] N = 83

In addition, children were asked about their attitude towards advertising in the game. The majority of children did not express negative opinions about advertising. When asked "Is it fair that there is advertising in the game?", a majority of respondents answered with "Yes, maybe". To the question," Is it bad that there is advertising in the game?", a majority of respondents said "No, I don't think so". Table 15 presents an overview of the percentages per answer given.

Table 15 Attitude towards in-game advertising, percentage per answer[1]

Answer	Fair	Good	Bad	Mean
Yes, definitely	12%	9.8%	12%	4.8%
Yes, maybe	41%	25.2%	20.5%	14.5%
No, I Don't think so	34.9%	20.3%	42.2%	34.9%
No, definitely not	12%	12.2%	24.3%	45.8%

Note [1] N = 83

7   Discussion

In this chapter, the findings from the different research lines are discussed. The discussion is structured along the objectives guiding this study, which have been achieved following different methodologies.

The first objective of this study was to analyse the current state of knowledge on the impact of online marketing to children, in particular via online games and advergames. The literature review was designed with this objective in mind and helped synthesize research findings regarding online marketing to children that have employed a number of different methodologies. While a particular focus has been set on available experimental studies to support the design of the experiment conducted in this thesis, a significant inter-disciplinary literature has emerged on newer forms of marketing techniques. The fact that the issue has been studied from a variety of perspectives and methodological approaches illustrates the recognition of the societal relevance of online marketing outcomes for children. Academics have raised concerns because of the fear that children can easily be misled or confused about the purpose and intent of new online marketing techniques targeting youth audiences. This is, in part, due to the use of digital media exposing young people to online brand promotions that do not look like typical advertising. A specific form of online marketing is advergames, which are free online games that integrate advertising stimuli, such as messages, logos, and trade characters (Culp, Bell & Cassady, 2020). Advergames are designed almost exclusively to promote a brand, product or service by integrating marketing cues into game content (Mallinckrodt & Mizerski, 2007). Children are considered the most important target group for advergames, but its commercial purpose is seldom revealed to or understood by its main target group. The review shows that repeated exposure to marketing content in advergames can have an impact on cognitive, affective and behavioural responses of children, which mays have negative consequences for children's health. The prevailing pattern of advertising via advergames is to promote products or brands that can be categorised as unhealthy. Foods characterised by high fat, sugar and salt (HFSS) foods. Experimental studies indicate that playing advergames leads to increased/immediate food intake of the products advertised, but experimental evidence remains contested as to whether advergames could be an effective marketing technique to encourage the consumption of healthy food products.

The second objective was to investigate the characteristics of online marketing techniques and features in online games and advergames. Traditional television advertising, such as the typical 30 seconds TV spot (Culp, Bell & Cassady, 2013), has been superseded by Internet-based

advertising and led to the proliferation of sophisticated, efficient methods of matching advertisers and consumers (Evans, 2009). As children's leisure activities moved online, marketers have adapted their activities to online environments to target children using new media technologies including social media websites, online games and advergames which result in an omnipresence of commercial content in these environments. The websites hosting online games are often highly commercialised spaces that have evolved as important marketing platforms to reach young audiences using different techniques to market their products. In particular, the level of integration of marketing content and its context is found to be one of the defining characteristics of the current commercialized media environment. Building on the findings from the literature, the most frequently used marketing techniques and protective measures were analysed in a content analysis of some of most popular online games and advergames. The snapshot of popular online games and advergames show that a variety of marketing practices and elements are applied in these games that make them particularly attractive for young people, while the commercial purpose is often not revealed.

The third objective of the study was to test the effectiveness of an advergame promoting fruit on subsequent intake of fruit. Previous research has shown that playing advergames promoting food can influence product recognition, liking, preference over other products (Cauberghe, de Pelsmacker, 2010; Mallinckrodt & Mizerski, 2007; van Reijmersdal, Rozendaal & Buijzen, 2012) and actual food intake (Folkvord et al., 2013, 2014, 2015, 2016; Pempek & Calvert, 2009). Previous studies have also shown that increasing the availability and priming children with cues of healthier foods can stimulate them to select healthier food (Blanchette & Brug, 2005; Hoffman et al., 2009; Folkvord et al., 2017). On this basis it was hypothesized that a memory-game with images of fruit would lead to higher intake of fruit by the children exposed to these cues than by children not being exposed to food cues in a control condition.

The following sections will elaborate on the results obtained in more detail and discuss these findings within a wider theoretical and empirical framework.

7.1 Current state of knowledge of the impact of online food marketing on children's behaviour

Online marketing targeting children and young people has been studied from a variety of angles and perspectives, which demonstrates the societal relevance of online marketing targeting children and youth. Current research, employing a mix of methods from experimental studies to naturalistic surveys, confirms food promotion via advergames can impact children's knowledge, food preferences, purchase behaviours, as well as food consumption and diet-related health. Much research has been dedicated to the study the impact of exposure to advertising content in online environments, often studying its impacts from a health perspective. Previously conducted literature reviews have primarily focussed on traditional advertising channels (such as TV) and the use of persuasive techniques in these formats (e.g., Jenkin et al., 2013), indicating that exposure to advertising increases the consumption of products advertised. Research has shown that exposure to unhealthy food advertising, at least under experimental conditions, increases in food consumption, particularly energy-dense, low-nutrient foods (Boyland et al., 2016). These findings are corroborated by other recent studies. For example, the review on the effects of screen advertising of unhealthy foods children conducted by Russel, Croker & Viner (2018) suggests that TV advertising for unhealthy food results in significant increases in dietary intake among children.

The literature review conducted as part of this study focussed on marketing techniques that target children where they spend much of their free time: on the Internet, pursuing a range of different activities, including playing online games. The fact that marketers have increasingly turned to non-traditional channels to target children with commercial messages has fuelled fears among researchers and parents, as children are particularly susceptible to persuasion through these channels. In particular, the marketing of products in online games and advergames has gained considerable attention among researchers. Advergames are designed almost exclusively to promote a brand, product or service by integrating persuasive marketing messages into game content (Mallinckrodt & Mizerski, 2007). Research indicates that they primarily promote products of low nutritional quality and rarely promote healthy food products. Empirical evidence suggests that children face more difficulty recognizing embedded marketing in these advertising formats compared to traditional advertising formats (e.g., Rifon et al., 2014; Rozendaal et al., 2013; Van Reijmersdal et al., 2012, Waiguny, Nelson & Terlutter, 2014). These formats often integrate advertising subtly into media content, making it more difficult to recognize the source of marketing message and as a consequence, the persuasive intent (e.g.,

Verhellen et al., 2014; Panic, Cauberghe & De Pelsmaker, 2013; Waiguny, Nelson & Terlutter, 2014). As the Processing of Commercialized Media Content (PCMC) Model shows, the level of integration of persuasive message and its content is considered one of the defining characteristics of advergames (Buijzen, Van Reijmersdal & Owen, 2010). For children, the exposure to this kind of product advertising may be fun, but have several, often negative, impacts on children's behaviour, especially if it involves the subsequent intake of the food promoted. These are found to be predominantly unhealthy HSFF foods.

Existing literature points towards impacts related to cognitive responses, such as brand recall and recognition (e.g., An & Stern, 2011) affective responses, such as liking a product or brand (e.g., Evans, 2009), and behavioural responses, such as product choice and consumption (e.g., Folkvord et al., 2016). Advergames as a distinct marketing technique have been subject to criticism due to their highly integrative and engaging nature (Avy & Calvert, 2008; An & Kang, 2014; An & Stern, 2011; Folkvord et al., 2016). Advergames embed brand identifiers into game play and blur the boundaries between advertising and entertainment and are increasingly used to target children from a very young age (An & Kang, 2014).

For children, advergames are fun and appealing, with the result that they may play an advergame repeatedly and potentially be repeatedly exposed to brand identifiers. At the same time, advergames create a context for associating the brand with positive feelings while playing (Culp, Bell & Cassady, 2010). Previous studies suggest marketing strategies promoting nutritionally poor foods to young people are likely to influence through social cognitive processes that are designed to create positive brand attitudes (Harris, Brownell & Bargh, 2009). The same happens with advergames that blur the boundaries between advertising and entertainment, with the result that positive emotions are transferred from the media to the brand (Harris, Brownell & Bargh, 2009).

The interactive and immersive nature of advergames gives children a more enjoyable experience than traditional advertising such as television (Rifon et al., 2014; Bailey, Wise & Bolls, 2009). By enabling a kind of "telepresence", i.e., the feeling of being present in the game, children are likely to develop positive attitudes towards these brands (Lee et al., 2009). While with television advertising, persuasion knowledge is regarded as driving the impacts, in the case of advergames, persuasion effects are found to be driven by the attitude towards the advertising format itself (Panic, Cauberghe & De Pelsmaker, 2013). In other words, children like the games, get immersed and transfer these positive attitudes towards the product marketed in these games as suggested in the concept of "flow".

In line with the persuasion knowledge model, children's responses to these tactics are found to be age dependent (e.g., Rifon et al., 2014). As children under the age of 8 years have difficulty distinguishing between product advertising and television programmes in which the advertising is embedded (Waiguny, Nelson & Terlutter, 2012), it is very unlikely that they are aware of the persuasive intent exposed to when playing an advergame. This is because especially young consumers are less likely to process persuasive messages systematically or even heuristically. Children only incrementally accumulate consumer and advertising-related skills through experience during their childhood and adolescence (Buijzen, Van Reijmersdal & Owen, 2010). As a result, children processing persuasive messages in low elaboration scenarios often do not have enough cognitive capacity available to activate scepticism regarding the intention of the commercial message and are particularly vulnerable.

Children playing an advergame are first and foremost interested to play an online game; the processing of a commercial message is only a secondary task. As a consequence, persuasion knowledge and scepticism are unlikely to be activated in the automatic processing of an advergame because recipients are often unaware that they are being targeted. It is foremost highly embedded and hidden forms of marketing that aim for automatic processing as suggested in the PCMC Model (Buijzen et al., 2010). Advergames are a prime example of this type of marketing. Lower-level processing may be enhanced by message characteristics, such as format integration, and entertainment-based content style, or a highly emotive medium context (Buijzen, Van Reijmersdal & Owen, 2010). Research suggest that repeated exposure to brand logos or name leads to a fluent processing and creates a sense of familiarity, which, in turn, may result in positive affect towards the brand (Janiszewski, 1993). The repeated exposure may therefore result in positive affect transfer of an entertaining advergame towards the promoted brand outside conscious awareness (Buijzen, Van Reijmersdal & Owen, 2010).

Some research suggests that if children recognize the source behind a persuasive message, this may activate greater persuasion knowledge (Rifon et al., 2014), which can result in less favourable attitudes toward a brand (Waiguny, Nelson, & Terlutter, 2012; Verhellen et al., 2014). Other studies provide evidence that understanding of persuasive intent does not provide an automatic defence against advertising influence (Harris, Brownell & Bargh, 2009). Despite the general importance attributed to children's persuasion knowledge to cope effectively with marketers' attempts to manipulate them, a number of experimental studies demonstrate only limited effectiveness of persuasion knowledge to mediate cognitive, affective and behavioural

responses (Rifon et al. 2014; ReijmersdaL, Rozendaal & Buijzen, 2012; Rozendaal et al., 2013; Panic, Cauberghe & De Pelsmaker, 2013).

Activation of persuasion knowledge was not found to have an impact on children's brand identification and evaluation (Reijmersdal, Rozendaal & Buijzen, 2012; Rifon et al., 2014), or the desire for the brand advertised (Rozendaal et al., 2013). As the results by Panic, Cauberghe & de Pelsmaker (2013) suggest, advergames are indirectly more persuasive than advertisement via television as children report more positive attitudes towards advergames compared to the TV advertisement. While children with more knowledge about advertiser's tactics are more likely to identify brands and commercial content in advergames and are less susceptible to the advertisement, a high level of absorption in the medium can moderate the effect of persuasion knowledge on persuasion outcomes (Waiguny, Nelson & Terlutter, 2014). As Rozendaal et al. (2013) suggest, attitudinal persuasion knowledge, such as a general critical attitude toward advertising, can effectively reduce children's desire for brands advertised in online social games. Conceptual persuasion knowledge in turn, in the form of recognition of advertising, understanding advertising's commercial source and understanding advertising's persuasive intent, is not effective in reducing this desire (Rozendaal et al., 2013).

The results of this review confirm not only that advergames positively influence brand recall and brand attitude, but also children's behaviour (Harris et al., 2012; Folkvord et al., 2016). Empirical evidence gained from previous experimental research demonstrates that exposure to food stimuli presented in advergames can lead to an immediate, increased food intake. This is particularly alarming in light of the fact that the products advertised to children through advergames often promote food product categories classified as unhealthy. In fact, however, one of the reasons why children are targeted with advergames is that they are more susceptible to its effects (Folkvord & van t' Riet, 2018).

The effect of online marketing on children's food intake is confirmed in recent studies such as the meta-analysis conducted by Folkvord & van t'Riet (2018). The results of this study revealed that advergames promoting unhealthy foods provoke unhealthy eating behaviour among children (Folkvord & van t'Riet, 2018). Similarly, a recent systematic review and meta-analysis conducted by Russel, Croker & Viner (2019) found that short-term exposure to food marketing in advergames increases immediate calorie consumption in children.

A rather contested issue in the scientific literature remained whether advergames promoting healthy food such as fruit led to a higher consumption of healthy food products, which have not been analysed in these meta-analyses. Empirical evidence derived by experimental studies

testing the effects for the use of advergames to promote fruit in this review demonstrated inconsistent results. For example, results by the study conducted by Pempek & Calvert (2009) showed that children who played a version of an advergame promoting fruit ate significantly more fruit than those who played a version of the advergame promoting energy-dense food.

The study conducted by Harris et al. (2012) showed that children who played an advergame promoting energy-dense food ate more energy-dense snacks and fewer fruit and vegetables than children who played an advergame with fruit or those in the control condition. The study conducted by Folkvord et al. (2013) comparing advergames promoting energy-dense snacks, fruit, or non-food products with a control condition found that both advergames promoting foods (energy-dense snacks or fruit) increased the intake of energy-dense snacks, but not for fruit. One of the reasons that the fruit advergame did not improve the intake of fruit may have been that energy-dense snacks were also presented to the children in this study, and most children preferred to consume these snacks over the fruit. Thus, the results derived by Folkvord et al. (2013) challenged the premise that advergames can be used to stimulate healthy food intake as proposed in other studies.

The inconsistencies across the findings of these studies indicated that the effectiveness of advergames to promote healthy food so far remained contested, which rendered further investigation necessary. The experiment presented in this study tried to fill this knowledge gap and examined the effects of an advergame promoting fruit on the intake of fruit by children if no energy-dense snacks are made available.

Before discussing the results of this experiment, the results of the content analysis are discussed in light of the theoretical framework and broader research.

7.2 Characteristics of marketing via online games and advergames

The main objective of the content analysis was to identify the most prevalent marketing techniques used in online games and advergames. As playing digital games has evolved into one of the most popular Internet activities among children (Rideout et al., 2010; Terlutter & Capella, 2013), websites hosting online games, including social media platforms, have increasingly become commercialised and act as multipliers to reach target audiences (Terlutter & Capella, 2013, Hudders, Cauberghe & Panic, 2015). In fact, advertising and marketing content have evolved as a major revenue sources of business models of app and website developers (OECD, 2013). This is demonstrated in the prevalence of commercial content in online gaming environments to which recipients are exposed to in different ways. The integration of commercial content into online games can take various forms. In this study, the distinction proposed by Terlutter & Cappella (2013) was followed to include in-game advertising, advertising in social network games and advergames. In-game advertising refers to the inclusion of products or brands within a game which is in itself provided solely for entertainment purposes (Terlutter & Capella, 2013). The advertisement is integrated into gameplay in either a subtle or prominent manner, but the games do not dependent on ad placements to provide the playing experience. Advertising in social network games refers to the placement of brands or products in digital games that are played via major social networks such as Facebook (Terlutter & Capella, 2013). The games offered on social networking sites are mostly casual games, and playing these games enables social interaction. Advergames blur the line between entertainment and commercial content and are designed to achieve a high traffic on brand websites (Terlutter & Capella, 2013). From the review of literature, it became apparent that children appear to be particularly susceptible to this new marketing technique as the repeated and prolonged exposure to marketing material embedded in advergames are found to elicit cognitive, affective, and behavioural responses for children. The results from this content analysis of games shows that online games and advergames make use of a large number of marketing features to target young audiences, which may either be particularly appealing to youth audience, or exploits their susceptibility.

The content analysis performed in this study made use of a framework of indicators focussing on four different dimensions that have broadly been divided along advertising features, game features, user engagement features and protective measures. This framework was employed to identify the presence and characteristics of marketing techniques directed at children in the most popular online games and advergames. The first dimension concerned different types of

advertisement (embedded or contextual), their attributes (picture of the product, logo or product symbol and link for product information) and the type of embeddedness (sponsorship, pre-game, inter-game, post-game, product placement or advergame) of commercial content in online games. The second dimension focussed on relevant game features that are appealing to the target audience, such as game attributes, including genres and the existence of purchase requirements and/or inducements to extend game playing as well as personalization options. This dimension further covered different play themes that are relevant and appealing to the target audience. Lastly, this dimension also considered the revenue model that underlies the online games and advergames, including paid downloads, in-app advertising, in-app purchases, freemium, the promotion of non-digital goods and resale of data collected via app use. The third dimension focussed on user engagement features, including social media components, community elements (register or create an account or member sign-in) and viral elements (messages passed on via social networks, sending an e-mail greeting to a friend and inviting a friend to play or join the web site) and different type of prompts to engage users in certain behaviour. The fourth dimension identifies the presence or characteristics of protective measures deployed in online games and advergames, including presence, format or content of ad breaks. The content analysis of the games under analysis showed that online games and advergames deploy a number of marketing features, while at the same time there is clearly a lack of protective measures that would raise awareness about the exposure to marketing content.

Most importantly, and in line with the first expectation (H1) that marketing content in online games is blended into media content to different extend, marketing content is found to be widespread in the online games and advergames analysed and varies in the level of integration. Many of the online games studied from the different platforms, and all advergames under analysis, contain high levels of embedded advertising. Advergames stand out as they are specifically designed and created to promote a brand, product, service or idea and by nature consist of placing advertising messages, logos, and trade characters within games (Terlutter & Capella, 2013; Mallinckrodt & Mizerski, 2007). The fact that embedded advertising is found in many of the online games under analysis pinpoints towards the fact that promotional content in these games is not always recognizable as such by the target audience. All advergames under study included embedded and contextual advertisements and displayed marketing content in form of a logo or product symbol (mainly for food products). Previous research suggests that the placement of brand identifiers or cues in advergame is found to provoke significant improvement of brand attitude (Redondo, 2012). Embedded advertisements of this type were

identified in only less than half of the games from iTunes and Google Play, and contextual ads in only one of the games from both platforms. It nevertheless entails a frequent exposure of young people to commercial cues in leisure activities.

