Their feed & what they eat

The extent, nature and impact of social media food marketing targeted to adolescents

Newcastle
19:00
Tuesday, 4 July

Wageningen
11:00
Tuesday, 4 July

Daphne van der Bend

Propositions

1. Consumers have the right to be informed about the commercial intent of social media food posts through sponsorship disclosure.
(this thesis)

2. Policies aimed at regulating food marketing more effectively promote adolescent health than educational programs targeting adolescent behaviors.
(this thesis)

3. Conducting PhD research at two different locations leads to more comprehensive outcomes, enhancing the quality of research.

4. As no food is healthy or unhealthy on itself, front-of-pack labels are ineffective means for educating consumers about a healthy diet.

5. Free food stimulates social cohesion among PhD students.

6. The COVID-19 pandemic has led to more creative and original research methodologies.

7. Digitalization leads to consumers appreciating the value of unique experiences, as illustrated by the increasing interest in analog photography.

8. It is crucial that identical twins attend different school classes.

Propositions belonging to the thesis, entitled

Their feed & what they eat: the extent, nature and impact of social media food marketing targeted to adolescents.

Daphne van der Bend
Wageningen, 4 July 2023

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The extent, nature and impact of social media food marketing targeted to adolescents

Daphne Leonore Mariël van der Bend

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Thesis

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General introduction

1.1. Scope of this thesis

Over the past decades, there has been a clear shift from traditional marketing (e.g., television, print, radio) towards digital marketing, with social media becoming an increasingly popular marketing channel [1]. This has given marketers the opportunity to broaden and extend their marketing communication techniques and this clearly has altered the research community's views on traditional marketing communication models [2-5]. As consumers can now share or interact with marketing content on social media, the boundaries between entertainment and marketing are blurred, leading to more implicit persuasion through social networks and engagement of consumers in emotional, personalised and entertaining experiences often without them being fully aware of persuasive intent [1, 2, 6]. Social media marketing is mainly expected to reach younger age groups, including adolescents, as they are the most digitally-experienced segment of the population [6]. A large majority of adolescents spend a large proportion of their leisure time on social media nowadays and spend relatively little time watching television [7]. Thus, the rapid shift from traditional to digital media has to a large extent impacted the type of marketing communication strategies adolescents are exposed to, how they interact with it, and how they process it [1]. Before the writing of this thesis, a very limited body of evidence showed that food promotions on social media are largely showing energy-dense, nutrient-poor (EDNP) foods [8, 9]. Concerningly, exposure to EDNP food marketing in traditional media channels has been shown to positively influence adolescents' attitudes towards, preferences for and consumption of these foods, which may predispose them to an increased risk for obesity and related diseases [10]. Yet, limited evidence is available about the extent, nature and impact of food marketing targeted to adolescents on social media platforms [11]. This type of marketing is expected to grow and increasingly impact adolescents' exposure to EDNP foods and beverages in the future. This may potentially impact their dietary behaviours and health, and therefore more evidence on its specific effects among adolescents is warranted.

In the following sections, the problem will be placed into perspective by elaborating on the obesogenic food environment, the food marketing environment and how this has changed with marketing channels evolving over time. Finally, social media food marketing (SMFM) will be discussed in particular, and what is known about its extent, nature and impact on the adolescent group. Given that the research presented in this thesis was carried out in both Australia and the Netherlands, certain sections may draw on statistics and research specific to those countries.

1.2. The obesogenic food environment

In contemporary society, we encounter food choices in nearly any aspect of our lives. Think of the breakfast you made yourself this morning, the snack you selected in your break, or the dinner you are having tonight. What made you choose these foods at the time? What factors drove these decisions? According to the social ecological model [12], we can explain this from two interacting perspectives: from the perspective of the individual and of the food environment.

From the individual perspective, it could be that hunger triggered you to have that snack, or it made you feel happy, elicited particular memories, or made you feel healthy or unhealthy. Thus, besides a physiological role, food also has a psychological (e.g., emotional) role in our lives [13]. Additionally, according to the social ecological model, it is the physical, social and policy environments that drive our food decisions [12]. Food producers play a large role in creating consumers' physical food environment. Over the course of the past century, unprocessed and freshly prepared meals have increasingly been displaced by processed foods, initially in Western countries and later worldwide. Driven by the industrialization of food systems, technological changes and globalization, food producers started to increasingly create convenient, inexpensive, easily accessible, and palatable foods [14, 15]. Ultra-processed foods that were more efficient and inexpensive to produce, such as ready meals, sweetened or salted snacks, and biscuits, became more and more abundant, impacting consumer food choices to a great extent [16]. Many of these foods are high in saturated fat, sodium, sugar and energy, and hence do not align with national dietary guidelines [17]. For instance, 79% of products sold in Dutch supermarkets do not comply with the Dutch dietary guidelines [18], and only 34% of the foods Australian promoted by Australian supermarkets are in the five core food groups recommended for daily consumption [19].