The findings of this content analysis are aligned with those from previous studies, which indicate that children have increasingly become target of marketing attempts due to the commercialization of online environments, and especially online games (Buckleitner, 2008; Lehdonvirta, 2009; Terlutter & Capella, 2013). Marketers have developed strategies that are designed to appeal to the targets and build strong consumer relationships. Previous research shows that users find the sponsored content more informative, more amusing, and less irritating than the banner ad (Tutaj & van Reijmersdal, 2012). Also, the pervasiveness of embedded advertisements in advergames has been documented in a variety studies, and a majority of these studies point towards a persisting problem of advertising of unhealthy foods to children in these formats. In the current study, a purposive sampling of most valuable brands' advergames was used. Hence, no conclusion about the type of products primarily advertised in advergames can be drawn although 6 out of 7 advergames are related to food products. Available research, however, suggests that it is predominantly nutritionally poor foods that are advertised via advergames (Harris et al., 2012; Lee et al., 2009). For example, the findings by the content analysis conducted by Lee et al. (2009) show that more than 80% of the food products advertised to children in advergames were low-nutrient food, which is high in fat and sugar content. Brands were often integrated as active game components – most frequently as tools or equipment that need to be used throughout game play. Similarly, Weatherspoon et al. (2013) have shown that about 95% of the advertised meals and 78% of the snacks marketed in advergames did not meet the nutrition recommendations for foods marketed to children. While the advergames under study were derived from corporate company websites, our results appear to confirm the findings by An & Kang (2014), who suggest that children are even more susceptible to embedded advertising messages on gaming sites than on company websites. As children visit gaming sites for the sole purpose of playing games, they do not expect to be exposed to company-sponsored advertisements within the games. As a result, they often face more difficulties to identify the commercial nature behind advergames in online gaming sites than in company websites and hence, activate persuasion knowledge (An & Kang, 2014). Previous research suggests, however, that the most important predictors of children's desire for advertised brand are low critical attitude and high peer influence susceptibility (Rozendaal et al., 2013). With respect to persuasion knowledge, recognition of the advertising format,

understanding of persuasive intent, and ad scepticism are considered higher for banner ads than for sponsored content (Tutaj & van Reijmersdal, 2012). The features that are deployed in online games and advergames are therefore critical to children's understanding of its commercial purpose. All Facebook games included contextual advertisement, while embedded advertisement was identified in only one game. Accordingly, especially in the most popular social networking site young people are exposed to targeted advertising when playing games on this platform which is in line with findings from other studies who posit that social media enables marketers to enhance their reach (e.g., Freeman et al., 2014; Winpenny, Marteau & Nolte, 2013). From the PCMC model it gets clear that user playing a game online is first and foremost interested to play the game, which leaves the processing of a commercial message as a secondary task with the results that it affects them beyond their awareness threshold.

The second expectation, that online games deploy a large number of features that are appealing to children and intend to prolong gameplay or engage users (H2), is also confirmed.

In Facebook, purchase requirements for moving to a higher level in the game, inducement to extend game play and game personalization options are engagement features that could be frequently identified. These often contain viral elements and prompts for repeat or prolonged visits and prompts for buying virtual goods in games. It is in fact a well-known Facebook strategy, linked to its business model, to strive to prolong user's involvement with the application for as long as possible (Lanier, 2018). Research pinpoints to the fact that the repeated and prolonged exposure to marketing stimuli embedded in advergames can trigger cognitive, affective, and behavioural responses for children (An & Stern, 2011; Buijzen, Owen, & Van Reijmersdal, 2010; Folkvord et al., 2016; Rifon et al., 2014; Verhellen et al., 2014). Gaming applications featuring in-app purchases to allow users to make upgrades are extremely popular but have been subject to scrutiny in cases where children have been able to download apps and make substantial purchases without consent or knowledge of their parents. Facebook was also identified as the main social media platform to engage users in the games under analysis. These findings confirm studies such as Boyd & Ellison (2007), who suggest that information sharing forms the backbone of most social network sites, together with the public display of friend lists. Games within these platforms typically try to incorporate friends into gameplay to intensify information exchange within the network. In line with findings from previous studies, viral marketing is a very common strategy deployed in online games to encourage visitors to share commercial content or invite friends to play games or advergames and thereby increase outreach. Viral marketing is considered to be a feature that makes it

increasingly difficult to protect young people from marketing influence, as the motivation to conform to the message is stronger than the motivation to resist (Harris, Brownell & Bargh, 2009, p. 27).

All the games analysed fell into the game genres, while a majority can be regarded as casual games. The use of game genres may have important implications for the attractiveness for certain user groups, especially young people. In line with Terlutter & Capella (2013), it was found that most social network games are casual games, and they are also playable on mobile devices. Due to the widespread use of social network sites, the number of users of social network games is often accordingly high. Similarly, most advergames fall under the genre of casual games and reflect what is described by Redondo (2012) as typically distinguishable by their "*ease of play, low demand on user involvement and short required time commitment*" (Redondo, 2012, p. 1672). Importantly, the features included in the games make it a very pleasurable experience. It is suggested that the pleasure derived from game play may be transferred to the brand through some kind of affect transfer (Waiguny, Nelson & Terlutter, 2012; Waiguny, Terlutter & Zaglia, 2011; Rifon et al., 2014). This means that playing an online game or advergame may actually trigger positive attitudes towards the game, which is then associated with the advertised brand or product through this process (Rifon et al., 2014). The results from this content analysis further appear to confirm the results from Lehdonvirta (2009), to the extent that the inclusion of marketing content in online games and the selling of virtual goods for real money has become a common revenue model for businesses. The predominant revenue model for games from the App Store, Google Play and Facebook relates to in-app purchases, while for advergames it is the promotion of non-digital goods.

Lastly, the third expectation (H3) that online games deploy limited protective measures that could serve to alert children about their exposure to commercial content, is confirmed. A major finding of this analysis is that there is a lack of safeguards in games from the App Store, Google Play and Facebook that would perform as a protective measure to alert users about their exposure to commercial content. None of the games analysed from the three platforms included some type of ad breaks/ ad alerts, while they are present in more than half of the advergames before, during or after loading. This is surprising and rather counterintuitive, as the use of ad breaks in advergames has been shown to effectively mitigate cognitive responses in terms of brand recall and brand preference (An & Stern, 2011). On the other hand, content and characteristics of ad breaks often reveal problems of low visibility readability and other deficiencies in terms of clearly informing about the commercial purpose of the game (An &

Kang, 2015). The results of this present study confirm previous works that found that ad breaks do not always clearly state the purpose of the game, which in most instances is the promotion of a particular brand or good. None of the ad breaks identified in this content analysis were in the format of a one-sentence ad break, multiple-sentence ad break, icon, or a combination of these and none provided an introductory explanation about the ad break itself or included other advertising literacy components. The effectiveness of the ad breaks identified in these. Games is therefore highly questionable.

Games from iTunes/App Store, Google Play and Facebook in turn were found to provide legal information, age limit suggestion and content rating and mechanisms to contact the firm. Facebook has been the only platform to include an age restriction. The platform requires everyone to be at least 13 years old before they can create an account. However, while users need to enter their birthdate upon registration in Facebook, studies indicate that incorrect ages are often provided in Facebook profiles of younger children, with the result that age restrictions can easily be circumvented (Jernigan & Rushman, 2014; Winpenny, Nolte & Marteu, 2013). The effectiveness of these restrictions to prevent underage users from access is therefore questionable. Only a few advergames under study suggested an age limit at all, but none of these provided mechanisms to enforce the suggested age limitation. This confirms available studies that advergames are often targeting ever younger audiences.

Lastly, although most games and advergames provide mechanisms to contact the provider or developer, only few games were identified to include mechanisms for parental control, although available studies see an important role for parents in mediating children's exposure to commercial content in online environments (Evans, Carlson & Hoy, 2013). On the other hand, it is suggested that parents' often confined understanding of these new marketing practices (Spliteri Cornish, 2014) hinders them from protecting their children from the persuasive attempts of ever more sophisticated strategies that build on psychological processes.

7.3   The impact of playing an advergame promoting fruit on children's fruit intake

The main objective of the experiment conducted in this study was to examine the effectiveness of an advergame promoting fruit to increase the actual fruit consumption of children aged between 7 to 13 years.

Unlike previous studies that claimed that advergames may be used to promote healthy foods and beverages, this effect could not be corroborated in this study. These results are also different from Folkvord et al. (2013), who showed in an experimental study with children that playing an advergame containing food cues increases general caloric intake, regardless of the advertised brand or product type (energy-dense snacks or fruit), and that playing an advergame particularly increases the intake of energy-dense snack foods. In Folkvord et al. (2013), it appeared that the food cues presented in the advergames primed cravings that eventually led to a higher caloric intake compared to the control condition as the children were offered these products. Therefore, the authors came to the general conclusion that exposure to food cues in advergames influences the direct food intake of children. The findings of this present study question those derived in the study by Pempek & Calvert (2009) who, based on the outcomes of an experiment testing the effect of playing an advergame promoting healthy or non-healthy foods on subsequent food intake, found that advergames may "just as easily" (p. 636) be used to promote healthier foods.

The results of this current study show that the promotion of fruit in an advergame does not encourage subsequent intake of fruit. This might imply that the food cues in advergames promoting palatable foods induce cravings for these food products as shown in a number of studies, but this effect does not apply to healthy food products. The impacts that are found for the promotion of palatable foods is therefore significantly different from the promotion of fruit and vegetables. A number of studies have reported on how food marketers exploit the fact that cravings for palatable food products are induced that would eventually lead to the consumption of these products (Horwath, Hagmann & Hartmann, 2020; Gearhardt et al., 2020; Lindstrom, 2011).

The Reactivity to Embedded Food Cues in Advertising Model (REFCAM) assumes that cue-reactivity and classical and operant conditioning are the underlying mechanisms that explain the impact of food cues in advertising on subsequent (palatable) food intake. Food-related stimuli are assumed to elicit the expectancy of substance availability. This means that exposure to food cues triggers a craving for food, which results in children wanting to eat something. The frequent consumption of palatable foods, however, are demonstrated to lead to neuroadaptive

changes that can lead to compulsive or addictive eating behaviour over time (Davis & Carter, 2009). This means that frequent exposure to food cues in media environment actually means that children are trapped in a vicious circle that is almost impossible to escape from. Not all children are affected by the food cues to the same extent. Rather, some children appear to be more reactive to food cues that signal future food intake (Folkvord et al., 2016). In particular, obese children are found to be more susceptible to food cues (Berrige, 2009) as they may have been sensitized through increased intake of these foods which then led to neuroadaptations that make them more vulnerable to food cues of palatable (HFSS) foods (Folkvord et al., 2016).

Scientific literature provides explanations as to why there is a higher sensitivity for palatable foods. Taking an evolutionary perspective, energy-dense foods were important for the survival of human species (and other animals), as they can be quickly converted into energy (de Macedo, Soares de Freitas & da Silva Torres quoting Nesse & Berridge, 1997). A possible explanation is that these food products elicit stronger responses that motivates people to consume these foods compared to low-calorie food (Allen et al., 2012; Folkvord et al., 2016; de Macedo, Soares de Freitas & da Solva Torres, 2016). Energy-dense foods have intrinsically rewarding properties due to high amounts of salt, sugar and fat (de Macedo, Soares de Freitas & da Solva Torres, 2016) and thus have more motivational capacities and incentive qualities than food products such as fruit and vegetables (Stice et al., 2009; Nederkoorn & Jansen, 2002; Castellanos et al., 2009; Alonso-Alonso et al., 2015).

Research indicates that exposure to stimuli of palatable food products actives brain activity and metabolism (Wang et al., 2004; de Macedo, Soares de Freitas & da Solva Torres, 2016), which eventually may lead to the activation of the reward system (de Macedo, Soares de Freitas & da Solva Torres, 2016). A study investigating the neural responses to fast food commercials found that exposure to unhealthy food cues led to greater neural activations in the brain's reward-related regions, eventually leading to greater food intake (Gearhardt et al., 2020). According to de Macedo, Soares de Freitas & da Solva Torres (2016), specific brain regions (i.e. the lateral hypothalamus, nucleus accumbens, ventral tegmental area, prefrontal cortex and amygdala) are activated in response to the consumption of palatable foods. The neurons connecting brain regions involved in reward behaviour, of which dopamine is the one most implicated in the reward process, are connected to many neurotransmitter systems (de Macedo, Soares de Freitas & da Solva Torres (2016). The consumption of palatable food with high fat, salt and sugar content can significantly activate the dopamine reward processes, which in turn is associated

with reward related to food intake and the behaviour (de Macedo, Soares de Freitas & da Solva Torres, 2016).

As a result, exposure to palatable food cues may induce cravings for these food products, but not for products that are perceived as less rewarding and are less appreciated (Alonso-Alonso et al., 2015). A factor that makes the situation even more complex is that marketing for palatable foods is omnipresent. Food marketing is an enormous global industry, and there is plenty of evidence suggesting that there are disproportionate amounts of marketing of products with high sugar, fat, and salt content (Galbraith-Emami & Lobstein, 2013). The omnipresence of unhealthy food marketing can stimulate the intake of these products as a result of the accumulation of years of priming and branding (Boyland et al., 2016; Folkvord et al., 2017), whereas even short-term exposure can eventually lead to higher food consumption (Boyland &Whalen, 2015). As suggested by Boswell & Kober (2016), the abundance of food and food cues in the modern '*toxic food environment*' may function as conditioned stimuli that trigger increased food consumption and eventually leads weight gain on a population level (Boswell & Kober, 2016, p. 169). In the long run, eating energy dense foods may eventually lead to neurological adaptations and higher sensitization to these foods (Folkvord et al., 2015).

In addition, research suggests that children pay more attention to unhealthy foods than to healthy foods in advertising (Spielvogel et al., 2018; Naderer et al., 2018). Thus, while images of unhealthy foods can trigger behavioural responses and prime an increased appetite for these products (Mandel & Brannon, 2017; Wadhwa et al., 2008), the exposure to the cues of healthy food products does not lead to the same effect (Hebebrand et al., 2014; Folkvord et al., 2016; Spielvogel, Matthes, Naderer, & Karsay 2018; Folkvord & Laguna-Camach, 2018; Luo et al., 2015). There further appears to prevail an implicit belief among young people that healthy food does not taste as good as unhealthy food (Harris, Brownell & Bargh, 2009).

Also, individual susceptibility factors influence children's responses to food cues (Folkvord et al., 2016; Valkenburg & Peter, 2013). Impulsive children are considered to be more prone to seeking rewarding substances after exposure to food cues, which make them more vulnerable to its effects (Folkvord et al., 2016; Nijs et al., 2010).

The results of this experiment could further be explained by children's awareness of, and attitude towards advertising. Many of the children participating in this study did not express a negative attitude towards advertising, and many appeared to be well aware of the persuasive intent of the advergame. This critical knowledge could be an indication that the commercial content was processed systematically and more elaborated and hence, had limited effect. It

could therefore be interesting to test the effects of playing an advergame promoting fruit with children of younger ages than those participating in this study.

A majority of children participating in this study answered to the questions "*Is this game made so that you will buy / like / want products from 'the brand'*?" with a "*Yes, maybe*". This indicates that the children were aware of the commercial intent of the advergame they were playing, which may have influenced the results. Research suggests that children in particular are particularly susceptible to advergames because they do not realize that this is a form of advertising. For example, Moore & Rideout (2007) describe that children are less sceptical when playing an advergame than when watching commercials on television, which results in higher susceptibility of children. Also, other studies testing the effects of advergames on children's food intake have shown that children often do not understand that they have been exposed to commercial cues (e.g., van Reijmersdal et al. 2012; An & Stern, 2011). Exposure to these cues nevertheless affected their behaviour afterwards. The current study shows that children participating in this experiment had enough persuasion knowledge to be well aware that they were exposed to a persuasive intent, hence, were strategic processors as proposed by Wright, Friestad & Boush (2005). This may explain the conflicting results with the study by Folkvord et al. (2017), where a paper memory game was used with fruit images and non-food images. The current study does not confirm the statement that advergames work well because children do not realize that there is advertising in the games as proposed in Folkvord et al., (2016). This means that the advergames may not have as much of an impact as suggested in other studies, and thus may also provide a possible explanation for the limited effectiveness in promoting fruit intake.

Another explanation for the findings of the present work relates to the habitual context of fruit intake. Children may not have the habit of eating fruit at school times, although most of the children take these kinds of foods as a lunch or as a snack to school (Evans et al., 2012). The priming of fruit with the advergame did not elicit a strong effect on subsequent fruit intake, which may entail that children should be more frequently exposed to food cues of healthy food products. A study by Reisch et al. (2013) found that children's food preferences are influenced by their immediate environments, which includes their families, peers and role models, but also their exposure to and familiarity with certain food products. As the marketing for unhealthy foods is ubiquitous (Wardle et al., 2008), the frequent exposure to healthy food cues could lead to similar effects and result in increased fruit intake. Importantly, this current study only examined the immediate effect on intake, but a medium-term effect on fruit consumption at a

later home meal could be likely if this was a more familiar context. Food choices are considered to be strongly affected by the "triple A" effect of the respective food items: availability, affordability, and accessibility (Elinder & Jansson, 2008).

Food marketers have objected the marketing healthy foods as a solution in the past, as children were supposed to have shown only limited responsiveness to marketing messages that promote health benefits of foods (FTC, 2008). The findings of this study resemble what Harris, Brownell & Bargh (2009) formulate as a *competitive advantage* of unhealthy foods vis-à-vis healthy food products: the marketing of unhealthy food that are made to taste good may always possess an unfair advantage over the marketing of healthy foods and educational efforts emphasizing its benefits. This means that more innovative techniques are needed to support behavioural changes, which should rely on automatic processes (Coelho et al., 2012; Hofmann, Rauch, & Gawronski, 2007; Marteau, Hollands, & Fletcher, 2012) rather than explicit ways of changing cognitive structures, such as education-based interventions on advertising literacy (Knai et al., 2006).

The advergame that was used in this study can be considered an example of a relatively new method, although it was demonstrated as not effective to stimulate higher fruit intake. The effectiveness of other novel methods that target cognitive processes underlying eating behaviour could improve if they were part of a comprehensive approach, which could include environmental changes such as increase in availability of fruit and vegetables in the daily lives of children. More research is needed to make use of psychological mechanisms in current marketing techniques that can influence eating behaviour in children. In particular, experiments need to examine when and for whom novel techniques may increase healthy food intake. What is certain is that the current obesogenic environment will not change rapidly into a healthier one and stimulating children to consume fruit and vegetables through techniques that appeal to children might be an addition to existing interventions.

Based on the elaborations above, the conclusions of this study are presented in the next chapter.

8   Conclusions

This chapter summarizes the main findings of this research, elaborates on its strengths and limitations and highlights options for future research.

8.1   Main findings

Although there is a multitude of factors that add to childhood obesity, one of the potential contributors is the exposure of children to advertising messages promoting unhealthy food products in online environments. In order to counteract the rising prevalence of childhood obesity, there is a growing recognition among researchers and health experts that there is a need to encourage the consumption of healthy food products by children and adolescents. This study attempted to synthesise current knowledge on the impacts of online marketing targeting children (RQ1), identify prevalent marketing techniques and protective measures in online games and advergames (RQ2) and examine if an advergame promoting fruit affects children's subsequent fruit intake (RQ3).

Available research suggests that concerns about the potential harmful impact of marketing techniques to children are well founded. The findings from this literature review have shown that marketing directed at children has been very often studied from a health perspective, elaborating on its potentially harmful effects for children. Current research suggests that young people are faced with enormous quantities of promotional content on a daily basis and new marketing practices are potentially more effective than traditional marketing techniques. For example, branded websites may be highly effective because people spend significant amounts of time with advertising content. Similarly, marketing content embedded in online games is highly involving and entertaining, and there are potentially no restrictions to limit children's exposure. Literature suggests that a defining characteristic of the current media environment that children are exposed to is the level of integration between the persuasive message and the media content.

Games provided in platforms such as the App Store, Google Play, Facebook and advergames from corporate company websites commonly apply features and practices that are particularly appealing to young audiences and intend to promote certain goods or encourage users to extend game play, and hence, be exposed to advertising content for longer periods of time. Embedded and contextual advertisements are frequently used in online games, while most games provided in platforms further induce users to purchase additional features to enhance the gaming

experience, or to extend gameplay and thereby exposure to marketing content. At the same time, most of the games provided in platforms fail to provide protective measures to effectively protect children from these practices. The lack and content deficiencies of ad breaks in games, where content and advertisement are blended almost seamlessly such as in the case for advergames, seems particularly worrisome. The high level of integration between entertainment and persuasive elements means that children are not always able to identify commercial content as such. This renders particularly young children influenced by online advertisements without them being aware. A majority of experimental studies clearly point towards a detrimental impact of online food marketing on young people's health, as it may lead to increased food intake of food products advertised, which are found to be predominantly unhealthy food products. Also, findings from nonexperimental studies revealed that exposure to online advertising is positively associated with dietary intake in children. Hence, current research pinpoints towards the negative health outcomes of the current marketing landscape for children. Less research, however, has been conducted to investigate the potential of currently deployed marketing techniques, and more concretely – advergames - to encourage the intake of healthy food products, which revealed an opportunity for research.

The design of the experiment in this study was therefore driven by an empirically based assumption building on previous research, namely, that the effectiveness of current food marketing techniques such as advergames could also be used for the marketing of healthy food products such as fruit. Playing an advergame differs from conventional forms of advertising in three ways (Folkvord et al., 2016). First of all, they allow users to have a highly involving, interactive and entertaining experience with a product or brand that is not possible with traditional forms of advertising such as TV. In the latter, the recipient receives the commercial message (only) passively but does not engage with it. Second, branded online games embed brand messages in an entertaining animated context. This mix of commercial message with entertainment media often makes it very difficult for young users to understand the commercial purpose of these games (Van Reijmersdal et al., 2012; Buijzen et al., 2010). Last but not least, exposure to the commercial messages in advergames is potentially much longer than the exposure to a typical advertisement, as the game can be repeated again and again. It is suggested that these factors largely explain why the impact of this marketing technique on children's food intake is so strong (Folkvord et a., 2016).

Empirical evidence suggests that food marketing via advergames affects actual food intake. However, so far, results from experimental research remained contested as to whether

advergames can be used to stimulate healthy food intake. A few studies have shown that exposure to food cues in advergames leads to the consumption of the product advertised, irrespective of whether they are healthy or not. The study by Pempek & Calvert (2009) demonstrated that children who played a healthier version of an advergame selected and ate significantly more healthy snacks than those who played the less healthy version. Also, the study conducted only a couple of years later by Dias & Agante (2011) showed that the preference for healthy products was higher for those children who played the healthy version of the advergame. Yet, in the study by Folkvord et al. (2013), children who played the fruit version of the advergame did not eat significantly more fruit than did those in the other groups. What was similar in all these studies is that after exposure to the respective food cues, children were offered both snacks or products of lower nutritional quality and healthy snacks such as fruit to choose from.

This current study differed from these studies by testing the effects of an advergame promoting fruit on children's subsequent fruit intake when no unhealthy food products are offered after playing the advergame. It was hypothesized that an advergame promoting fruit could encourage the subsequent intake of fruit. However, its effectiveness to encourage the intake of fruit could not be confirmed. No demonstrable difference was found in the amount of fruit intake based on the different conditions (children who played the advergame to promote a fruit brand, children who played an advergame to promote a toy brand and the control condition). Based on the results of this study, marketing via advergames is not a useful technique to increase the intake of fruit by children. Its effectiveness as a technique to encourage healthy eating behaviours among younger people is therefore questionable. It is therefore necessary to test whether other marketing forms are more effective to encourage the intake of healthier foods and educate children from very early ages on to strive for healthy lifestyles.

Overall, much evidence suggests that young people are excessively exposed to marketing techniques that exploit their developmental needs (Harris, Brownell & Bargh, 2009). This is even more pronounced as online advertising exposes children to commercial messages which would not be permitted in more familiar (and more thoroughly researched and regulated) media, such as print and television (Kervin, Jones & Mantei, 2012), especially as concerns the level of embeddedness of commercial content with other media content. This study revealed that there is generally a lack of protective measures used in online games and advergames that would enable users to be aware of their exposure to commercial messages. It could therefore be interesting to develop new and innovative protective measures that are included in these games

to support children to de-flow and raise their awareness about the potential health effects of the products advertised. These could be in the shape of add warnings or disclaimers that cannot simply be clicked away and/or inform users about the impact of these products on their health in a child-friendly way. A recent example of this type of disclaimers was put forward by Disney, who included add warnings for racist stereotypes in some of its classic animated films. Before viewers watch some of these films, they are warned about scenes that include "negative depictions" or "mistreatment of people or cultures" in a 12-second disclaimer that cannot be skipped and directs viewers to a website that explains some of the problematic scenes. A similar approach could be adopted for online games and advergames advertising HSFF foods.

From a policy perspective, current regulatory and self-regulatory environment surrounding online marketing is unlikely to constrain the amount and effects of the promotion of unhealthy food products. Policy makers have relied heavily on self-regulation of marketing practices of HFSS foods in the past. Digital marketing is to a significant extent subject to industry self-regulation and voluntary pledges (Harris et al., 2009; Jones et al., 2014) with limited government regulation protecting children from highly commercialised online environments (Calvert, 2008; Linn & Novosat, 2008; Schwartz, Kunkel & Delucia, 2013). As opposed to new advertising formats, commercial content during children's programs in television is subject to time limitations and has to be distinguishable from program content as a rule, while online advertising is less regulated. However, industry-led initiatives are not sufficient to protect young children from marketers attempt to consume their products as their fail to restrict the use of practices that do not transparently disclose their commercial interest. As Harris, Brownell & Bargh (2012) put it "*given the financial bonanza that is the youth market, the clear importance to industry to foster brand loyalty early in life, and the ease of convincing children to eat foods high in sugar, fat, and salt, there is every reason to distrust the motives of industry self-regulation* "(p. 32).

Recently, the EU consumer and marketing law has been revised in order to enhance the protection of children from unfair commercial practices in online environments. Also, the General Data Protection Regulation (GDPR) will have a significant impact on the advertising industry and their handling and use of user data to target their advertisements. Nevertheless, the WHO (2018b) pointed out it that despite existing political commitments, evidence reveals that children and adolescents are still regularly exposed to digital marketing of many unhealthy food products. Importantly, governments responses and public health institutions still lag behind, and efforts are complicated by rapid technological changes in digital and marketing strategies

adopted by business. A key question that remains, however, is how to reach a balance between legislative regulation and self-regulation by the industry to ensure adequate protection for children. Due to its inherent nature, self-regulatory efforts lack the ability to enforce ethical standards and behaviour without a credible threat of government regulation. At the same time, policy makers refrain from regulating online business too much in order to allow for innovation.

Given these shortcomings, parent's roles in governing children's online behaviour have been proposed (Harris, Brownell & Bargh, 2009; Jain, 2010), so as awareness raising initiatives among children to enhance understanding (Blades, Oates & Li, 2013), alongside increased governmental and industry efforts to ensure responsible and ethical advertising (Calvert, 2008; Harris et al., 2009; Montgomery et al., 2012, Jain, 2010). Parents have an important role to play in presenting children with healthy food options on a daily basis. Energy dense foods are readily available to most children, which exposes them to eating environments that are detrimental for their health and encourage unhealthy dietary choices (Birch, 1999). However, given the current media landscape and fast technological advancements that allow for ever more sophisticated and targeted marketing practices, it has become increasingly difficult for parents to adequately protect their children from advertising practices (Spliteri-Cornish, 2014).

On a general level, a reduction in exposure to food cues of unhealthy products and an increase of exposure to healthy food cues is regarded as an important step to encourage healthy eating behaviours and support obesity prevention interventions. Moving forward therefore requires a holistic approach to encourage healthy food intake: exposure to healthy food cues together with the availability of healthy food products that only encourages the consumption of products of high nutritional value; the development of innovative and effective protective measures; educational interventions to reach children and youth about the importance of a healthy diet for their overall wellbeing and health; and the provision of a regulatory framework restricting practices that exploit children as consumers especially in online environments.

8.2   Strengths and limitations

Despite broad consensus that food marketing exposure is a key modifiable variable to the development of children's food preferences, health related behaviour is developed in complex and interrelated pathways (Cairns et al., 2013), which brings methodological challenges inherent to differentiating the impact of marketing from other factors.

The strength of this study is the combination of different research methods to inform the issue with the overall goal of using the synthesized knowledge to investigate whether advergames as a marketing technique proof effective to increase children's consumption of healthy food products. A strength of this study is also the fairly strong outline of context of the research and insights gained from previous research related to the impact of marketing on children's behaviour. At the same time, it shows why there has to be a reduction of children's exposure to highly sophisticated marketing content encouraging the consumption of unhealthy food products. The study went beyond replication of previous work and studied some aspects on the topic using several different research methods that enabled the triangulation of research results.

Investigating the impact of an advergame on children's subsequent fruit intake using a similar design as in other research on the issue, the study nevertheless has a number of limitations. One limitation relates to the fact that the current knowledge in the field has been enriched in the past few years with new studies dedicated to the impact of online marketing targeting children. The literature review performed in this study was limited to the state of knowledge up to mid 2015. As the volume of research in the area has increased in the last years, more recent works in the field have been taken account of in the discussion section of this this work. The literature review has synthesized the academic literature on online advertising directed at children with a focus on its impact on children. While the importance of the findings from these works cannot be overstated, another limitation remains in that many of these studies concerned short-term effects. Longitudinal research will be important to test the direction of the effects reported in many of the studies that have been reviewed in this study.

Another limitation concerns the content analysis performed in this study. The content analysis provides only a snapshot of available games. Despite the relatively small sample of available games to conduct a content analysis, it was nevertheless demonstrated the potential for high exposure of children and young adults to problematic practices in games from the three platforms and the advergames based on this selection. A second limitation rests on its design as a cross-sectional study involving the data collection at one specific point in time. Online

environments are developing rapidly, and it is worthwhile to keep track of developments and the use of new techniques that may not have been considered in this study. New games are introduced on a frequent basis together with new marketing techniques that are developed. Monitoring new media and investigating is inherently difficult because websites can be changed easily, new strategies are developed, and social networks allow marketers to privately reach out to young people with commercial appeals. In addition, only two coders were used in the content analysis, which could be extended to more coders. The analysis conducted, nevertheless, showed that high consensus existed between the appraisers. Lastly, the indicators used to establish the presence and characteristics of marketing techniques and its characteristics have been derived from selected literature. Although the coding scheme is very straight forward and based on previous studies in the field, which is a solid approach used in the research, it may be extended to other features and characteristics that have not been considered in this present study.

Lastly, there are some limitations related to the experiment. One limitation of the experiment is that the final sample consisted of 123 children divided over three conditions. Hence, each sample consisted of about forty children, which is a relatively small sample size considered. However, compared to other experiments testing the effects of advergames, similar participant numbers have been tested. Future studies could use larger sample sizes to test the effectiveness of advergames or other marketing techniques to promote healthy food. Another limitation of the experiment was that it only included two specific types of fruit in the experiment. Bananas and apples are, however, the most popular and frequently consumed fruit products in the Netherlands, where the experiment was conducted. Future studies could use more different types of fruit because some children might not like these fruit products, and this might have an effect on the results. In addition, it could be interesting to test the effects for younger age groups, as their persuasion knowledge may be lower and hence, different results could be retrieved.

Next, although no effect was found for the fruit that children selected and ate, long-term effects of advergames on food and beverage choices were not assessed in this study. Future studies should examine the benefits of playing advergames promoting healthy food for a longer period using a longitudinal design. Effects of such game play may be short-lived, but repeated exposure could also enhance the effects. As this study has extensively elaborated upon, children are exposed to a multitude food marketing while they grow up, predominantly for unhealthy and palatable food products. This accumulation of exposure makes food marketing for unhealthy foods very effective (Boyland et al., 2016; Folkvord et al., 2016). It might therefore be important to conduct food marketing activities for healthier foods for longer periods, with

different techniques (e.g., celebrity endorsement, vloggers, television advertising, billboards), to be able to assess its effectiveness compared to the food marketing for unhealthy foods.

Another limitation of the experiment was that children played the study for only 5 minutes. In real life settings, the exposure to branded content in advergames may be significantly higher, especially if no ad breaks are featured in the game. This means that effects could be stronger than the effects identified in this study. A last limitation is the availability of food after playing an advergame. In real life settings, the food items promoted in an advergame may not be available, and even less, in unlimited amounts, which means that actual food intake might be different in real life settings.

8.3   Future research

Childhood obesity continues to be a major problem in our current society which renders further research necessary. The marketing of energy-dense, nutrient poor foods and beverages remains omnipresent and continues to challenge policy makers around the globe to curb this public health challenge. The marketing of these products nevertheless constitutes a key modifiable factor influencing children's dietary patterns (Jenkin et al., 2013; Reisch et al., 2013). In light of the findings of this study, a number of future research directions appear relevant to increase our insights about the impact of online marketing to children, and potentially use these insights to promote healthy food consumption. Academics and policy makers will continue to face difficulties to keep pace with technological advancements that are used for ever more sophisticated marketing strategies that target lower levels of cognitive elaboration. Therefore, more research is needed to track evolving marketing practices and design effective strategies to increase young people's awareness of persuasive intents at the time of exposure. Given food marketers interest in adopting online advertising strategies that target lower levels of persuasion, academic attention could be dedicated to the how to "de-flow", for example, protective measures incorporated into advertising formats such as advergames. Another opportunity for research is to study the flow experience and its impact on the persuasion effects of other types of advergames in-depth.

Growing awareness among children of the importance of a healthy diet should be a priority for parents, caretakers and politicians. Therefore, increased academic attention should also focus on critical media and advertising skills of children, as well as the role of parents and schools in socialising children into informed citizens that are interested in following a healthy lifestyle. Teaching children about less healthy and healthy foods and their impact on wellbeing should start already in pre-school years (Tatlow-Golden et al., 2013). An interesting line of research could be whether advertising literacy interventions can increase the level of cognitive processing of food cues. Increasing children's media and advertising literacy could well result in higher levels of scepticism towards advertisements and eventually to lower susceptibility and reactivity to food cues which may continue to be predominantly for unhealthy food products. Studies should address how media and advertising literacy interventions can support children to process food advertisement more consciously and at higher levels of cognitive processing. These studies could then test whether these interventions mediate the impact of relevant cues embedded in advertisements.

In addition, research has often focused upon children as a homogenous group. A number of studies suggest that some children may be more vulnerable to the effects of food advertising than others, which renders a more developmental perspective in research addressing the impacts of marketing desirable. Certain characteristics and individual dispositional factors of children, such as being obese, may play a part in their individual processing of commercial messages (King & Hill, 2008, Folkvord et al., 2016). For example, research suggests that children with a higher BMI recognise more food advertisements and consume more foods following exposure (Halford et al., 2004). These results were corroborated in a follow up study a few years later (Halford et al., 2007). Folkvord et al. (2016) found that individual dispositional factors impact on children's processing of food cues and their reactivity in advertisement. Future research should therefore study the differences in vulnerability and marketing effects by age and demographic groups more extensively.

The study has shown that online advertisements have impact on behaviour that often occurs beyond the awareness threshold. An interesting opportunity for research could be to steer young people into taking healthier decisions without compromising their own choice to select. Behaviourally informed approaches make use of nudges to steer young people to adopt healthier lifestyles and choices (cf. Thaler & Sunstein, 2008). From this point of view, parents and caretakers act as "choice architects" that nudge their children's choice and selection of healthier food options by regularly offering these products (Reisch et al., 2013). This could lead to a change of behavioural patterns that ultimately result in "the healthy choice" being "the easy choice" (Volpp & Asch, 2017). Current research in the field comes to conclusion that nudges hold promise in fostering healthier food choices (Bauer & Reisch, 2019). A key aspect would be to develop interventions targeted to the specific audiences in a non-complex, easily comprehensible manner to help prioritize health aspects in their decision behaviour.

Lastly, more research is needed on the effectiveness of using online games and advergames, as well as other novel techniques, as tools to promote healthy preferences and behaviours using longitudinal designs. More extensive research efforts are needed to inquire how healthy food and behaviours can be effectively marketed to children and young people. Future studies could, for example, examine the benefit of playing advergames promoting healthy food for a longer period using a longitudinal design. Also marketing campaigns via other media channels that are popular with children, such as YouTube, could be tested for their effectiveness to promote healthy food products to children. Given the growing popularity of social media influencers, the marketing of food and beverage products via featured content on YouTube and other social

networks could entail vast potential to influence healthier eating habits. Although this research agenda is not exhaustive, it shows important gaps in the literature and interesting areas for further work.

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10 Annexes

10.1 Annex 1 Summary parameters of literature reviewed

10.1.1 Miscellaneous studies

Miscellaneous studies reviewed						
Author	Article Type	Field	Type of marketing	Artefact	Focus	Summary/Conclusion
Blades, Oates & Li (2013)	Short communication	Public health	Online Food/ Beverage marketing	Internet/ websites	Children's ability to identify advertisements included on web-pages	Children's lack of proficiency in identifying what is and is not an advertisement on a webpage make them vulnerable to new forms of advertising. Alternative to restricting advertising to young children on the Internet, awareness raising activities on food and other advertising in newer media is proposed.
Calvert (2008)	Review	Regulation and protective measures	Online Food/ Beverage marketing	Other media	Impact of new marketing techniques and regulatory responses to it	New technologies are providing new ways for marketers to reach children. Marketing practices such as repetition, branded environments, and free prizes are effective in attracting children's attention, making products stay in their memory, and influencing their purchasing choices. Online environment less heavily regulated than traditional media.
Chen et al. (2013)	Mixed	Regulation and protective measures	Mobile Marketing	Apps/ mobile	Content appropriateness of in-app advertisements on mobile devices from children's	In-app advertisements are common in the free apps designed for children on smart platforms. A large percent of the in-app advertisements carry inappropriate contents for children. Neither mobile platforms nor advertising

Miscellaneous studies reviewed						
Author	Article Type	Field	Type of marketing	Artefact	Focus	Summary/Conclusion
					online safety perspective	networks provide maturity policies to restrict the content appropriateness of the in-app advertisements.
Harris, Brownell & Bargh (2009)	Theoretical discussion	Public health	Online Food/ Beverage marketing	Other media	Introduction of a food marketing defence model	Increasing the focus on psychological processes in food marketing can help in several important ways: (1) to help youth develop skills to better defend themselves against toxic influences; (2) to alert parents, educators and health officials about forms and effects of marketing on children and adolescents; (3) to inform the public policy agenda; (4) to provide information to develop successful campaigns to promote healthy eating.
Harris et al. (2009)	Discussion	Public health	Online Food/ Beverage marketing	Other media	Reviews existing knowledge on the impact of marketing and the value of approaches to change	Of the factors posited to be linked to childhood obesity, food marketing is one of the most thoroughly tested. Evidence shows clear and powerful effects of food marketing and justifies action by organizations and governments.
Jain (2010)	Discussion	Public health	Online Food/ Beverage marketing	Internet/ websites	Impact of newer marketing techniques directed at children and the potential	New marketing techniques directed at children are becoming widespread. Current and future regulatory effects have to address marketing to which children are

Miscellaneous studies reviewed						
Author	Article Type	Field	Type of marketing	Artefact	Focus	Summary/Conclusion
					implications on childhood obesity	exposed and should measure the success in terms of children's consumption of these products.
Jones et al. (2014)	Review	Regulation and protective measures	Online Food/ Beverage marketing	Internet/ websites	Review of programs and policies to prevent children from accessing alcohol marketing online.	Alcohol websites typically deploy poor filter systems to prevent entry of underage persons. Even the most effective commercial Internet filters allowed access to one-third of the sites that were examined.
Linn & Novosat (2008)	Review	Public health	Online Food/ Beverage marketing	Other media	Assessment of the depth and breadth of child-centred food marketing and discussion of grassroots strategies for instituting change.	Parents can no longer keep pace either with innovations in advertising or increased spending, which suggests the need for more stringent government regulations on food marketing to children. The government should take steps to restrict the current proliferation of food marketing targeting children.
Montgomery & Chester (2009)	Review	Public health	Online Food/ Beverage marketing	Other media	Review of digital marketing strategies targeted at children and adolescents.	More responsible marketing practices are needed. Industry research concerning behavioural targeting in general, and marketing to youth in particular, has to be more transparent.