Repeated exposure to food cues, such as the sight of foods, significantly stimulates purchase and consumption [20]. Unfortunately, the rise of so-called obesogenic environments, i.e., "the collective physical, economic, policy and socio-cultural surroundings, opportunities, and conditions that promote obesity", stimulates individuals to consume EDNP foods and drinks, leading to a higher energy intake than required [21, 22]. In Australia, only about half of the Australian adults consume the recommended minimum of two serves of fruit a day, and a small minority (i.e., 4% of men, 11% of women) are consuming the recommended 5 to 6 servings of vegetables per

day [23]. In the Netherlands, one-third of the total daily food intake consists of products that do not comply with the Wheel of Five recommendations, e.g., sweet and savoury snacks, candy, sugary drinks, ready-to-eat meals or other highly processed foods such as sauces and breakfast cereals [18]. Specifically, compared with all other age groups, 9–19-year-old Dutch children and adolescents, were found to be the most frequent consumers of candy and sweet and savoury snacks [24]. Consumption of sweets, candy or highly processed and nutrient-poor snacks does not only displace consumption of nutrient-rich foods, but it can also lead to overconsumption and excess energy intake [25]. When higher energy intake is not compensated with an increase in physical activity, this may lead to weight gain and potentially overweight or obesity, which is related to several serious health conditions such as cardiovascular disease or Type 2 diabetes [26]. The increasing availability of ultra-processed foods is suggested to be a key driver in the global obesity pandemic [21]. Obesity prevalence has increased dramatically worldwide in the past 4-5 decades, with childhood and adolescent obesity being of specific concern, because of its serious short-term health consequences and the likelihood of persistence into adulthood, leading to morbidity and premature mortality in later life [27, 28]. These have led to the development of the 2013 World Health Organization (WHO) Monitoring framework for the Global Plan of Action to Prevent and Control Noncommunicable Diseases (NCDs) 2013-2020, which aimed to halt the rise in obesity by creating supportive environments that promote healthy behaviours, with a specific focus on maternal health, children, adolescents, and youth, including prevention of childhood obesity [29]. Specifically, the WHO endorsed an implementation plan which specified that the global childhood overweight prevalence of 6.7% estimated for 2010 should not further increase to 10.8% as per trends observed in 2014 [30].

Yet, research suggests that globally the implementation of obesity prevention policies has been relatively inconsistent and slow to date [21, 31], and for most countries it seems unlikely that the WHO targets will be met by 2025 [32]. A recent analysis predicted that global obesity numbers will continue to rise from 2020 to 2030, among both 5-9-year-old children (i.e., with 45%) and 10-19-year-old children (i.e., with 74%) [33]. In 2030, 103 million children aged 5-9 years and 150 million adolescents aged 10-19 years will be affected by obesity, representing almost 1 in 8 (12.9%) of all children and adolescents worldwide [33].

Meanwhile, commercial entities that pursue profit, production, and market expansion continue to counteract the effectiveness of policies that aim to tackle childhood and

adolescent obesity and related diseases [33]. Specifically, the food marketing practices these entities rely on are considered important contributors to youth's exposure to EDNP food cues and hence seem to undermine policy measures to reduce obesity rates [34].