Miscellaneous studies reviewed						
Author	Article Type	Field	Type of marketing	Artefact	Focus	Summary/Conclusion
Montgomery et al. (2012)	Review	Public health	Online Food/ Beverage marketing	Other media	Overview of the growing digital media and marketing landscape, and developments shaping marketing strategies and techniques.	A set of fair marketing principles and practices to protect children online are needed, which should focus on all digital marketing targeted at both young children and adolescents. The governmental and industry needs to ensure that youth are not subjected to unfair and deceptive marketing, particularly for unhealthy products.
Nairn & Fine (2008)	Theoretical discussion	Public health	Online Marketing	Other media	Discussion of children's age-related ability to understand advertising and the changes in children's advertising formats	Applications of new findings from neuroscience and psychology show that advertising techniques that use evaluative conditioning formats manipulate consumer behaviour via implicit attitude change. Children do not possess sufficient cognitive control capacities to resist implicit persuasion, and even adolescents may have difficulty, relative to adults.
Sandberg, Gidlof & Holmberg (2011)	Mixed	Marketing	Online Marketing	Internet/ websites	Children's exposure to advertising	The study suggests a substantial difference between girls' and boys' actual exposure to Internet advertising. The gender differences are most noticeable in the categories gambling, ad links and lifestyle and recreation. Most

Miscellaneous studies reviewed						
Author	Article Type	Field	Type of marketing	Artefact	Focus	Summary/Conclusion
						students experience the online advertising as a nuisance. They are irritated, annoyed and upset about it for various reasons.
Schwartz, Kunkel & Delucia (2013)	Review	Regulation and protective measures	Online Food/ Beverage marketing	Other media	Effects of food advertising on children and policies to combat unhealthy food marketing	Food marketing directed at children is ubiquitous and effective and is a significant contributor to childhood obesity. Food marketing to children must be regulated better.
Thomson (2011)	Discussion	Public health	Online Food/ Beverage marketing	Advergames	Analysis of online child-targeted food advergames	The advergames provided on Millsberry.com send players contradictory messages about health by simultaneously promoting nutritional wellness and consumption of high-sugar cereals. Mixed messages about nutritional health used in advergames are highly problematic, particularly given the alarming increase in diet and weight-related diseases among children.

10.1.2 Content Analyses

Content analyses reviewed				
Authors (year)	**Topic (N artefacts)/ Perspective**	**Indicators**		**Summary/ conclusion**
Alvy & Calvert (2008)	Online Food/ Beverage Marketing (n=10 websites) Public Health	**Marketing as:** • advertisement • a product placement • integrated marketing page • Advergame	**Features** • Animation • Bold/colorful text • Dynamic image • Branded character presence	A majority of children's websites contain food marketing. Online advertisements, advergames and integrated marketing pages use many of the same techniques as television commercials, with possibly similar effects. The seamless integration of content and marketing observed on some children's sites may make online advertising even more effective than advertising on television.
An & Kang (2013)	Online Food/Beverage Marketing (n=164 brand websites / 542 advergames) Regulation and protective measures	**Format of ad break** • One-sentence / multiple sentence ad break • Icons • Combination **Content of ad break** • Introductory explanation about the ad break itself • Advertising literacy components	**Characteristics of ad break** • Placement • Duration Interactivity • Color • Size • Readability	Major food marketers extensively use advergames to reach children. A majority of websites targeting children under analysis contained advergames, while very few websites contained ad breaks. Problems also prevail in terms of visibility, readability and lack of explanation about the commercial intent of advergames.

An & Kang (2014)	Online Food/ Beverage Marketing (n=131 websites/advergames) Regulation and protective measures	**Advergames as:** • online game featuring individual products or brands	**Characteristics of ad break** • Placement • Duration • Readability		Very few websites make a distinction between advergames and general games. Only about 10% of the advergames notify users of their commercial nature via ad breaks during the game, and those breaks demonstrated potential problems in terms of visibility, content and readability. Advergames featuring food products in the games tend to show foods high in calories and with low nutritional value.
Brady et al. (2010)	Online Food/Beverage Marketing (n=24 websites) Regulation and protective measures	**Engagement features** • Prompts for repeat and prolonged visits • Interactive elements	**Brand preferences** • Brand and product imagery • Featured food and beverage products	**Brand engagement** • Brand synergy • Integration of branded elements • Life-scape branding	The majority of sites target children between six and 12 years old, while fewer sites include more sophisticated graphics, language and mature themes favoured by adolescents. There is an increased use of exceedingly sophisticated and highly engaging marketing techniques promoting nutritionally poor branded food and beverage products that pervade children's online environment outside the scope of existing regulatory codes.
Bucy, Kim & Park (2011)	Online Marketing (n=101 websites)	**Marketing technique** • Spokes-characters in online advertising/ product-based games			A majority of sites e characters for persuasive purposes and do not identify advertising with an explicit label when characters are featured on their homepages. Similar patterns are identified for product-based games. Over time, fewer websites featured product characters on their homepage, but the use of character-

	Regulation and protective measures				advertising in product-based games (advergames) increased substantially.
Cai (2008)	Online Marketing (n=196 websites, 751 ads) Regulation and protective measures	**Advertisement Features** • Prompt words • Enticement • Earning money • Receiving gifts • Joining clubs **Privacy features of the website** • Link to privacy policy page • Collection of personal information	**Privacy features of the advertising page** • Direction to other websites • Targeting general public/ children	• Link to privacy policies • Collection of personal information	Compared to for-profit websites for children, non-profit websites host fewer ads, and such ads are less likely to contain prompt words and enticements. Non-profit websites still carry ads that would link children to for-profit websites that collect personal information. Non-profit websites to make more efforts to fully protect children's privacy online.
Cai & Zhao (2010)	Online Marketing (n=133 websites, 697 ads) Public Health	**Structural Ad features** • Graphics • Type of enticement • Bridge window or page/ Ad alerts • Identification/ labelling of ads • Prompting words	**Privacy features** • Target population • Page as personal information collection device • Links to personal collection of children Privacy policy links		Most children's websites contain hosted ads on their homepages. The majority of ads are not identified as ads, while almost 2 in 5 are identified as targeting children. Most ads are graphical and dynamic to easily attract children's attention. Because of the simultaneous presentation of ads and content on the web, simple and effective cues are needed to help children distinguish ads from content, particularly those among in the limited processing stage (under the age of 7). Besides the structural similarity

				between ads and content, the information contained in ads could also be inviting to children.
Cai & Zhao (2013) (n=117 websites)	Online Marketing Regulation and protective measures	**Structural Ad features** • Number of advertising positions on the homepage • Target audience **Advertisement features** • Presence of graphics and dynamism • Type of enticement offered by the ad	• Availability of bridge window or page • Ad labelling • Prompting words such as ''go,'' ''click here'' **Privacy features** • A link to the website's privacy policy on the homepage • Collection of personal information • Prior parental permission • Number of third-party advertising	A majority of children's websites carry ads, but not all specifically target children. Ads are everywhere on the websites and are often graphical. Many ads are labelled but few used a bridge window or page. A substantial proportion use prompt words and enticements to draw children in. Structural features make it make it especially difficult for children to understand the advertiser's intent. Ad labelling is common, and few commercial websites are collecting personal information from children.
Cheyne et al. (2013) (n=17 websites)	Online Food Beverage Marketing Public Health	**Engagement features** • Included features (games, videos, quizzes) • Branding present (spokes-characters, product's package)	• Representation of product • Claims made on the site **Information gathering and personalization techniques** • Site registration • Content sharing • Customizable content • Avatar creation virtual worlds	Top cereal manufacturers maintain child targeted websites that use a variety of branded engagement techniques to target children including branded engagement techniques such as advergames, videos, site registration, and viral marketing, including inviting friends to join the site. Despite cereal manufacturers' self-regulatory pledge to improve their marketing to children, their marketing practices exploit children's susceptibility to advertising by almost exclusively promoting high-sugar cereals using these deeply engaging techniques.

Cicchirillo & Lin (2011)	Online Food/Beverage Marketing (n=80 Advergames) Public Health	**Focus of the game** • Health-related information • Product-related information • Company related info **Game functions** • Teach about product • Teach about health	**Sponsor in the game** • Sponsor's identifiers • Levels of integration • Sponsored messages • Games Genres • Representation of one-self and the opponent • Rewards • Punishments • Incentives to try the product • Printable results	There are considerable differences in the interactive gaming genre types employed by non-profit and for-profit organizations. These differences may have an impact on children's perceptions of unhealthy products and a potential link to childhood obesity. A majority of non-profit advergames focus on health-related messages regarding food intake, whereas the majority of for profit advergames offer little if any nutritional information.
Culp, Bell & Cassady (2010)	Online Food/Beverage Marketing (n=19 websites, 247 games) Public Health	**Features** • Online games • Sweepstakes contests • Free downloads • Page customization **Branding Features** • Brand identifiers • Logos • Product brand logo	• Product package images • Textual representations of brands • Product images **Educational nutrition-related content** • Healthful messages • Pro-nutritional messages • Links to sites • Physical activity messages	Food advertisements on children's television networks promoted websites are frequently sponsored by companies selling food items high in sugar and/or fat. The majority of the websites have features that appeal to children, including free online games, sweepstakes and downloads. Websites features at least one brand identifier, and many feature multiple identifiers in games and non-game pages.
Dahl, Eagle & Báez (2009)	Online Advertising (n= 15 websites,	**Advertisement Features** • Separation of content and advertising	• Pressure to purchase • Viral marketing • Domain names • Advergames as part of the overall corporate website, or as a separate website	Only two examples are identified in which children are steered towards healthier, varied diet and encouraged to exercise (Kellogg´s and Dairy Lea, which presented themselves as de facto alternative to sweets).

	184 Advergames)	• Availability of health or nutritional information	• Registration	
	Marketing			
Flowers, Lustyik & Gulyás (2010)	Online Food /Beverage Marketing (n=27 Advergames) Regulation and protective measures	**Advertisement Features** • Membership • Registration • Disclaimer • Brand Immersion	**Game features** • Promotion • Interactive Brand Extensions	As concerns junk food advergames, Hungarian youth are approached by advertisers in rather similar fashion to those in the UK. Hungarian children constitute a crucial "entry point" for food advertisers and manufacturers because they are more curious, flexible, and receptive than adults, and a positive association with "Western" brands.
Freeman et al. (2014)	Online Food/Beverage Marketing (n=27 Facebook pages) Marketing	**Features** • Competitions, prizes, giveaways • Special price promotions • Vouchers, offers, rebates • Celebrities • Children's characters • Branded characters • Branding elements • Games	• Photos • Fan page profile • Personal page profile **Quizzes and polls** • Videos • Events • Apps • Conversations • Links • User-generated content • Sponsorships and partnerships • Corporate social responsibility and philanthropy	All of the food and beverage brand pages comprise products classified as high in calories but low in nutritional value. Pages widely use marketing features unique to social media that increase consumer interaction and engagement. Common techniques include competitions based on user-generated content, interactive games, and apps. Four pages include apps that allow followers to place an order directly through Facebook. Adolescent and young adult Facebook users appear most receptive to engaging with this content.

Griffiths & Casswell (2010)	Online Food/Beverage Marketing (Alcohol) (n=150 Bebo Web pages) Public Health	**Alcohol and personal image** • Quizzes • Viral marketing Fan Social Networking		A high level of viral circulation and enjoyment of alcohol-related messages and brand material within this media platform is identified. These activities may further contribute towards the normalisation of youth consumption of alcohol.
Henry & Story (2009)	Online Food /Beverage Marketing (n=130 websites) Public Health	**Advertisement** **Features** • Graphics • Movement and motion • Animation • Interactive component/ programs • Sound Music **Product attributes** • Picture of product/ Logo or product symbol • Link for product information **Engagement**	**Tie-ins** • Tie-in to television commercial • Tie-in to sporting events **Promotional characters** • Spokes-characters • Cartoon characters • Pictures of celebrities or athletes • Children depicted consuming product **Gaming and fun** • Designated children's area/ kids' club • Fun section • Advergaming • Downloads	**E-mails and accounts** • Newsletter • Send E-cards or text messages **On-line store** • Store to purchase branded merchandise **Nutrition and health** • Health topics • Nutrition information • Nutritional messages **Safeguards** • Ad break warning Parental permission required statement

		• Promotional items • Sweepstakes or contests • Prizes/ merchandise	• Registering/ Member sign-in	
Hofmeister-Toth & Nagy (2011)	Online Food/Beverage Marketing (n=11 websites, 50 Advergames) Marketing	**Advergame genre** • Adventure • Logic • Strategy etc. **Brand features** • Brand placed in game or next to it • Visual features • Character • Colour	**Engagement features** • Rewards for completing the game **Special interactive features** • Online social communities • Holidays • Anniversaries/ Holidays (Christmas, birthday etc.) • Time limit of games	Similar to online advertisements, advergames and integrated marketing pages use many the same techniques as TV commercials, and consequently have similar effects. The seamless integration of content and marketing observed in some children's sites may operate even more effective online marketing strategies than TV advertisements.
Jernigan & Rushman (2014)	Online Food/Beverage Marketing (Alcohol (n=15 alcohol- branded pages on Facebook) Public Health	**Brand posts** **Users responses to brand posts** • Posts • Likes • Shares • Comments		Examination of the policies for Facebook, YouTube and Twitter shows gaps in ensuring that alcohol brand content is restricted to audiences above the legal purchase age and does not reach underage users.

Jones, Wiese, Fabrianesi (2008)	Online Food/Beverage marketing	**Promotion** • Competition • Advergames • Advertorial	**Marketing type** • In-site promotion • Advertisement	Food product promotions targeting children via popular children's magazine websites are commonplace. Much of this food product promotion on websites is indirect and subtle, with the majority of products being associated with a game or competitions and attached to opportunities for the child to win prizes.
	(n=5 websites)			
	Public Health			
Kelly et al. (2008)	Online Food/Beverage marketing	**Target audience** • Young children • Adolescents • General population **Brand identifiers** • Brand logo/ Product packaging graphics • Different brand variants • Product as part of the background **Gaming and children's sections** • Advergaming	• Designated children's sections • General gaming **Promotions** • Competitions • Giveaways • Fundraiser opportunities • Product samples **Promotional characters** • Spokes-characters • Sports figures • Celebrities • Cartoon characters **Partnerships and tie-ins** • Links to other food websites/ non-food websites • Other brands used in premiums • Television advertisement	Many instances of branding within websites are identified, with the majority of websites clearly displaying brand logos, product packaging graphics and available product variations. Food references are strongly skewed towards unhealthy foods. No child protection features are found on websites with branded food references, with no legal information, statements about cookies, information to parents, parental consent required to enter the sites or age blocks found on any of the websites.
	(n=315 websites)			
	Public Health			

			Child protection	
			• Legal information • Statement about 'cookies' • Parental consent required • Age blocks	
Potvin Kent et al. (2013)	Online Food/Beverage Marketing (n=147 websites) Public Health	**Marketing features** • Product logo/ Manufacturer logo • Slogan • Featured packaged product • TV- like commercials • Promotional photos • Videos • Recipes • Spokes characters **Branded/ unbranded virtual activities**	• Advergames/Unbranded interactive games • Activities that encourage purchase of product • Downloads **Protective measures** • Viewership restrictions for children under 13 • Viewership restrictions for children under 6 • Parental permission required statement • Ad alert/ad breaks **Healthy lifestyle messages** • Limited screen time • Promotion of physically active lifestyle Nutritionally balanced meal or snack	There is no mandatory preclearance of Internet marketing directed at children. Child protection features are present on fewer than 15% of the English websites and 18% of the French websites. In terms of marketing features, both the majority of the Canadian Children's Food and Beverage Advertising Initiative (CAI) and non-CAI websites feature product logos, the product you can eat/drink, and advergames. Advergames are present in 79% of the CAI websites and 62% of the non-CAI websites.
Kervin, Jones & Mantei (2012)	Online Food/Beverage marketing	**Advertisement features** • Recorded 'food instances' Advertising through:		Analysis reveals 13 examples of overt and 39 examples of covert food advertising across the three websites under analysis. Hidden advertisements in strategic placement of logos and images,

		• Webpage Banners /Recipe/ Game		product placement and reference, editorial comments and thematic choices.
	(n=3 websites)			
	Public Health			
Lascu et al. (2013)	Online Food /Beverage Marketing (n=161 websites) Regulation and protective measures	**Nutrition-related features** • Nutrition-facts • Other nutrition information • Calorie information • Presence of benefit claims • Fitting within a balanced diet • Compliance with an act **Game-related features** • Link to specific games • Recommendation for other games • Play again option • Presence of games • Return web site visits • Advertisements on game page	**Brand-related features** • Corporate logo image of the food • Brand appearance • Educational ties • Pictures of logos • Brand character conveying content • Brand ingredient history **Interactions-related features** • Viral marketing • E-greetings • Information to be collected from children • Use of cookies or not • Mechanism to contact the firm • Websites • Brand wallpapers • Screen savers challenge • Online privacy protection • Parent section **Rewards-related features** • Product as the end prize • Link to promotions	There are significant country differences in online marketing of food products to children. These differences in the websites are conceptualized to result from the differences in the socio-cultural and policy/regulatory environments of the three countries. The design of food companies' websites in terms of their emphasis on different categories of features reflects the companies' understanding of consumers in the respective country and government policy and enforcement of online communications.

			Rewards to members • Premium offers • Sweepstakes offers • Direct inducement to purchase	

Premiums and merchandise discounts

Attributes-related features

- Packaging
- Taste
- Appearance
- Aroma
- New packaging

Lee et al. (2009)	Online Food/ Beverage Marketing (n=139 websites, 290 Advergames) Public Health	**Type of brand identifier** - Brand logos - Branded food items - Product packages - Brand spokes-characters - Types of brand integration - Integrated as active game (earn points or to move to a higher level)	- Embedded as billboard-style ads within the Advergames - Displayed around the Advergame frames **Educational function** - To teach children about healthy eating habits - To teach them about product characteristic - To teach them about other subjects	Top-selling food marketers heavily use interactive children's games on their Websites. Brands are integrated as active game components. In many advergames children were invited to actively play with the food, while very few food advergames are found to serve to educate children about nutritional and health issues.
Lingas, Dorfmann & Bukofzer. (2009)	Online Food /Beverage marketing (n=28 websites)	**Marketing features** - Branded products in top children's websites and their nutritional quality		Food and beverage products advertised on websites accessed by children are those children should avoid given their low nutritional quality.

	Public Health			
Paek et al. (2014)	Online Food -/Beverage marketing (n=143 Advergames) Public Health	**Types of brand identifier** - Brand logos - Branded food items - Product packages - Brand spokes-characters **Age limit specification** - Absent, present and age limit suggested - Present and age limit enforced (must enter birthdate)	**Ad breaks** - Absent - Present only before game loads - Present only while game is loading - Present only after game loads - Present before and after loading - Present during loading (during playing game) - Present before, during and after loading	Most of the advergames promoted foods that are classified as unhealthy. Ad breaks are frequently present, including disclaimers before, during, and after loading.
Quilliam et al. (2011)	Online Food/Beverage Marketing (n=166 Advergames)	**Brand identifiers** - Brand names - Pictures of food or packaging - Spokes-characters	**Presence or absence of healthy lifestyle information** - Healthy diet/nutritional suggestions - physical activity suggestions	Among the interactive games studied, a vast majority includes some kind of brand identifier. Large differences can be identified between the Children's Food and Beverage Advertising Initiative (CFBAI) participating companies and non-participants in terms of inclusion of advertising breaks, but no difference in terms of inclusion of healthy lifestyle messages. A significant difference between CFBAI company Advergames and those offered by non-

				CFBAI participants in terms of the inclusion of food products that meet outside nutritionists'' recommendations is identified.
Sandberg (2011)	Online Food /Beverage Marketing (n=181 websites) Public Health	**Presence or absence of ad breaks/notice** • Type of site • Page level (first page or link) • Number of screenshots • Product category in • Advertisement • Presence of food or beverage on the site • Proportion of food and beverage pictures	• Food and beverage category • Presence of • (type) of unhealthy food on first page • Presence of children • Gender, age, activity or traces Connection between food and children • Use of marketing techniques **Features** • Mascots • Cartoons • Children's club/membership, competitions • Coupons • Additional activities material for free down-load games	Most of the food and beverage advertising can be found on the food-related sites. The child-oriented websites also contain food advertising but to a lesser degree. The proportion of advertisements for unhealthy food is high on both kinds of websites. In 2005, 70 percent of the websites in the sample contained brand incentives, usually several at the same time, whereas in 2007, the proportion of websites based on these kinds of marketing techniques was 50 percent. The brand incentives online are more elaborate than the ones used in the TV-commercials' due to Internet's interactive character.
Slater et al. (2012)	Online Advertising (n=14 websites) Marketing	**General features** • Type of advertisement (text, display, motion) • Product category	• Number of people presented • Estimated age • Overall appearance focus • Body emphasis on thin or muscular ideal	The advertisements identified promote a high variety of products, but by far the most frequently advertised relate to cosmetics and beauty products. Advertising on the Internet perpetuates the stereo- typical ideal of feminine beauty, reinforcing the importance of beauty and thinness.

Thomson (2010)	Online Food/Beverage Marketing (n=2 websites) Public Health	**Marketing feature** • Online branded gaming environments in which players are accompanied by a spokes-character through virtual worlds.	• Sites contain narrative series comprised of videos	Both Frootloops.com and Luckycharms.com represent cereal as a valued (treasured, magical) item, and reward players not just for consuming/ manipulating the desired food item, but also for mastering the marketing narratives/ discourses guiding online play. Players are disciplined (through play) into a potentially unhealthy nutritional logic in which the most nutritionally bereft food items are most valuable and the consumptive possibilities are endless.
Ustjanauskaus,Harris & Schwartz (2013)	Online Food/Beverage marketing (n=72 websites) Public Health	**Interactive content designed for children** • Online games • Virtual worlds	• Avatars • Virtual pets	The majority of ads targeting children feature unhealthy food products, while only a minority meets the Interagency Working Group on Food targeted To Children (IWG) standards for sodium, saturated fat, trans fat and added sugar. Display advertising remains an important advertising technique for food companies to reach large numbers of children.
Weatherspoon *et al.* (2013)	Online Food /Beverage Marketing (n=143 websites)	**Advertisements for Child-oriented food products** • Serving sizes and total calories • Total fat • Saturated fat • Added sugar	• Sodium • Cholesterol	A large number of foods with low nutritional value are being marketed to children via Advergames. A standardization of food marketing guidance is needed to better inform the public about healthfulness of foods advertised to children. Nutrition recommendations for foods marketed to children vary greatly and clear criteria and enforcement of food advertising guidelines and

	Public Health			regulations is warranted in the absence of consistent and enforceable voluntary standards.
Winpenny, Marteau & Nolte (2013)	Online Food/Beverage Marketing (Alcohol) (n=3 Social Websites) Public Health	**User engagement** • Facebook: Likes • Facebook: 'People Talking About This' • YouTube: Subscribers • YouTube: Video views • Twitter: Followers **Marketer-generated content** **Facebook** • 'Like' button • Page wall • Video advert • Competitions / free giveaways • Alcohol sale links • Additional content/apps	• Freq. on brand comments on the wall • Link to website • Link to drinkaware • Link to Twitter **Marketer-generated content** **YouTube** • Number of videos • Types of video content • Link to website • Link to Facebook • Link to drinkaware • Link to Twitter • Age control message **Marketer-generated content** **Twitter** • Number of tweets • Freq. of tweets • Tweets subject • Link to drinkaware • Age control message	Facebook pages cannot be accessed by underage users, but in most cases YouTube content and Twitter content can be accessed by minors. The systematic use of age restrictions on alcohol content is limited to Facebook; while no mechanism for restriction of viewers on the basis of age is identified for YouTube or Twitter websites.
Zhang, Sung & Lee (2010)	Online Marketing	**Branded entertainment types** • Downloads • Games	• Cash • Coupons/vouchers/gift cards/discount • The brands' products/services • Products or services not belonging to the brand	Consumer goods marketers and their service provider retailers are highly active in providing branded entertainment. Marketers use monetary rewards to entice Facebook users into branded entertainment.

(n= 89 brand profile pages on Facebook)	• Videos • Contests • Sweepstakes • Festivals	• No monetary prize • To be announced as winners • To be featured in Website, advertisement, or any kind of show
Marketing	**Features of branded entertainment** • Encouragement of word-of-mouth communication • Buddy icons for users to download **Rewards** • Monetary prize/no monetary	**Play themes** • Play as power • Play as fantasy • Play as identity • Play as frivolity

10.1.3 Qualitative studies

Qualitative studies reviewed						
Authors	**Field**	**Type of marketing**	**Focus**	**Artefact**	**Method / Respondents**	**Summary/ conclusion**
Brady et al. (2008)	Public health	Online Food/ Beverage Marketing	Awareness, engagement and impact of online marketing on children	Internet/ websites	Interviews (n=83) Children aged between 7 and 13	Branded Internet sites offer new opportunities for marketers to reach children with messages promoting commercial food and beverage items. Awareness of online marketing increases successively by age group. Given children's widespread use of the Internet and their engagement with online advertising, it is crucial to consider how this impacts their consumption and purchase behaviour and may ultimately contribute to the prevalence of childhood obesity.
Martinez, Jarlbro & Sandberg (2013)	Regulation and protective measures	Online Marketing	Children's relationship with online advertising	Internet/ websites	Interviews (n=20) Children aged between 9 and 10	Children have ambivalent or negative feelings towards advertising on the Internet and have developed different avoidance tactics to cope with unwanted advertising on the Internet.
Metha et al. (2014)	Public health	Online Food/ Beverage	Perceptions of parents and children on ethical aspects of food marketing	Other media	Interviews (n=13)	Parents and children consider a number of aspects of food marketing to be problematic and unethical. Parents and children are especially are concerned by the promotion of energy-dense nutrient-poor (EDNP) foods, which they

Qualitative studies reviewed						
Authors	**Field**	**Type of marketing**	**Focus**	**Artefact**	**Method / Respondents**	**Summary/ conclusion**
		Marketing			Parent-child pairs aged between 13 and18	judge to put children's health at risk. Parents were particularly concerned about marketing on the Internet, through advergames, viral marketing and the mining of personal information.
Owen et al. (2012)	Public health	Online Marketing	Comparison of children's understanding of television advertising with non-traditional advertising	Other media	Interviews (n= 134) Children aged between 6 and 7 and children aged between 9 and10	Children demonstrate a significantly more sophisticated understanding of television advertising in comparison to non-traditional advertising. Embedded advertising practices (movie and in-game brand placement) are most difficult for children to understand. Children appear to have limited knowledge of what alternative marketing tactics involve and consequently lack the cognitive skills to evaluate them critically.
Snyder, Henderson & Beale (2011)	Public health	Online Marketing	Awareness of advertising in SNS and integration of digital technologies in everyday lives of children	Other media	Interviews (n=3) 6th grade students	Children use social media extensively after school but have no awareness of these social media sites as commercial brands. While being aware of overt advertising within social media sites, they are capable of being influences by them. For the children in this study, different brands of social media were considered simply as a means to

Authors	Field	Type of marketing	Focus	Artefact	Method / Respondents	Summary/ conclusion
						communicate and play rather than as advertising channels, but they were deeply integrated into their daily lives.
Spliteri Cornish (2014)	Regulation and protective measures	Online Marketing	Parent's online advertising literacy and skills required to protect their children from online persuasive messages.	Other media	Interviews (n=42) Parents with children aged between 5 and 12	Parents have limited understanding of the effectiveness of online advertising and this restricts their ability to protect their children from online marketing endeavours. Parents recognize online persuasive techniques only when they themselves have been exposed to them (e.g., banners, pop-up advertisements) and are often unable to appreciate more subtle marketing techniques in their persuasive capacity (e.g., advergames).
Nairn (2008)	Regulation and protective measures	Online Marketing	Analysis of commercial activity on the favourite web sites of UK children and report the views of a sample of parents and children.	Internet/ websites	Focus groups Four in-school focus groups with a total of (n=24 children) aged between 7 and 15. Four focus groups with (n=30) parents	Most advertising is poorly labelled and deceptively integrated into content. Most sites visited by children are created for an adult audience. There is also evidence of pester power, dubious ''free'' offers and incitement to make impulse purchases using mobile phone credit. Current regulations to protect children from the risks of harm and deception from online commercial agents need to be tightened and more rigorously enforced or self-policed.

Table header: **Qualitative studies reviewed**

Qualitative studies reviewed						
Authors	**Field**	**Type of marketing**	**Focus**	**Artefact**	**Method / Respondents**	**Summary/ conclusion**
					of children from both primary and secondary school	

10.1.4 Quantitative studies

Quantitative studies reviewed							
Authors	**Field**	**Type of marketing**	**Artefact**	**Type of Survey**	**Respondents**	**Focus**	**Summary/ conclusion**
Evans, Carlson & Hoy (2013)	Marketing	Online marketing	Adver-games	Cross-sectional (online)	(n=214) Parents of children aged between 7 and 11	Parents' awareness and understanding of advergames	Parents do not have knowledge or skills to correctly identify advergames. Authoritarian and authoritative parents report more negative attitudes toward advergames compared to their indulgent counterparts.
Hawkes & Lobstein (2011)	Regulation and protective measures	Online Food/ Beverage marketing	Other media	Cross-sectional	(n=59) Government officials	Policies and regulations on food marketing to children in different countries	There has been considerable movement towards greater restriction on promotional marketing to children, but the nature and degree of the restrictions differ considerably, with significant implications for evaluating their effects.
Martí Parreño et al. (2013)	Marketing	Mobile Marketing	Apps/ Mobile	Cross-sectional	(n=355) Spanish Teenagers aged between 14 to 16	Key drivers of teenagers' attitude toward mobile advertising	Findings show that entertainment, irritation and usefulness are key drivers of teenagers' attitude toward mobile advertising. Improving teenagers' attitude toward mobile advertisements is a key factor for teenagers' mobile advertising acceptance.

Quantitative studies reviewed							
Authors	**Field**	**Type of marketing**	**Artefact**	**Type of Survey**	**Respondents**	**Focus**	**Summary/ conclusion**
Okazaki (2009)	Marketing	Mobile marketing	Apps/ Mobile	Cross-sectional (after mobile-based viral campaign)	(n=1705) Male teenagers aged between 13 and 18	Factors that affect youth participation in a mobile-based word-of-mouth (WOM) campaign	Face-to-face word-of-mouth (WOM) campaigns elicit stronger affective brand commitment and attitude than mobile-based WOM. This pattern is reversed in the willingness to make referrals, suggesting that mobile based WOM may be persuasive even when adolescents are less interested in the campaign content.
Pettigrew et al. (2013)	Public Health	Online Food/ Beverage Marketing	Internet/ websites	Online web panel survey	(n=1302) Parents and their children (n=1302) aged between 8 and 14	Impact of television and Internet food advertising on Australian parents and children	After a single exposure to each advertisement, parent respondents evaluate the products more favourably, have a greater desire to consume the products and think the product could be consumed more frequently than those in the control condition. Similar trends are observed among children, although the differences are statistically significant only for the frequency of food consumption in the Internet advertisement condition and the evaluation of one product.
Shin, Huh & Faber (2012)	Marketing	Online Marketing	Internet/ website	Cross-sectional	(n=381) Dyad samples of parents-	Role of antecedent variables impacting	Children with a higher level of online ad scepticism are likely to have a more negative attitude towards online advertising and are less likely to disclose personal information to online marketers. While scepticism substantially affects online ad attitude, the

Quantitative studies reviewed							
Authors	Field	Type of marketing	Artefact	Type of Survey	Respondents	Focus	Summary/ conclusion
					preteens aged between 9 and 12	children's attitudinal and behavioural responses to online advertising	attitude shaped by scepticism is not carried over to a willingness to disclose personal information. Instead, a media-related variable (perceived Internet competency) is more important than scepticism in explaining the information disclosure willingness. To help protect their children, parents may need to carefully monitor their children's online activities.

10.1.5 Experimental studies

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
Ali et al. (2009)	Online Advertising/ Internet/websites/ Public health	**(Exp. I):** Children aged 6 to 12 years (n=161)/ UK/ School **(Exp. II)**: Children aged 6 to 12 years (n=240)/ Indonesia / School	**Experiment I:** **Design:** Cross-sectional - visual test **Materials**: 27 printed pages simulating web pages; (1) 9 web pages with 2 advertisements; (2) 9 web pages with 1 advertisement; (3) 9 web pages without advertisement. All advertisements were adapted from advertisements found on Internet pages aimed at children; 14 of the advertisements did not include a price for the items advertised. **Procedure:** Children (individually) were shown the 27 mock-ups asking them to point out the advertisements	Children's ability to recognize advertisement in web page designs/ • Age related improvement in Advertisement Recognition (cognitive)	**Exp. I**: The 6-year-olds identified only a quarter of the advertisements, the 8-year-olds identified about half the advertisements, and the 10-year-olds identified three-quarters of them. When an advertisement included a price (cue) the older children were more likely to identify it correctly. **Exp. II:** The results were the same as the results from Experiment 1. There was an age-related improvement in the children's ability to recognize the web page advertisements, and the mean number of advertisements recognized by the 6-, 8- and 10-year-old groups in Indonesia and the same groups in the UK was very similar.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			included. The pages were presented one at a time, in a different random order for each child. **Experiment II:** The same 27 web pages were used in Experiment 2. The text on the web pages was translated into Bahasa Indonesian, and prices were changed into Indonesia currency (Rupiah). The procedure and scoring were the same as in Experiment 1.		
An & Stern (2011)	Online Advertising/ Advergame/	Children aged 8 to 11 years (n=112) / US/ School	**Design**: 2 × 2 (visual ad break × audio ad break) between-subjects design **Materials**: Real Advergame ("Be a Pop Start"), which includes brand symbols and name. The game *was modified* so that all other links on the	Children's advertising recognition and Advertising Literacy/ • Brand recall (cognitive) • Brand preference (affective)	Persuasion knowledge and agent knowledge were not associated with the presence or type of the ad break. Belief about the game's assistive intent was associated with the presence of a visual ad break: participants who viewed a visual ad break were significantly less

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
	Regulation and Protective measures		site were blocked to make participants stay on the same page. Four different conditions of the treatment: (1) The game Web site that included the visual ad break: "Ad Break: The games and other activities on this website include messages about the products Kraft sells"; (2) The same website that was *modified* to include the audio voice-over; (3) The same Web site with both the visual break and the audio voice-over at the beginning; (4) The same Web site with no ad break of any kind.	• Persuasion knowledge, agent knowledge (Self-reported)	likely to believe the game was trying to make them want to be a pop star compared. Ad break exposure makes children less likely to prefer the advertised brand and more likely to recall the brand.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			Procedure: After playing 10 minutes, students were instructed to stop and to complete a questionnaire.		
Bailey, Wise & Bolls (2009)	Online Advertising/ Advergame / Marketing	Children aged 8 to 12 years (n= 30)/ US/ Laboratory	**Design:** 3X3 mixed design **Materials:** 3 Advergames located on Websites for major food producers and intended for children. **Procedure:** Children were asked to play Advergames with (1) avatars that were assigned to them, (2) avatars chosen from a pool, and (3) self-designed avatars. Participants played the three Advergames for 5 minutes each, completing the presence scale after each game. Upon completion of data	Cognitive and emotional processing of interactive marketing/ • Brand attitude (affective) • Skin conductance levels (physiological) • Presence (observational)	Customization of game avatars affects both subjective feelings of presence and psychophysiological indicators of emotion during gameplay. Offering more customization options in terms of avatars may make games more enjoyable with higher highs and lower lows. It is likely that making these games more physiologically arousing will keep players coming back to play and playing longer, which gives sponsors of advergames with customization options several advantages, mainly a willing audience who will spend more time with their brands.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			collection, the researcher removed the sensors, then debriefed, thanked, compensated, and dismissed the participants to their parents. Children's skin conductance levels were collected during play. After game play, at each customization level, self-reported presence was collected.		
Dias & Agante (2011)	Online Food/Beverage Marketing / Advergames / Public Health	Children aged 7 to 8 years (n=231) / Portugal / School	**Design**: Randomised trial **Materials**: Two versions of the same Advergame were designed: one including healthy food and one including unhealthy food products. **Procedure:** Participants were randomly assigned to: (1) playing the healthy Advergame and (2) playing the less healthy	Effect of Advergames' food content on children's food choices, product liking and nutritional knowledge/ • Food selection (behavioural) • Product/brand attitude (affective) • Nutritional knowledge (Self-reported)	Children exposed to the less healthy version of an advergame selected nutrient-poor snacks more frequently. Preference for healthy products was higher for those children who played the healthy version of the game. Children's nutritional knowledge is not influenced by the version of the game children play.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			Advergame and played for about 5 minutes. After game exposure, the children were asked to choose between several alternate food types (pictures of the selected snacks were divided into two different 3×2 cards).		
Folkvord et al. (2013)	Online Food/Beverage Marketing/ Advergames/ Public Health	Children aged 8 to 10 years (n=270) / NL / School	**Design**: Randomized between-subject design **Materials**: A professional game designer designed three different Advergames. All games were identical (a memory game with 16 cards), except for the advertised brands and products: (1) an Advergame promoting energy-dense snacks;	Advertising recognition and food selection/ • Brand recognition (cognitive) • Food selection (behavioural) • Food intake (behavioural) • BMI (physiological)	Playing an advergame containing food cues increased general energy intake, regardless of the advertised brand or product type (energy-dense snacks or fruit). Children who played the fruit version of the advergame did not eat significantly more fruit than did those in the other groups. This activity particularly increased the intake of energy-dense snack foods instead.

			(2) an Advergame promoting fruit; (3) an Advergame promoting non-food products; (4) Control condition (no game). **Procedure:** Children were randomly assigned to one of the four conditions and tested individually after exposure. After playing minutes, they had a break for 5 minutes and could eat as much as they liked of any of the food products advertised in the Advergame. When the child was in the control condition, it could directly start with the eating part of the experiment. The children were interviewed (questionnaire) afterwards.		