1.3. The food marketing environment

As consumers we may be exposed to thousands of food and non-food marketing communications a day, led by product advertising [35]. The American Marketing Association defines marketing as "the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large" [36]. Advertising targets relevant determinants of our purchasing or consumption behaviour and in the case of food advertising forms the crucial link between food production and our demands for these foods. According to classical hierarchy of effect models such as AIDA, which stands for 'Attention', 'Interest', 'Desire' and 'Action', consumers move through a series of cognitive (thinking), affective (feeling) and behavioural (doing) stages when making purchase decisions [37]. Two direct purposes of advertising are 1) to provide information to consumers about a product, and 2) to induce positive feelings about a product so that consumers view the product as appealing [38]. The latter, more significant purpose suggests a more affective or emotional role of marketing, i.e., it seduces consumers by generating positive feelings about the product so they find the product appealing, without thinking about it rationally [38]. Marketers add perceived value to products by branding them and creating positive associations with their brands among consumers, to persuade them to purchase the product – also referred to as brand building [38]. To generate positive brand associations, marketers use two broad forms of promotions. On the one hand, they may apply paid advertising, through purchased media, and on the other hand, they may promote their brands through earned media, i.e., unpaid brand promotions through word-of-mouth by the general public [38]. Yet, the marketing strategies used for brand building have largely changed over the past decennia, that is, a shift has taken place from more traditional, overt forms of advertising towards more earned, covert promotions, with brand or products being increasingly integrated into entertaining content created by influencers or social media users [39]. This shift in marketing strategies can be partly attributed to a shift in the type of marketing channels available for marketers over time (see Figure 2.1 for a historical overview). With the rise of digital media, the dynamics of marketing have changed and linear or sequential marketing models such as AIDA may no longer apply to the currently digitalized media

environment that brings about much more stealth, affective and implicit forms of marketing. Consequently, this may have large implications for how consumers process food marketing messages, and subsequently their eating behaviours [2, 40].

The next subsections elaborate on the historical changes in marketing communications in more detail, and finally how these may affect marketing processing mechanisms in the adolescent group in particular.

1.3.1. Broadcast media: traditional marketing

Marketing was already present long before it was defined and analysed in the 20th century, and advertising, as being one of several marketing strategies, was even noted several centuries earlier. The first newspaper advert was printed in the 16th century, and since then, print advertising started to proliferate [37]. Halfway past the 19th century, advertising was defined more narrowly as 'paid for mass communication', and in the following years it became an important tool for large-scale development of food brands that are still present today, such as Schweppes, Coca-Cola, Quaker Oats and Heinz [37]. Yet, print advertising was soon taken over by radio and cinema advertising, and not long after that, in the 1950s, television advertising. The increasing availability of broadcast media led to marketers having to manage and optimize a range of different marketing channels and thus understand the effectiveness of their marketing efforts on their customers. They were aware that consumers had become much more sophisticated and critical towards marketing messages and hence were less readily responsive to traditional forms of advertising [37]. To perform optimally, marketers had to measure their impact and gain a better understanding of the consumer. Around the mid-20th century, the '4 P's' were introduced by Neil Borden, which identified product, promotion, place and price as key factors for marketers to measure and optimize the success of marketing campaigns [37]. Hence, while marketers originally aimed to reach as many people as possible through mass marketing communication, they increasingly started to employ alternative strategies to appeal to their audience and fine-tune their 'marketing mix' using the different broadcast media channels available [37]. This can be linked to the more strategic marketing approach applied by companies over time, described by the STP framework, which stands for Segmentation, Targeting and Positioning. This model summarises the concept of market segmentation, i.e., companies' process of identifying and subsequently targeting specific sub-groups of the market – referred to as segments – and lastly positioning themselves as the most attractive option. Over time, branding

evolved into a segmentation tool with different brands becoming available for and suited to even the smallest segments [37].

An example of a strategy that became notorious with the rise of cinemas and aimed to tackle consumers' more critical attitudes towards marketing messages included subliminal marketing [41]. In 1957, private market researcher James Vicary claimed to have successfully stimulated sales of popcorn and Coca-Cola in a cinema by secretly showing the subliminal, flashing messages "Drink Coca-Cola" and "Eat popcorn" during a movie [41]. Subliminal messaging or priming is typically described as the projection of visual cues or messages below an individual's threshold for conscious perception [42]. While Vicary's study eventually appeared to be a publicity hoax, subliminal advertising has been banned in the UK, America and Australia since 1958 [41]. The idea of influencing consumers on such an unconscious level had become abhorrent to people.