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
Hang (2012)	Online Advertising/ Games/SNS/ Marketing	Children aged 9 to 11 years (n=166) / China / School	**Experiment 1 (n=84):** **Design:** Randomised trial **Materials:** Video game (FIFA) with one created screen (no video game interception) where children could select their favourite T-shirt, depicting a brand. Three conditions: 1) bimodal: exposure to brand placement both auditory and visually; 2) unimodal: visual exposure to brand placement; 3) control group (no brand placement). **Procedure:** Children (in groups of 10 to 12) played the game wearing headphones three times (for 10-12	Children's ability to recall brand placements embedded in video games/ • Brand recall (cognitive) • Brand choice (Behavioural) • Brand preference (affective) • Previous game experience self-reported) • Game involvement (self-reported) • Mood (self-reported)	The majority of the children could not recall a brand placement embedded in a video game. Exposure to a brand was found to be related to brand choice. Presenting a brand placement in a single modality makes children more likely to choose the target brand at test than presenting it in multiple modalities.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			minutes). After gameplay, children completed a questionnaire. **Experiment 2 (n=82):** Identical to Experiment 1 except that children were asked to write down their single choice without any stimuli being provided.		
Hang & Auty (2011)	Online Advertising/ Games/SNS/ Marketing	Children aged 9 to 10 years (n=207)/ China / School	**Design:** 2 (exposed to product placement vs. not exposed) ×2 (interact with placement vs. not interact) × 2 (memory-based test vs. stimulus-based test) between-subjects design. **Materials:** Real video game (FIFA) **Procedure:** Children were randomly placed into the following conditions:	Impact of interactivity on product placement effectiveness/ • Brand recall (cognitive) • Brand choice (behavioural)	Prior incidental exposure to the placement had an impact on children's choice. When children cannot interact with the placements in video games, perceptual fluency is the underlying mechanism leading to positive affect. The effects are only evident in a stimulus-based choice, where the same stimulus is provided as a cue. When children have the opportunity to interact with the placements in video games, they

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			(1) branded video game without the opportunity to interact with the placement; (2) interact with the placement but played the same video game without placement; (3) to interact with the placement and played the branded video game; (4) same game without placement and without the opportunity to interact with the placement. Each trial had two stages. (1) All the children (in groups of 10–12) were asked to play the video games for 10–12 minutes. (2) After the game, children were asked to complete a questionnaire.		may be influenced by conceptual fluency. Placements are still effective in a memory-based choice where no stimulus is provided as a cue. Product placements influence children (and consumers in general) under their awareness threshold.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			Half the children in each condition were asked to make a stimulus-based choice while the other half made a memory-based choice.		
Harris et al. (2012)	Online Food/beverage marketing / Advergame / Public health	Children aged 7 to 12 years (n=152) / US/ Research centre	**Design:** Between-subjects design **Materials:** Real Advergames available online, clearly labelled as appropriate for children and without additional third-party advertising. **Procedure:** Children participated in one of three randomly assigned condition: (1) unhealthy Advergames condition; (2) healthy Advergames condition; (3) non-food computer games (control condition).	Children's exposure to branded advergames and effects on snack consumption/ • Food selection/ intake (behavioural) • Game experience (reported by parents)	Children in the healthy advergames condition consumed 50% more healthy food compared to children in the unhealthy advergames condition. Children consumed most unhealthy food in the unhealthy advergames condition and the least in the healthy food condition. Food-branded advergames contribute to increased consumption of nutrient-poor foods. Playing food-branded advergames affects the amount of both healthy and unhealthy snack foods consumed by children during the experiment.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			Children first played two games and were told they could play the games in any order and for any length of time as long as they played each game once. After 12 minutes, the children were given the chance to eat from pre-weighed snacks in bowls as much as they wanted. After 5 minutes, the children were asked to complete a questionnaire indicating how much they liked each food product and how healthy they thought it was. The researcher recorded the weight of the remaining snacks. Separately, parents completed a questionnaire about their children's media use.		

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
Hernandez & Chapa (2010)	Online Advertising / Advergame/ Marketing	Children aged 10 to 15 years (n= 128) / MEX/ School (classroom/ computer lab)	**Design:** One-group pre-test–post-test design **Materials:** Real Advergames promoting fruit products and snacks (3D Dune Derby & X-treme Ping-Pong from nabiscoworld.com) **Procedure:** Participants were tested with several random pairs of items (in each pair, one item was seen and one not seen) from which they had to pick out the presented stimulus (three pairs of items were presented for each game) Each pair was randomly created, and the position (left or right) of both target and distractor was also randomly selected. The distractors included other Nabisco brands and other comparable global	Factors that affect brand recognition and brand choice/ • Brand recognition (cognitive) • Brand attitude (affective) • Snack choice behavioural)	Participants exposed to advergames are significantly more likely to choose from seen brands than not seen brands. Adolescents who exhibit positive affect toward both advergames and featured food products obtained higher recognition scores as compared to adolescents who did not exhibit positive affect. Direct relationship between positive affect of advergames and higher brand recognition scores. Findings suggest that promotion of snack brands in advergames has the potential to influence both memory and food product choice.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			and Mexican snack brands. A pre-test was conducted a week prior to the lab experiment and measured brand experience along with product liking and experience and to obtain participants' demographics. Post-test was conducted in the school computer lab. Subjects participated on computers assigned individually and instructed to play each Advergame for 10 minutes. Following the game play, participants completed a questionnaire.		
Holmberg, Sandberg & Holmqvist (2014)	Online Advertising Internet/	Children aged 9 (n = 19) and 12 (n = 26)/ SE/ School	**Design:** Web-based visual search task (pre-test + 36 trials)	Impact of visually salient online adverts on children's task-oriented Internet use/ • Eye movement data	Evidence on cognitive and behavioural distraction effects in children's task-oriented Internet use caused by visual saliency in online adverts. Children to some extent are able to compensate for

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
	websites / Public health		**Materials:** Animated open-source movie (BigBuckBunny ©2008, Blender Foundation) **Procedure:** Prior to all eye-tracking recordings the participants were calibrated. Participants were instructed on how to solve the tasks through a detailed verbal walk-through of two test trials. The participants were instructed to memorize an initial image for each task and then try to find and click on the most similar image on a second web page. Instructions were given to complete each task as accurately as possible. The participants were not given any information about the	• Trial accuracy (physiological) • Trial duration (physiological)	behavioural effects caused by distracting visual stimuli when solving prospective memory tasks. Children cope with this distraction by adjusting responses to accommodate for coercive advertising features and thus manage to compensate to some degree for these visual demands when involved in task-oriented Internet use, i.e. children's task performance is adequate, but their experience of online advertising might be strenuous, especially for children that suffer from poor gaze control.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			advertisement content accompanying each task.		
Miyazaki, Stanaland, Lwin (2009)	Online Advertising/ Internet/websites/ Regulation and Protective measures	Children aged 10 to 11 (n=375)/ USA/ School	**Design:** Quasi-experimental design **Materials:** Scenario of participation in a website and safeguard manipulations based on actual online examples in children-oriented websites. **Procedure:** The children were presented with a scenario involving their potential participation in a children-oriented website. The procedure consisted of having the children imagine that they were surfing the Internet and came across one of their favourite Web sites that had a new online club that their friends had already joined and had	Influence of different types of online safeguards on information disclosure in preteen children/ • Children's willingness to disclose information (behavioural)	Children-oriented websites often have only warning safeguards, and those requiring parental consent almost exclusively use e-mail as a consent method. Results show that these safeguards can be easily bypassed by preteens. The presence of a credible threat (parental notification for the sample of preteen children) acts as a significant deterrent to online information disclosure and may constitute a potentially effective self-regulatory measure for online advertisers.

Experimental studies reviewed					
Authors (year)	**Topic / Artefact/ Perspective**	**Sample (n) / Country / Settings**	**Design / Materials / Procedure**	**Focus / Measures (cognitive, affective, behavioural, self-reported)**	**Results**
			described as "cool and useful. Children were also randomly presented with one of the safeguard conditions, which was explained as being present upon their initial entry into the Web site. The children were instructed regarding a survey that followed the presentation of the scenario, including a visual demonstration of how to complete the survey materials.		
Panic, Cauberghe & De Pelsmaker (2013)	Online Advertising/ Advergame/ Marketing	Children aged 7 to 10 (n=483) / Belgium / School	**Experiment 1 (n=257):** **Design:** Three-level between-subject-groups design **Materials:** Existing advertisement and an advergame with cues and without cues.	Children's advertising recognition and behavioural intention/ • Brand attitude (affective) • Game attitude (affective • Advertising recognition (cognitive)	**Exp.1:** Persuasion knowledge is significantly lower after exposure to the advergame than after seeing the TV. Persuasion knowledge has no significant effect on children's purchase request in the advergame without cue condition, nor in the advergame with cue condition. In the TV ad condition there is no

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			Procedure: Before starting the experiment, children were randomly exposed to one of the three experimental conditions. 1) An advertisement embedded into a TV program saved as audio visual material, including a break; 2) real advergame with cues and 3) real advergame without cues. After game play, each participant completed a standardized questionnaire. **Experiment 2 (n=128):** **Design:** Two level between-subject-groups design **Materials:** Existing Advergame (same as Experiment 1) and healthy	• Children's purchase requests (behavioural intention) • Persuasion knowledge (Self-reported)	significant effect of the attitude toward the advertising format on purchase request. **Exp. 2:** In a gaming context, the effect of persuasion knowledge does not differ between a game with commercial and non-commercial content.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			food game (especially developed to teach children the importance of eating healthy). **Procedure:** The exposure time in both conditions was 2 minutes. After game play, each participant completed a standardized questionnaire.		
Pempek & Calvert (2009)	Online Advertising / Advergame/ Public Health	Children aged 9 to 10 (n=30) / USA / School	**Design:** Cross-sectional, between-subjects experiment **Materials:** Two versions of Pac-Man advergame created (based on the original game). **Procedure:** Children were randomly assigned to (1) the healthier advergame; (2) the less healthy advergame and	Effect of playing Advergames on children's food selection and consumption/ • Game attitude (affective) • Food selection (behavioural) • Food intake (behavioural)	If the game promoted less healthy foods and beverages, snacks of poor nutritional quality were chosen and eaten. If the game promoted healthier foods and beverages, snacks of better nutritional quality were chosen and eaten.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			(3) the control condition.		
			In the healthier food version, the player was awarded 10 points for each nutritious snack eaten and penalized 10 points for each snack eaten by the Pac-Man character that was less nutritious. This was changed to the opposite in the in the less healthy food version. Children played the Advergames twice, answered some questions, and selected and ate a snack after gameplay. In the control condition, children selected and ate a food and beverage snack before playing the healthier version of the Advergame.		

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Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
Redondo (2012)	Online Advertising/ Advergame/ Marketing	Children aged 11 to 17 (n=405) / Spain / Internet	**Design:** pre-test – post-test control-group design. **Materials:** Three versions of a casual advergame were created. **Procedure:** The game was announced on a banner of a website. After clicking the banner, users were asked some questions first and then had to try a new game. When the users accessed the game webpage, the server identified the computer IP addresses and randomly assigned one of the three game versions to each user. Three versions of the Advergame included: (1) Advergame with low conspicuous embedded ads for M&M chocolate candy;	Effect of casual Advergames on brand attitude • Game attitude (affective) • Brand attitude (affective)	The subtle placement of M&M's in the advergames provoked a significant improvement in the brand attitude. An effective improvement of the attitude to M&M's was caused by the prominent placement. The overall interaction between game version and exposure duration failed to achieve significance.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			(2) Advergame with high conspicuous embedded ads for M&M chocolate candy and (3) Advergame with no placement. Two questionnaires were presented before and after play.		
Rifon et al. (2014)	Online Food/beverage Marketing / Advergames/ Marketing	Children aged 5 to 10 (n=276)/ US/ School	**Design:** 3×2 post-test only between-subjects design with randomised assignment to conditions. **Materials:** Advergame created by a professional game development company. Two versions of the game were created (brand integration and brand in the background). The control group game contained no brand information and used balloons as the game tokens to be collected.	Influence of food Advergames on children's brand recall, attitudes, taste expectations, purchase requests and health perceptions for brands placed in a game. • Brand recognition (cognitive) • Brand attitude (affective) • Brand choice/ perceived taste of the cereal (behavioural)	Advergames affect children's brand recognition, attitude towards the brand, brand taste expectations and brand requests. Children's responses to these tactics are age dependent. Interactivity alone does not enhance a child's recall or positive attitude towards a brand placed in a game, but the mode of brand integration. Same effects hold for unknown brands.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			Procedure: Children were allowed to stop playing at any time. To simulate passive exposure while ensuring internal validity, a hybrid recording was created, blending features of television advertising or static product placement with Advergame play. The passive exposure condition was a digital recording of the game being played, which was then displayed for the child. The child did not see anyone playing the game but watched the recording of game play on a computer screen and saw the same animations as a child would see if s/he was playing the game.	• Purchase intention (behavioural) • Children's persuasion knowledge (self-reported)	

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
Rozendaal et al. (2013)	Online Advertising / Games/SNS/ Marketing	Children aged 9 to 12 (n=155)/ NL / School	**Design:** Descriptive correlational design **Materials:** Created video compilation of Habbo game (to ensure that all children are exposed to the same rooms and advertisements for the same amount of time) **Procedure:** After a short introduction, children were invited to watch the Habbo video compilation on a laptop computer. Each child watched the compilation individually. After viewing, they were asked to complete a paper-and-pencil questionnaire	Children's Responses to Advertising in Social (online) Games/ • Advertising recognition (cognitive) • Brand request (behavioural) • Persuasion knowledge (Self-reported) • Susceptibility to Peer Influence (Self-reported) • Game use (Self-reported)	The most important predictors of children's desire for the advertised brands were a low critical attitude and high peer influence susceptibility. Recognition and understanding of advertising in social games was effective in reducing advertised brand desire only for children who were familiar with social games.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
Van Reijmersdal et al. (2010)	Online Advertising Games/SNS Marketing	Children (female) aged 11 to 17 (n=2453) / NL / Online	**Design:** Quasi-experimental design with two experimental conditions and a control group **Materials:** Real role-playing game (GoSupermodel) available for free online with and without an interactive brand placement. **Procedure:** Children were invited to participate to the first experimental group (exposed to the game without the brand placement) via a link on the goSupermodel site to fill out a questionnaire about the game. The players in the second experimental condition participated in the research following the same procedure 2 weeks after the interactive brand placement was introduced. At the	Effects of interactive brand placements in online games / • Game attitude (affective) • Brand recall/ top of mind awareness (cognitive) • Brand attitude (affective) • Conative response toward the brand (behavioural)	Interactive brand placement has a positive effect on top of mind awareness (cognition), brand image (affect), and behavioural intention (conation). The attitude toward the game itself is positively affected by brand placement. Children who have no prior experience with the brand were more influenced by the interactive brand placement.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			same time, players in the control condition, who were not exposed to the game at all, were recruited through an online panel.		
Van Reijmersdal, Rozendaal & Buijzen (2012)	Online Advertising/ Advergame/ Marketing	Children aged 7 to 12 (n=105) / NL/ School	**Design:** Randomised trial **Materials**: Two versions of an Advergame designed by professional game designers, including: 1) prominent brand placement 2) subtle brand placement. **Procedure:** After a short introduction, children played the Advergame twice (3 minutes each) and completed a computer-assisted online survey in a different room. The aim of both games was to catch falling bags of crisps and cans of soft	Children's Cognitive and Affective Responses to Advergames/ • Brand recall (cognitive) • Brand recognition (cognitive) • Brand attitude (affective) • Game attitude • Persuasion knowledge (self-reported)	Brand prominence within the game positively influenced children's recall and recognition of the advertised brand. Prominence did not influence children's affective responses to the game or brand. Game involvement did not influence children's cognitive responses. The effect of advergame involvement on brand attitude was fully mediated by attitude toward the game (spill-over effect). Persuasion knowledge did not influence cognitive or affective responses to the brand or game. Even if children

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			drink in a basket. In the prominent placement version, the products were Lays chips bags and Pepsi cans. In addition, large logos of both brands were displayed centrally in the background. In the subtle placement version, the crisp bags and soft drink cans contained no logos or brand identifiers. Instead, the words "chips" and "cola" were written on them. In addition a small Lays logo was displayed on the left side and a small Pepsi logo was displayed on the right side of the screen.		understand the game's commercial and persuasive nature, they do not use this knowledge as a defence against the advergame's effects.
Verhellen et al. (2014)	Online Advertising / Media/	Children aged 11 to 14	**Design:** Between-subject experiment **Materials**: Existing commercial materials for the Ola brand. The stimuli (traditional TV ad; Trailer;	Children's Responses to Traditional Versus Hybrid Advertising Formats/ • Brand recall (cognitive)	Many children were not able to identify the source and the persuasive intent behind a commercial message. Brand recall was lower in the advergames. The different experimental treatments did not

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
	Marketing	(n=125) / Belgium / School	Advergame; Trailer + Advergame) were all taken from the same campaign. **Procedure:** After the treatment (in front of a TV to watch the trailer -3 sec- or in front of a computer to play the advergame -2 min-), the children were individually administered a survey. The control group was not exposed to any form of advertising messages. Then, every child was separately taken to a freezer in a different room, where they were allowed to pick one popsicle (the children's choice was registered).	• Brand attitude (affective) • Brand choice (behavioural) • Persuasion knowledge (self-reported	produce significant differences neither in brand attitude nor in the brand choice. Persuasion knowledge partially moderates children's affective responses to the different advertising formats. Children without persuasion knowledge develop a significantly more positive attitude towards the brand than children with persuasion knowledge.
Waiguny, Terlutter and Zaglia (2011)	Online Advertising /	Children aged 9 to 12 (n=97)/	**Design:** Quasi-experimental survey **Materials:** Real Advergame.	Influence of advergames on consumer's brand	Children have high recall levels for elements integrated in the game play as a result of higher concentration levels,

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
	Advergames/ Marketing	Austria/ School	**Procedure:** Children were asked to play the Advergame for at least 15 minutes. Afterwards, they were asked questions using a standardised interview procedure. In addition to being asked to supply personal data, they were invited to indicate what they were able to remember of the game. To this end they were given two sets of cards. The first set contained items from one product group (snack foods, candies, chocolate, etc.) and the second featured a range of fruit and vegetables. The children had to pick out from each set one item, which had been featured in the game.	attitudes and behavioural intentions/ • Brand recall (cognitive) • Brand attitude (affective) • Game attitude (affective) • Food selection (behavioural) • Pester intention (behavioural)	and a more active experience than is the case in traditional advertising. The impact of attitude towards the advergame is strongly related to the enjoyable experience of the game. Highly entertained kids are significantly more inclined to reuse and recommend the game. attitudes towards the brand and pestering behaviour propensity are higher if children experience the game as being more enjoyable.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
Waiguny, Nelson & Terlutter (2012)	Online Advertising / Advergame/ Marketing	Children aged 7 to 10 (n=101)/ Austria/ School	**Design:** Quasi-experimental survey **Materials:** Real Advergame **Procedure:** After some initial questions related to demographics, gaming devices, and prior brand usage, children were asked to play the Advergame for about 10 minutes and then respond to questions about the game and the brand in an one-on-one interview setting. During the game play, the children were observed by two interviewers. These interviewers independently rated the perceived 'entertainment' (challenge) experienced by the children.	Impact of playing an advergame on children's brand attitudes/ • Brand attitude toward (affective) • Level of immersion (observational) • Persuasion knowledge (self-reported) • Brand usage (self-reported)	Brand attitudes are highest for those optimally challenged (i.e. 'in the flow') and lowest for those who are underchallenged. Such effects are qualified by the children's persuasion knowledge (PK) of the advergame. Identification of the commercial content has a significantly negative effect on brand attitudes. Further, significant two-way interactions of challenge and PK show that brand attitudes suffered the most for those who are under-challenged and recognized the commercial content.

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
Waiguny, Nelson & Terlutter (2014)	Online Advertising/ Advergames/ Marketing	Children aged 8 to 10 (n=51)/ Austria/ School	**Experiment I:** **Design:** Two factorial (media context: TV ad vs. advergame) quasi-experimental design **Materials:** Real Advergame and a corresponding TV commercial for Nesquik Duo. **Procedure:** Children were asked to either play the Advergame (for 30 minutes) or watch a TV commercial (7:24 minutes). Then, the children were asked if they recognized any commercial content, followed by questions about the brand. All questions were assessed in a face-to-face interview (6-point scale for the responses).	Influence of persuasion knowledge of an advertising tactic and level of engagement on the identification of commercial content and persuasion outcomes/ • Brand recall (cognitive) • Brand attitude (affective) • Pester intention (behavioural) • Presence (observational) • Persuasion knowledge (self-reported)	Media context moderates the influence of children's understanding of advertising. Children in the TV ad context showed a rather high ability to identify the commercial nature of the advertising vehicle. When playing an advergame, this ability was diminished, even though children of this age generally know a lot about advertisers' intent. These findings were confirmed in Study 2. Children who had more context-specific persuasion knowledge of advergames were more likely to identify the commercial content in the game. If children show a higher context-specific knowledge about the intent of what advergames are made for, it increases the children's identification of the commercial content in the game, thus

Experimental studies reviewed					
Authors (year)	Topic / Artefact/ Perspective	Sample (n) / Country / Settings	Design / Materials / Procedure	Focus / Measures (cognitive, affective, behavioural, self-reported)	Results
			Study II: **Design:** Quasi-experimental (pre- and post-game Interviews) **Materials**: Real Advergame. **Procedure:** Children were asked to play the Advergame and then respond to questions in a one-on-one interview. Additionally, data of a control group of children the same age, who did not play the Advergame, but responded to the brand-related questions in the same interview procedure, were collected.		triggering persuasion knowledge during the persuasion episode. Identification of commercial content can lead to a certain reduction in persuasion, namely reduced pestering intentions.

10.2 Annex 2 Data Collection Content Analysis

10.2.1 Data collection results by platform: iTunes and Google Play

| | Indicators | iTunes | | | | | | | | Google Play | | | |
| | | Game title | | | | | | | | Game title | | | |
nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
1	Embedded ad*	0	1	1	1	0	0	0	1	0	1	0	0
2	Contextual ad	0	0	0	0	0	0	0	0	1	0	0	0
3	Picture of the product	99	1	1	1	99	99	99	0	99	1	99	99
4	Logo or product symbol	99	1	1	1	99	99	99	1	99	1	99	99
5	Link for product information	99	0	1	1	99	99	99	1	99	1	99	99
6	Sponsorship	99	0	0	0	99	99	99	0	99	0	99	99
7	Pre-game ad	99	1	0	1	99	99	99	0	99	0	99	99
8	Inter-game ad	99	0	1	0	99	99	99	1	99	1	99	99

Indicators		iTunes								Google Play			
		Game title								**Game title**			
nº	**Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99**	Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
9	Post-game ad	99	0	0	0	99	99	99	0	99	0	99	99
10	Product placement	99	1	0	0	99	99	99	1	99	0	99	99
11	Advergame	99	0	0	0	99	99	99	0	99	0	99	99
12	Genres	Casual	Sport	Casual	Casual	Simulation	Puzzle	Simulation	Simulation	Casual	Casual	Simulation	Simulation
13	Purchase available/required for moving to a higher level in the game	0	1	1	1	1	1	0	1	1	0	1	1
14	Inducements to extend game play	1	0	1	1	1	1	0	0	1	0	1	1
15	Game personalization options	1	1	0	0	0	1	0	1	0	0	1	0

nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	iTunes							Google Play				
		Game title							**Game title**				
		Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
16	Activities that contribute to learning and provide educational value to users	0	0	0	0	1	0	0	0	0	0	0	0
17	Activities that motivate users to learn and read more about the brand or its products/services	0	0	0	0	0	0	0	0	0	0	0	0
18	Activities that help users pit their knowledge, skill, beauty, or any other type of competition against others.	0	0	0	0	0	0	0	1	0	0	0	0
19	Activities in which winner(s) are or will be clearly announced	0	1	1	1	1	1	0	0	0	0	0	0

nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	iTunes								Google Play			
		Game title								Game title			
		Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
20	Activities in which scoring more points, being faster, gaining more buddies, having more contributions is important to users	1	1	1	1	1	1	0	0	1	1	1	1
21	Activities which encourage users to test their skills	1	1	1	1	1	1	1	1	0	1	1	1
22	Activities that attempt to elicit imagery and creativity from users	0	0	0	0	0	0	1	1	0	0	1	1
23	Activities that offer a sense of escape or adventure	0	0	0	0	1	0	1	1	0	0	0	1
24	Activities that provide an opportunity to users to experience an imagery life.	0	0	0	0	0	0	1	1	0	0	0	1

	Indicators	iTunes							Google Play				
				Game title							Game title		
nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
25	Activities that contain beauty, objects, or goals to be dreamed of or fantasized about.	0	0	0	0	1	0	1	1	0	0	0	0
26	Activities that require users' full concentration and engrossing in order to enjoy.	1	1	1	1	1	1	1	0	0	0	1	1
27	Activities that have the highest control in users' hands and leader direct guidance or rules to follow.	0	0	0	0	1	0	1	1	0	0	1	1
28	Activities that involve the formation of interest-groups or community with a specific group name	0	0	0	0	0	0	1	0	0	0	0	0

| nº | Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99 | iTunes Game title | | | | | | | Google Play Game title | | | | |
		Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
29	Paid downloads	1	1	0	0	0	0	1	1	0	0	0	0
30	In-app advertising	0	1	1	1	0	0	0	1	1	1	0	0
31	In-app purchases (games, digital content)	0	1	1	1	1	1	0	1	1	0	1	1
32	Freemium (free-to-premium)	0	0	0	0	0	0	0	0	0	0	0	0
33	Promotion of non-digital goods	0	1	0	0	0	0	0	1	0	0	0	0
34	Resale of data collected via app use	0	0	0	0	0	0	0	0	0	0	0	0
35	YouTube	0	0	0	0	1	0	0	0	0	0	0	0
36	Facebook	1	1	1	1	1	1	0	0	1	0	1	0

nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	iTunes							Google Play				
		Game title							Game title				
		Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
37	Twitter	1	1	1	0	1	0	0	0	1	0	0	0
38	Others**	0	0	0	0	0	0	0	0	0	0	0	0
39	Register or create an account	1	0	0	0	1	0	0	0	1	0	0	1
40	Member sign-in	1	0	0	0	1	0	0	0	1	0	0	1
41	Messages passed on via social networks	0	0	1	1	1	1	0	0	1	0	1	0
42	Sending an e-mail greeting to a friend	0	0	0	0	0	0	0	0	1	0	0	0
43	Inviting a friend to play or join the Web site	0	0	0	0	0	0	0	0	1	0	0	0
44	For repeat visits	0	0	1	1	1	0	0	0	0	0	0	0

	Indicators	iTunes								Google Play			
		Game title								Game title			
nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
45	For prolonged visits	0	0	1	0	1	1	0	0	0	0	0	0
46	For buying virtual goods	0	1	1	1	1	1	0	0	0	1	0	0
47	For buying goods	0	0	0	0	0	0	0	0	0	0	0	0
48	Present only before game loads	99	0	0	0	99	99	99	0	99	99	99	99
49	Present only while game is loading	99	0	0	0	99	99	99	0	99	99	99	99
50	Present only after game loads	99	0	0	0	99	99	99	0	99	99	99	99
51	Present before and after loading	99	0	0	0	99	99	99	0	99	99	99	99

nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	iTunes								Google Play			
		Game title								Game title			
		Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
52	Present during loading (during playing game)	99	0	0	0	99	99	99	0	99	99	99	99
53	Present before, during and after loading	99	0	0	0	99	99	99	0	99	99	99	99
54	One-sentence ad break	99	0	0	0	99	99	99	0	99	99	99	99
55	Multiple-sentence ad break	99	0	0	0	99	99	99	0	99	99	99	99
56	Icon	99	0	0	0	99	99	99	0	99	99	99	99
57	Combination	99	1	1	0	99	99	99	0	99	99	99	99
58	Presence of an introductory explanation about the ad break itself	99	0	0	0	99	99	99	0	99	99	99	99

nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	iTunes Game title								Google Play Game title			
		Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
59	Presence of advertising literacy components	99	0	0	0	99	99	99	0	99	99	99	99
60	Privacy policy	0	1	1	1	1	1	1	1	1	0	1	1
61	Terms of usage	0	1	1	1	1	1	1	1	0	0	0	0
62	Age limit suggested	1	1	1	1	1	1	0	1	1	1	1	1
63	Age limit enforced (must enter birthdate)	0	0	0	0	0	0	0	0	0	0	0	0
64	Parental permission required statement	0	0	0	0	0	0	0	0	0	0	0	0
65	Parental section	0	0	0	0	0	0	0	0	0	0	0	0
66	Parental warning	0	0	0	0	0	0	0	0	0	0	0	0

Indicators		iTunes							Google Play				
		Game title								Game title			
nº	Indicator – Code YES = 1/ NO = 0 / Not applicable (N.A) = 99	Geometry Dash	Stickman Soccer 2014	Fish Out Of Water!	Angry Birds Epic	Clash of Clans	Candy Crush	Minecraft	The Sims™ 3	Don't Tap The White Tile	Angry Cats	Hay Day	Castle Clash
67	Content rating	4+	4+	4+	4+	9+	4+	Low***	Low ***	Low ***	Low ***	Medium***	Medium***
68	Labelling schemes	0	0	0	0	0	0	0	0	0	0	0	0
69	Forms	1	0	0	0	0	0	0	0	0	0	0	1
70	Email	1	0	1	1	1	1	0	1	1	0	1	0
71	Report a problem	1	0	1	0	0	1	1	1	1	1	1	1
72	Phone	0	0	1	0	0	0	0	0	0	0	1	0

*IF Indicator 1=0 GO TO Indicator 12 and SKIP from indicator 48 to 59 **coded as Free text *** Low maturity: Applications in this category may include instances of mild cartoon or fantasy violence or other potentially offensive content. Applications may collect user location data for the purpose of providing location specific information or otherwise improving the user experience but should not share the data with other users. Applications may include some social features but should not focus on allowing users to find and communicate with each other. Medium maturity: Applications in this category may include sexual references; intense fantasy or realistic violence; profanity or crude humour; references to drug, alcohol and tobacco use; social features and simulated gambling. Applications may collect user location data for the purpose of sharing or publishing with the user's consent.

10.2.2 Data collection results by platform: Facebook

nº	Indicators Indicator - Code YES= 1 /NO = 0 / Not applicable (N/A) = 99	Facebook					
		Game Title					
		Farm Heroes Saga	Pet Rescue Saga	Bubble Witch 2 Saga	DoubleDown Casino - Free Slots	FarmVille 2	Slotomania Slot Machines
1	Embedded ad*	0	0	0	0	1	0
2	Contextual ad	1	1	1	1	1	1
3	Picture of the product	99	99	99	99	1	99
4	Logo or product symbol	99	99	99	99	1	99
5	Link for product information	99	99	99	99	1	99
6	Sponsorship	99	99	99	99	0	99
7	Pre-game ad	99	99	99	99	0	99
8	Inter-game ad	99	99	99	99	0	99
9	Post-game ad	99	99	99	99	0	99
10	Product placement	99	99	99	99	1	99

nº	Indicator - Code YES= 1 /NO = 0 / Not applicable (N/A) = 99	Farm Heroes Saga	Pet Rescue Saga	Bubble Witch 2 Saga	DoubleDown Casino - Free Slots	FarmVille 2	Slotomania Slot Machines
	Indicators	**Facebook**					
				Game Title			
11	Advergame	99	99	99	99	0	99
12	Genres	Casual	Casual	Casual	Casino	Simulation	Casino
13	Purchase available/required for moving to a higher level in the game	1	1	1	1	1	1
14	Inducements to extend game play	1	1	1	1	1	1
15	Game personalization options	1	1	1	1	1	1
16	Activities that contribute to learning and provide educational value to users	0	0	0	0	0	0
17	Activities that motivate users to learn and read more about the brand or its products/services	0	0	0	0	0	0
18	Activities that help users pit their knowledge, skill, beauty, or any other type of competition against others.	0	0	0	0	0	0
19	Activities in which winner(s) are or will be clearly announced	1	1	1	1	1	1

nº	Indicator - Code YES= 1 /NO = 0 / Not applicable (N/A) = 99	Farm Heroes Saga	Pet Rescue Saga	Bubble Witch 2 Saga	DoubleDown Casino - Free Slots	FarmVille 2	Slotomania Slot Machines
	Indicators	**Facebook**					
				Game Title			
20	Activities in which scoring more points, being faster, gaining more buddies, having more contributions is important to users	1	1	1	1	1	1
21	Activities which encourage users to test their skills	1	1	1	1	1	1
22	Activities that attempt to elicit imagery and creativity from users	0	0	0	0	0	0
23	Activities that offer a sense of escape or adventure	0	0	0	0	1	0
24	Activities that provide an opportunity to users to experience an imagery life.	0	0	0	0	0	0
25	Activities that contain beauty, objects, or goals to be dreamed of or fantasized about.	0	0	0	0	1	0
26	Activities that require users' full concentration and engrossing in order to enjoy.	1	1	1	1	1	1
27	Activities that have the highest control in users' hands and leader direct guidance or rules to follow.	0	0	0	0	1	0

	Indicators		Facebook					
					Game Title			
nº	Indicator - Code YES= 1 /NO = 0 / Not applicable (N/A) = 99		Farm Heroes Saga	Pet Rescue Saga	Bubble Witch 2 Saga	DoubleDown Casino - Free Slots	FarmVille 2	Slotomania Slot Machines
28	Activities that involve the formation of interest-groups or community with a specific group name		0	0	0	0	0	0
29	Paid downloads		0	0	0	0	0	0
30	In-app advertising		0	0	0	0	1	0
31	In-app purchases (games, digital content)		1	1	1	1	1	1
32	Freemium (free-to-premium)		0	0	0	0	0	0
33	Promotion of non-digital goods		0	0	0	0	1	0
34	Resale of data collected via app use		0	0	0	0	0	0
35	YouTube		1	1	1	0	0	0
36	Facebook		1	1	1	1	1	1
37	Twitter		1	1	1	0	1	0

Indicators		Facebook					
		Game Title					
nº	Indicator - Code YES= 1 /NO = 0 / Not applicable (N/A) = 99	Farm Heroes Saga	Pet Rescue Saga	Bubble Witch 2 Saga	DoubleDown Casino - Free Slots	FarmVille 2	Slotomania Slot Machines
38	Others**	Instagram	Instagram	Instagram	0	0	0
39	Register or create an account	0	0	0	0	0	0
40	Member sign-in	0	0	0	0	0	0
41	Messages passed on via social networks	1	1	1	0	1	1
42	Sending an e-mail greeting to a friend	1	1	1	1	1	1
43	Inviting a friend to play or join the Web site	1	1	1	1	1	1
44	For repeat visits	1	1	1	1	1	1
45	For prolonged visits	1	1	1	1	1	1
46	For buying virtual goods	1	1	1	1	1	1
47	For buying goods	0	0	0	0	0	0
48	Present only before game loads	99	99	99	99	0	99

	Indicators	Facebook					
		Game Title					
nº	**Indicator - Code** **YES= 1 /NO = 0 /** **Not applicable (N/A) = 99**	**Farm Heroes Saga**	**Pet Rescue Saga**	**Bubble Witch 2 Saga**	**DoubleDown Casino - Free Slots**	**FarmVille 2**	**Slotomania Slot Machines**
49	Present only while game is loading	99	99	99	99	0	99
50	Present only after game loads	99	99	99	99	0	99
51	Present before and after loading	99	99	99	99	0	99
52	Present during loading (during playing game)	99	99	99	99	1	99
53	Present before, during and after loading	99	99	99	99	0	99
54	One-sentence ad break	99	99	99	99	0	99
55	Multiple-sentence ad break	99	99	99	99	0	99
56	Icon	99	99	99	99	0	99
57	Combination	99	99	99	99	0	99
58	Presence of an introductory explanation about the ad break itself	99	99	99	99	0	99
59	Presence of advertising literacy components	99	99	99	99	0	99

nº	Indicator - Code YES= 1 /NO = 0 / Not applicable (N/A) = 99	Farm Heroes Saga	Pet Rescue Saga	Bubble Witch 2 Saga	DoubleDown Casino - Free Slots	FarmVille 2	Slotomania Slot Machines
	Indicators	**Facebook**					
				Game Title			
60	Privacy policy	1	1	1	1	1	1
61	Terms of usage	1	1	1	1	1	1
62	Age limit suggested	1	1	1	1	1	1
63	Age limit enforced (must enter birthdate)	1	1	1	1	1	1
64	Parental permission required statement	0	0	0	1	0	1
65	Parental section	0	0	0	0	0	0
66	Parental warning	0	0	0	0	0	0
67	Content rating	0	0	0	0	0	0
68	Labelling schemes	0	0	0	0	0	0
69	Forms	0	0	0	1	0	1
70	Email	1	1	1	1	1	0

| nº | Indicator - Code YES= 1 /NO = 0 / Not applicable (N/A) = 99 | Facebook |
| | | Game Title |
		Farm Heroes Saga	Pet Rescue Saga	Bubble Witch 2 Saga	DoubleDown Casino - Free Slots	FarmVille 2	Slotomania Slot Machines
71	Report a problem	1	1	1	1	1	1
72	Phone	0	0	0	0	0	0

*IF Indicator 1=0 GO TO Indicator 12 and SKIP from indicator 48 to 59 **coded as free text

10.2.3 Data collection results: advergames

nº	Indicator - Code YES = 1/NO = 0 / Not applicable (N.A) = 99	Coke Recycling	Happy Meal	Crunch	Doritos	Trust Danone	Club Kellogg's	Fast or Fail
1	Embedded ad*	1	1	1	1	1	1	1
2	Contextual ad	0	1	1	1	0	0	0
3	Picture of the product	1	1	1	1	0	1	1
4	Logo or product symbol	1	1	1	1	1	1	1
5	Link for product information	0	1	1	1	1	0	1
6	Sponsorship	0	0	0	0	0	0	0
7	Pre-game ad	0	1	0	0	0	0	0
8	Inter-game ad	0	0	0	0	0	0	0
9	Post-game ad	0	0	0	0	0	0	0
10	Product placement	1	0	1	0	1	1	1

The table header rows: Indicators | Advergames (Game Title)

nº	Indicator - Code YES = 1/NO = 0 / Not applicable (N.A) = 99	Coke Recycling	Happy Meal	Crunch	Doritos	Trust Danone	Club Kellogg's	Fast or Fail
	Indicators	**Advergames**						
				Game Title				
11	Advergame	1	0	0	1	1	1	1
12	Genres	Casual	Casual	Casual	Casual	Simulation	Casual	Casual
13	Purchase available/required for moving to a higher level in the game	0	0	0	0	0	0	0
14	Inducements to extend game play	1	0	1	1	0	1	1
15	Game personalization options	0	0	0	0	1	0	0
16	Activities that contribute to learning and provide educational value to users	1	0	0	0	1	0	0
17	Activities that motivate users to learn and read more about the brand or its products/services	1	0	0	0	1	0	0
18	Activities that help users pit their knowledge, skill, beauty, or any other type of competition against others.	0	0	0	0	0	0	0
19	Activities in which winner(s) are or will be clearly announced	0	0	0	0	0	0	0

nº	Indicator - Code YES = 1/NO = 0 / Not applicable (N.A) = 99	Coke Recycling	Happy Meal	Crunch	Doritos	Trust Danone	Club Kellogg's	Fast or Fail
	Indicators	**Advergames**						
				Game Title				
20	Activities in which scoring more points, being faster, gaining more buddies, having more contributions is important to users	0	1	1	1	0	1	1
21	Activities which encourage users to test of their skills	1	1	1	1	1	1	1
22	Activities that attempt to elicit imagery and creativity from users	0	0	0	0	0	0	0
23	Activities that offer a sense of escape or adventure	0	0	0	0	0	0	0
24	Activities that provide an opportunity to users to experience an imagery life.	0	0	0	0	0	0	0
25	Activities that contain beauty, objects, or goals to be dreamed of or fantasized about.	0	0	0	0	0	0	0
26	Activities that require users' full concentration and engrossing in order to enjoy.	1	0	0	0	0	1	1
27	Activities that have the highest control in users' hands and leader direct guidance or rules to follow.	1	0	0	0	0	1	0
28	Activities that involve the formation of interest-groups or community with a specific group name	0	0	0	0	0	0	0