Moreover, with the advent of television and films, companies gained interest in another marketing technique: product placement. This method allowed them to target critical consumers in a more subtle manner, distinct from more traditional forms of advertising [43]. Product placement is referred to as "the convergence of advertising and entertainment industries where a brand message is integrated within the appropriate context as part of the interaction" [37]. Product placement in films was first used in the 1940s but only in more recent decades it has been used as a key marketing strategy, playing a significant role in broadcast sponsorship. Product placement in movies was found to be financially effective, i.e., companies' stock price on average increased by 0.89%, as the result of product placement in a movie, during the movie's opening [43]. Also, one of the earlier examples of placement of a food brand into a film was in 1982, when the brand *Reese's Pieces* chocolate was shown in *ET* and subsequently led to a 65% rise in product sales [37]. Because of its effectiveness in boosting sales, marketers started to increasingly invest in product placement. In 2005, companies paid $722 million in fees, free products and promotional support for product placement in films, and by 2010 spending on film product placement was expected to rise to up to $1.8 billion [43]. Recent statistics report that globally, product placement spending surged to $22.93 billion in 2021 [44].

Thus, marketers increasingly started to employ more advanced strategies that were outside the scope of more traditional, covert forms of marketing, and that would target consumers more subconsciously. These advanced marketing communications especially

accelerated from the end of the 20th century, when advertising and product placement were no longer limited to broadcast media, including print, radio and television. The introduction of the internet and digital media made it possible for marketers to reach their customers through even more personalised and advanced online marketing techniques, broadening their marketing mix.

1.3.2. Social media: digital marketing

With the first web page being created in 1991, this initiated a cascade of new developments that led to a more digitalized food marketing environment. The commercialization of the Internet was noted by 1995, after which the launch of search engines, websites, email, digital and display advertising, mobile apps and social media enabled the application of a broad range of digital forms of marketing to develop [45]. In 1997 the website Six Degrees was launched, the first recognised social media platform [37]. Social media can be defined as "a group of Internet-based applications that enable users to create and exchange content" [46]. The popularity of social media sites particularly started to grow since the launch of the social-networking platform Facebook in 2004, after which photo- or video-sharing platforms such as YouTube (2005), Instagram (2010), Pinterest (2011) and TikTok (2016), microblogs such as Twitter (2006), and multi-media messaging apps such as Snapchat (2011) followed [37, 47]. In 2022, around 59% of the world's population was estimated to be actively using social media sites, with the average number of social media platforms used by individuals aged 16-64 years being 7.2 [48]. The highest rates of social media use within populations were reported in Northern Europe (85%) and Western Europe (84%) [49]. Moreover, the introduction of application software (apps) with social and commercial applications for the iPhone, which was launched by Apple in 2007, expanded and advanced the digital world even more and took social media and mobile marketing to a whole new level [37]. To date, the number of unique mobile phone users has increased to up to 69% of the world's population [48]. In the Netherlands, 82% of people 12 years and older used a smartphone to access the internet in 2019 [50]. Moreover, 81% of the Australian population used a smartphone in 2017, which was projected to reach around 87% by 2026 [51].

The shift towards a more digitalized environment has not only had several implications for how consumers are accessing media content, but also how they are being targeted by marketing communications. With the rise of social media platforms, consumers are

increasingly able to find information and entertainment, communicate with others and engage or interact with media content very fast, in many ways. Consequently, social media platforms enable marketers to apply two-way conversations with their customers and reach audiences worldwide [47]. At the same time, digital media and smartphones have enabled the gathering of big data on consumer behaviours, consumers' interactions, and their personal profiles [52]. Many leading food, beverage, and restaurant companies, including Kellogg's, Mondelez, Coca-Cola, PepsiCo, and McDonalds, use data-management platforms and marketing clouds to generate detailed profiles of consumers, by collecting 'first-party data' (i.e., directly from a customer's own record), 'second-party data' (i.e., from another company, sold to others), and 'third-party data' (other types of data-broker information, retrieved from thousands of different sources). This data is merged to form the basis of marketers' predictive analytics, involving the application of sophisticated algorithms to forecast how consumers will respond to marketing messages, improving the accuracy of personalised targeting [52]. Additionally, marketers' ability to measure individuals' responses to specific marketing techniques through data analytics has formed the basis for enhanced effectivity and consumer targeting through social media [37, 47, 52]. Moreover, marketers can track consumers' real-time location through their mobile phone's global positioning system (GPS), Wi-Fi and Bluetooth communications, or their Internet Protocol (IP) address. By means of unique identifiers for mobile devices, referred to as advertising 'IDs', consumers can be tracked and targeted on the spot by food marketers, for example, while they are buying groceries [52]. Also, the ability of marketers to follow, track and target individuals across the different digital devices they are using, makes personalised, real-time marketing even more efficient. For example, parents can be targeted with marketing communications based on data of their children's online behaviour and ad exposure [52]. Additionally, marketers can apply geolocation targeting by extensively analysing places that individuals visit. For instance, neighbourhoods and communities are mapped based on their characteristics, such as income, age, or ethnicity, to generate geo-data-rich profiles. When individuals enter certain 'mapped' areas, they pass through a so-called 'geo-fence', triggering ads and coupons delivered via mobile devices [52].