	Indicators		Advergames						
						Game Title			
nº	Indicator - Code YES = 1/NO = 0 / Not applicable (N.A) = 99		Coke Recycling	Happy Meal	Crunch	Doritos	Trust Danone	Club Kellogg's	Fast or Fail
29	Paid downloads		0	0	0	0	0	0	0
30	In-app advertising		0	0	0	0	0	0	0
31	In-app purchases (games, digital content)		0	0	0	0	0	0	0
32	Freemium (free-to-premium)		0	0	0	0	0	0	0
33	Promotion of non-digital goods		1	1	1	1	1	1	1
34	Resale of data collected via app use		0	0	0	0	0	0	0
35	YouTube		0	0	0	0	0	0	0
36	Facebook		0	0	0	1	1	0	1
37	Twitter		0	0	0	0	1	0	1
38	Others**		0	0	0	Android Iphone	Google+	0	0

n°	Indicator - Code YES = 1/NO = 0 / Not applicable (N.A) = 99	Coke Recycling	Happy Meal	Crunch	Doritos	Trust Danone	Club Kellogg's	Fast or Fail
	Indicators			**Advergames**				
					Game Title			
39	Register or create an account	0	0	0	0	1	1	1
40	Member sign-in	0	0	1	0	1	1	1
41	Messages passed on via social networks	0	0	0	1	0	0	1
42	Sending an e-mail greeting to a friend	0	0	1	0	0	0	0
43	Inviting a friend to play or join the Web site	0	0	1	0	1	0	0
44	For repeat visits	0	0	0	1	0	0	0
45	For prolonged visits	1	0	1	0	0	0	0
46	For buying virtual goods	0	0	0	0	0	0	0
47	For buying goods	0	0	0	1	0	0	1
48	Present only before game loads	0	1	0	0	0	0	0
49	Present only while game is loading	0	0	0	0	0	0	0

nº	Indicator - Code YES = 1/NO = 0 / Not applicable (N.A) = 99	Coke Recycling	Happy Meal	Crunch	Doritos	Trust Danone	Club Kellogg's	Fast or Fail
	Indicators	**Advergames**						
				Game Title				
50	Present only after game loads	0	0	0	0	0	0	0
51	Present before and after loading	0	0	0	0	0	0	0
52	Present during loading (during playing game)	0	0	0	0	0	0	0
53	Present before, during and after loading	0	0	1	1	0	1	1
54	One-sentence ad break	0	0	0	0	0	0	0
55	Multiple-sentence ad break	0	0	0	0	0	0	0
56	Icon	0	0	0	0	0	0	0
57	Combination	0	0	0	0	0	0	0
58	Presence of an introductory explanation about the ad break itself	0	0	0	0	0	0	0
59	Presence of advertising literacy components	0	0	0	0	0	0	0
60	Privacy policy	1	1	1	1	1	1	0

	Indicators	Advergames						
					Game Title			
nº	**Indicator - Code** **YES = 1/NO = 0 /** **Not applicable (N.A) = 99**	**Coke Recycling**	**Happy Meal**	**Crunch**	**Doritos**	**Trust Danone**	**Club Kellogg's**	**Fast or Fail**
61	Terms of usage	0	1	1	1	1	1	0
62	Age limit suggested	0	1	0	0	1	0	0
63	Age limit enforced (must enter birthdate)	0	0	0	0	0	0	0
64	Parental permission required statement	0	1	0	0	0	0	0
65	Parental section	0	1	0	0	0	0	0
66	Parental warning	0	0	0	0	0	0	0
67	Content rating	0	0	0	0	0	0	0
68	Labelling schemes	0	0	0	0	0	0	0
69	Forms	0	0	1	1	0	1	0
70	Email	0	1	1	1	1	1	0
71	Report a problem	0	0	0	1	0	0	0

Indicators		Advergames						
					Game Title			
nº	**Indicator - Code** **YES = 1/NO = 0 /** **Not applicable (N.A) = 99**	**Coke Recycling**	**Happy Meal**	**Crunch**	**Doritos**	**Trust Danone**	**Club Kellogg's**	**Fast or Fail**
72	Phone	0	1	1	1	0	1	0

*IF Indicator 1=0 GO TO Indicator 12 and SKIP from indicator 48 to 59 **coded as free text

10.2.4 Data collection analysis

Indicators by dimension and sub-dimension							**Presence of indicators in games and advergames**								
No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
1	Ad feature	Type	Embedded ad*	3	2	5	41,67%	1	16,67%	6	33,33%	7	100,00%
2	Ad feature	Type	Contextual ad	0	1	1	8,33%	6	100,00%	7	38,89%	7	100,00%
3	Ad feature	Attributes	Picture of the product	3	1	4	33,33%	1	16,67%	5	27,78%	6	85,71%
4	Ad feature	Attributes	Logo or product symbol	3	2	5	41,67%	1	16,67%	6	33,33%	7	100,00%
5	Ad feature	Attributes	Link for product information	2	2	4	33,33%	1	16,67%	5	27,78%	5	71,43%
6	Ad feature	Embedded	Sponsorship	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
7	Ad feature	Embedded	Pre-game ad	2	0	2	16,67%	0	0,00%	2	11,11%	1	14,29%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
	Indicators by dimension and sub-dimension						**Presence of indicators in games and advergames**						
8	Ad feature	Embedded	Inter-game ad	1	2	3	25,00%	0	0,00%	3	16,67%	0	0,00%
9	Ad feature	Embedded	Post-game ad	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
10	Ad feature	Embedded	Product placement	1	1	2	16,67%	1	16,67%	3	16,67%	5	71,43%
11	Ad feature	Embedded	Advergame	0	0	0	0,00%	0	0,00%	0	0,00%	7	100,00%
12	Game feature	Attributes	Genres**	6	6	12	100,00%	6	100,00%	18	100,00%	7	100,00%
13	Game feature	Attributes	Purchase available/required for moving to a higher level in the game	5	4	9	75,00%	6	100,00%	15	83,33%	0	0,00%
14	Game feature	Attributes	Inducements to extend game play	5	3	8	66,67%	6	100,00%	14	77,78%	5	71,43%

Indicators by dimension and sub-dimension								Presence of indicators in games and advergames							
No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
15	Game feature	Attributes	Game personalization options	3	2	5	41,67%	6	100,00%	11	61,11%	1	14,29%
16	Game feature	Play themes	Activities that contribute to learning and provide educational value to users	1	0	1	8,33%	0	0,00%	1	5,56%	2	28,57%
17	Game feature	Play themes	Activities that motivate users to learn and read more about the brand or	0	0	0	0,00%	0	0,00%	0	0,00%	2	28,57%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
			its products/ services										
18	Game feature	Play themes	Activities that help users pit their knowledge, skill, beauty, or any other type of competition against others	0	1	1	8,33%	0	0,00%	1	5,56%	0	0,00%
19	Game feature	Play themes	Activities in which winner(s) are or will be clearly announced	5	0	5	41,67%	6	100,00%	11	61,11%	0	0,00%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
Indicators by dimension and sub-dimension				**Presence of indicators in games and advergames**									
20	Game feature	Play themes	Activities in which scoring more points, being faster, gaining more friends, having more contributions is important to users	6	4	10	83,33 %	6	100,00 %	16	88,89 %	5	71,43%
21	Game feature	Play themes	Activities which encourage users to perform to the best of their ability	6	5	11	91,67 %	6	100,00 %	17	94,44 %	7	100,00 %

Indicators by dimension and sub-dimension				Presence of indicators in games and advergames									
No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
22	Game feature	Play themes	Activities that attempt to elicit imagery and creativity from users	0	4	4	33,33%	0	0,00%	4	22,22%	0	0,00%
23	Game feature	Play themes	Activities that offer a sense of escape or adventure	1	3	4	33,33%	1	16,67%	5	27,78%	0	0,00%
24	Game feature	Play themes	Activities that provide an opportunity to users to experience	0	3	3	25,00%	0	0,00%	3	16,67%	0	0,00%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
Indicators by dimension and sub-dimension				**Presence of indicators in games and advergames**									
			an imagery life										
25	Game feature	Play themes	Activities that contain beauty, objects, or goals to be dreamed of or fantasized about	1	2	3	25,00 %	1	16,67%	4	22,22 %	0	0,00%
26	Game feature	Play themes	Activities that require users' full concentration and engrossing in order to enjoy	6	3	9	75,00 %	6	100,00 %	15	83,33 %	3	42,86%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
Indicators by dimension and sub-dimension				**Presence of indicators in games and advergames**									
27	Game feature	Play themes	Activities that have the highest control in users' hands and leader direct guidance or rules to follow	1	4	5	41,67%	1	16,67%	6	33,33%	2	28,57%
28	Game feature	Play themes	Activities that involve the formation of interest-groups or community with a specific group name	0	1	1	8,33%	0	0,00%	1	5,56%	0	0,00%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
29	Game feature	Revenue model	Paid downloads	2	2	4	33,33%	0	0,00%	4	22,22%	0	0,00%
30	Game feature	Revenue model	In-app advertising	3	3	6	50,00%	1	16,67%	7	38,89%	0	0,00%
31	Game feature	Revenue model	In-app purchases (games, digital content)	5	4	9	75,00%	6	100,00%	15	83,33%	0	0,00%
32	Game feature	Revenue model	Freemium (free-to-premium)	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
33	Game feature	Revenue model	Promotion of non-digital goods	1	1	2	16,67%	1	16,67%	3	16,67%	7	100,00%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
34	Game feature	Revenue model	Resale of data collected via app use	0	0	0	0,00%	0	0,00%	0	0,00 %	0	0,00%
35	User Engagement	Social media	YouTube	1	0	1	8,33%	3	50,00%	4	22,22 %	0	0,00%
36	User Engagement	Social media	Facebook	6	2	8	66,67 %	6	100,00 %	14	77,78 %	3	42,86%
37	User Engagement	Social media	Twitter	4	1	5	41,67 %	4	66,67%	9	50,00 %	2	28,57%
38	User Engagement	Social media	Others**	0	0	0	0,00%	3	50,00%	3	16,67 %	2	28,57%

Indicators by dimension and sub-dimension				Presence of indicators in games and advergames										
No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
39	User Engagement	Community	Register or create an account	2	2	4	33,33 %	0	0,00%	4	22,22 %	3	42,86%
40	User Engagement	Community	Member sign-in	2	2	4	33,33 %	0	0,00%	4	22,22 %	4	57,14%
41	User Engagement	Viral elements	Messages passed on via social networks	4	2	6	50,00 %	5	83,33%	11	61,11 %	2	28,57%
42	User Engagement	Viral elements	Sending an e-mail greeting to a friend	0	1	1	8,33%	6	100,00 %	7	38,89 %	1	14,29%
43	User Engagement	Viral elements	Inviting a friend to play	0	1	1	8,33%	6	100,00 %	7	38,89 %	2	28,57%

Indicators by dimension and sub-dimension														
No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
			or join the Web site											
44	User Engagement	Prompts	For repeat visits	3	0	3	25,00 %	6	100,00 %	9	50,00 %	1	14,29%
45	User Engagement	Prompts	For prolonged visits	3	0	3	25,00 %	6	100,00 %	9	50,00 %	2	28,57%
46	User Engagement	Prompts	For buying virtual goods	5	1	6	50,00 %	6	100,00 %	12	66,67 %	0	0,00%
47	User Engagement	Prompts	For buying goods	0	0	0	0,00%	0	0,00%	0	0,00 %	2	28,57%

Indicators by dimension and sub-dimension				Presence of indicators in games and advergames										
No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
48	Protective measures	Ad breaks / alerts presence	Present only before game loads	0	0	0	0,00%	0	0,00%	0	0,00%	1	14,29%
49	Protective measures	Ad breaks / alerts presence	Present only while game is loading	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
50	Protective measures	Ad breaks / alerts presence	Present only after game loads	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
51	Protective measures	Ad breaks / alerts presence	Present before and after loading	0	0	0	0,00%	00	0,00%	0	0,00%	0	0,00%
52	Protective measures	Ad breaks / alerts presence	Present during loading (during	0	0	0	0,00%		0,00%	0	0,00%	0	0,00%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
			playing game)										
53	Protective measures	Ad breaks / alerts presence	Present before, during and after loading	0	0	0	0,00%	0	0,00%	0	0,00%	4	57,14%
54	Protective measures	Ad breaks / alerts format	One-sentence ad break	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
55	Protective measures	Ad breaks / alerts format	Multiple-sentence ad break	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
56	Protective measures	Ad breaks / alerts format	Icon	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
57	Protective measures	Ad breaks / alerts format	Combination	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
58	Protective measures	Ad breaks / alerts content	Presence of an introductory explanation about the ad break itself	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
59	Protective measures	Ad breaks / alerts content	Presence of advertising literacy components	0	0	0	0,00%	0	0,00%	0	0,00%	0	0,00%
60	Protective measures	Legal information	Privacy policy	5	5	10	83,33%	6	100,00%	16	88,89%	6	85,71%
61	Protective measures	Legal information	Terms of usage	5	2	7	58,33%	6	100,00%	13	72,22%	5	71,43%
62	Protective measures	Age limitation	Age limit suggested	6	5	11	91,67%	6	100,00%	17	94,44%	2	28,57%

Indicators by dimension and sub-dimension — **Presence of indicators in games and advergames**

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
63	Protective measures	Age limitation	Age limit enforced (must enter birthdate)	0	0	0	0,00%	2	33,33%	2	11,11 %	0	0,00%
64	Protective measures	Parental control	Parental permission required statement	0	0	0	0,00%	0	0,00%	0	0,00 %	1	14,29%
65	Protective measures	Parental control	Parental section	0	0	0	0,00%	0	0,00%	0	0,00 %	1	14,29%
66	Protective measures	Parental control	Parental warning	0	0	0	0,00%	0	0,00%	0	0,00 %	0	0,00%
67	Protective measures	Ratings and labels	Content rating**	6	6	12	100,00 %	0	0,00%	12	66,67 %	0	0,00%
68	Protective measures	Ratings and labels	Labelling schemes	0	0	0	0,00%	0	0,00%	0	0,00 %	0	0,00%

No	Indicator	Dimension	Sub-dimension	iTunes	Google	Google + iTunes	%	Facebook	%	Platforms Total	%	Advergames	%
69	Protective measures	Contact info	Forms	1	1	2	16,67%	2	33,33%	4	22,22%	3	42,86%
70	Protective measures	Contact info	Email	5	3	8	66,67%	5	83,33%	13	72,22%	5	71,43%
71	Protective measures	Contact info	Report a problem	3	6	9	75,00%	6	100,00%	15	83,33%	1	14,29%
72	Protective measures	Contact info	Phone	1	1	2	16,67%	0	0,00%	2	11,11%	4	57,14%

Indicators by dimension and sub-dimension — **Presence of indicators in games and advergames**

* If Indicator 1 = 0, go to Indicator 12 and skip indicator 48 to 59; **coded as free text

10.3 Annex 3 Questionnaire Experiment

10.3.1 Overview variables and questions from the questionnaire (English version)

Variables	Questions from the questionnaire (coding)
Condition	In which condition where the children (Neutral = 0, Chiquita = 1, Bart Smit = 2)
Fruit intake	Gram of apple before, gram of apple after Gram of banana before, gram of banana after
Score game	The score achieved in the game
Computer	Do you have a computer with Internet at home? (yes = 1, no = 2)
Games	How often do you play games on the Internet? (never = 1, almost never = 2, a few times a week = 3, almost every day = 4, every day = 5)
Diet	Are you on a diet? (yes = 1, no = 2)
Research	What do you think this research is about?
Sex	Are you a boy or a girl? (boy = 1, girl = 2)
Age	How old are you? (7 years = 1, 8 years = 2, 9 years = 3, 10 years = 4, 11 years = 5, 12 years = 6, 13 years = 7)
Class	Which class are you in?
BMI	Length (in meters) Weight (in kg)
Hunger	How hungry were you before playing the game?

	(not hungry at all = 0, very hungry = 14)
Game attitude	How much do you like the game? (not nice at all = 0, very nice = 14)
	How funny do you find the game? (not funny at all = 0, very funny = 14)
	How nice do you find the game? (not nice at all = 0, very nice = 14)
	How boring do you find the game? (recoded to very boring = 0, not boring at all = 14)
	How stupid do you find the game? (recoded to very stupid = 0, not stupid at all = 14)
	How much do you want to show the game to your friends? (not at all = 0, very much = 14)
	How annoying do you find the game? (recoded to very annoying = 0, not annoying at all = 14)
Product recognition	What was on the back of the cards in the game? 3x (good = 1, not good = 0)
	Have you seen a banana in the game? (recoded to Yes, definitely = 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not = 1)
	Have you seen a kiwi in the game? (Yes, definitely = 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Have you seen cherries in the game? (Yes, definitely = 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Have you seen lollipops in the game?

	(Yes, definitely = 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Have you seen wave boards in the game? (recoded to Yes, definitely = 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not = 1)
	Have you seen a bag in the game? (Yes, definitely = 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
Brand recognition – Chiquita	What was on the front of the cards in the game? 1x (good = 1, not good = 0)
	Have you seen McDonalds in the game? (Yes, definitely = 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Have you seen Chiquita in the game? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Have you seen Kanzi in the game? (Yes, definitely= 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Have you seen Del Monte in the game? (Yes, definitely = 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
Brand recognition – Bart Smit	What was on the front of the cards in the game? 1x (good = 1, not good = 0)
	Have you seen McDonalds in the game? (Yes, definitely= 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Have you seen Bart Smit in the game?

	(recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Have you seen Intertoys in the game? (Yes, definitely= 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Have you seen Toys R Us in the game? (Yes, definitely= 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
Advertising literacy	Was this game created to make you buy Chiquita / Bart Smit? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Was this game created to make you want Chiquita / Bart Smit? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Was this game created to make you like Chiquita / Bart Smit? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Was this game created because most people like it? (Yes, definitely= 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Was this game created because games like this are so much fun? (Yes, definitely= 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Is it fair that there is advertising in the game? (Yes, definitely= 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
	Is it bad that there is advertising in the game? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)

	Is it mean that there is advertising in the game? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Is it good that there is advertising in the game? (Yes, definitely= 1, Yes, maybe = 2, No, I don't think so = 3, No, definitely not = 4)
Attitude towards Chiquita	How much do you like Chiquita? (not at all = 0, very much = 14)
	How stupid do you find Chiquita? (recoded to very stupid = 0, not stupid at all = 14)
	How tasty do you find Chiquita? (recoded not tasty at all = 0, very tasty = 14)
	How unappetising do you find Chiquita? (recoded to very disgusting = 0, not disgusting at all = 14)
	How cool do you find Chiquita? (not cool at all = 0, very cool = 14)
	How boring do you find Chiquita? (recoded to very boring = 0, not boring at all = 14)
Attitude towards fruit	How boring do you find fruit? (recoded to very boring = 0, not boring at all = 14)
	How stupid do you find fruit? (recoded to very stupid = 0, not stupid at all = 14)
	How tasty do you find fruit? (not tasty at all = 0, very tasty = 14)
	How unappetising do you find fruit? (recoded to very disgusting = 0, not disgusting at all = 14)

	How cool do you find fruit? (not cool at all = 0, very cool = 14)
	How much do you like fruit? (not nice at all = 0, very nice = 14)
Brand attitude (Chiquita and Bart Smit separately)	Are you going to ask your parents to buy Chiquita fruit? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Are you going to buy Chiquita fruit from your own money? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Are you going to eat Chiquita fruit? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think = 2, No, definitely not= 1)
	Are you going to ask your parents to buy Bart Smit toys? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Are you going to buy Bart Smit toys with your own money? (recoded to Yes, definitely= 4, Yes, maybe = 3, No, I don't think so = 2, No, definitely not= 1)
	Which brand would you choose, Del Monte or Chiquita? (Del Monte = 1, Chiquita = 2)
	Which brand would you choose, Bart Smit or Intertoys? (recoded to Intertoys = 1, Bart Smit = 2)

NOTE: The variables have been recoded where necessary so that all variables were scored from negative to positive.