Thus, with the potential of reaching wider audiences efficiently, in a personalised manner, and using a two-way interaction, social media has become a highly attractive tool for marketers, and they have started to invest millions in these platforms. In 2019, social media was estimated to take over print and become the third-largest advertising

channel, accounting for 13% of the global advertising spend, behind television (29%) and paid search (17%) [53]. Marketers ranked Facebook (62%) and Instagram (49%) as the most effective for reaching their business goals in 2021, but a particularly large increase in perceived effectiveness was found for TikTok, Pinterest and Snapchat compared to the previous year, with TikTok showing the highest increase of 700% [54]. In 2021, the worldwide annual spend on social media advertising was 154 billion US dollars, which was a 17% increase compared to 2020 [54]. Among food and beverage companies in particular, social media marketing was found to be the second most popular digital marketing strategy with an advertising spend of $3.5 billion in 2021, behind search engine marketing (i.e., $5.5 billion) [55]. Food and beverage brands such as Domino's and Coca-Cola spend more than 20% of their total advertising budget on social media [56, 57]. Also, as of 2016, 200 fast food, beverage and snack brands altogether managed more than 500 official brand accounts on the social media platforms Instagram, Twitter, Facebook, Tumblr and Vine (now defunct), and had posted more than 12 million times on these [57]. These trends indicate that food marketers are increasingly shifting towards social media.

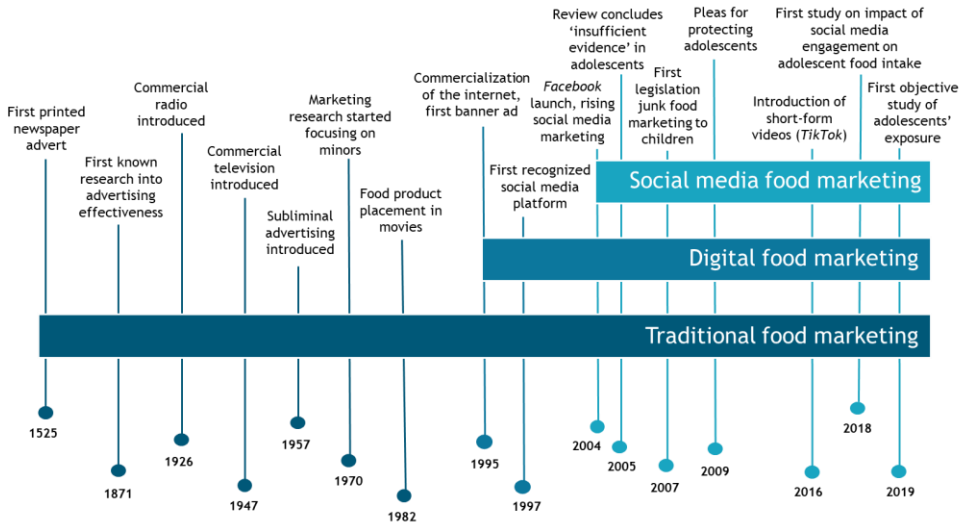

Figure 1.1. Historical representation of (research on) food marketing. Figure created by the candidate, based on literature [5, 37, 58-62].

1.3.3. Food marketing content on social media

Food marketers can use social media to promote their brands in two main ways: through paid or unpaid advertising. Paid advertising generally appears on a user's home page and includes a 'sponsored' or 'paid ad' disclosure [57]. For instance, 67% of all restaurants paid for at least one social media advertisement or campaign in 2021, which was an increase compared to previous years. Forms of social media restaurant advertisements that are most commonly posted include boosted posts - these give the brand more visibility as they appear in the social media feeds of more people (30%), followed by video advertisements (28%) and image advertisements (27%) [55]. On the other hand, companies can create their own, official social media brand account for free, referred to as 'owned content'. This enables users to follow them and hence food marketers are directly able to interact with their customers without spending any money [57]. However, marketing communications on social media reach much further than brand promotions created and disseminated directly by the companies themselves. Food companies can now take advantage of the creative and network features of social media, applying stealth or covert product placements. Besides personalisation and engagement, four key characteristics of digital marketing were defined previously: immersion, content creation, ubiquitous connectivity, and peer-to-peer networking [6].

Individuals can now immerse themselves in virtual, interactive video content, as companies apply subtle product placements of brands into game apps (i.e., advergames) or other creative channels, such as recipe or cooking videos showing food brands [58, 63]. Another marketing strategy that has particularly gained much interest with the rise of social media and blurs the lines between persuasion and entertainment by means of subtle product placement is word-of-mouth and user-generated content. Comments or reviews of food or beverage products that are passed on from potential customers to others in their social (online) network free of charge are regarded as a highly powerful marketing tool, particularly in the social media context [37]. The globalization and digitalization that came along with the rise of social media have created so-called 'crowd cultures', communities that can connect to and influence each other with one click and initiate new creative or cultural trends or movements [64]. Brands must keep up with these subcultures and their newest hypes for their marketing campaigns to remain effective. For example, a recent study found that food companies such as PepsiCo, Starbucks and McDonalds join or initiate TikTok challenges to increase brand dissemination [65]. TikTok is a social media platform with more than one billion users

– mostly children and adolescents - on which users create, post, watch and engage with short-form videos [65]. By encouraging TikTok users to create and post videos of their brand with a shared theme, food companies make users their 'unofficial brand ambassadors' [65]. Adding this earned promotional content to their marketing mix is highly attractive to food companies, as consumers generally trust their friends' or peers' recommendations more than those from brands or advertisers [1, 66].

Especially when information about a product is passed on by an influential person within social media networks, this can encourage their followers to purchase the product and thus significantly increase sales. These so-called social media influencers generally have large fan bases and established credibility on specific topics [67]. The increasing popularity of social media, the rise in the number of food-oriented influencers and the growing interest of brands to involve influencers in their marketing communications, are projected to stimulate further growth of food influencer marketing between 2019 and 2024, at a rate of 42% [55]. In contrast to traditional celebrities (e.g., famous actors, models, singers or sports stars), influencers on social media are referred to as 'micro celebrities', who have become famous through social media and are seen as normal people, except that they are followed by thousands or even millions of followers on these platforms [68]. Social media influencers are found to be more effective in encouraging brand preferences; a Google survey observed that 70% of young people reported they would be rather influenced by a brand recommendation from their favourite YouTube video blogger (i.e., vlogger) than a movie or television personality or celebrity [69]. Influencers can show and review brands voluntarily and thus without any commercial intent, but their content becomes advertising when 1) influencers receive a compensation in the form of free products or payment, or 2) advertisers have control over the content, also including approval of the influencer's post or instructing influencers on what to post [67]. Yet, influencers are hesitant to be transparent and do not disclose their commercial intent because they want to avoid irritation among their followers or they do not fully understand disclosure guidelines or regulations [70, 71]. In most countries worldwide, sponsorship disclosure regulations are described in self-regulatory codes that largely focus on traditional media such as TV and not so much on digital or social media [1, 38, 72]. Influencer marketing typically blurs the boundaries between commercial and entertaining content, making it more difficult for social media users to recognise advertising. As such, it is suggested to be most effective in reaching younger age groups, as they are highly receptive to recommendations in the social

networking context, but less likely to recognise them as marketing [2, 37, 38, 70]. Thus, ideally, strict regulations on the use of sponsorship disclosure on social media are warranted, but also on the type of foods allowed to be marketed on these platforms.

The increased use of social media in food marketing campaigns has rendered the presence of highly palatable, digitally enhanced, mostly EDNP food images ubiquitous [73], and may therefore contribute to the obesogenic environment. Specifically, it was observed that 65%-80% of digital food and beverage advertising was for EDNP foods, or brands associated with these foods [74-76]. Previous work showed that viewing appetizing food images enhances attention and neural activation in visual-processing and reward-related areas in the brain [73], and images of EDNP foods were found to increase gaze duration and lead to higher visual attention compared to healthier foods or non-food products [77]. Concerningly, EDNP food and drinks marketing mostly targets vulnerable populations, including younger age groups, which if it influences long-term behaviour could negatively impact their health [1, 52, 78, 79].

1.4. Adolescents in the 'social media era'

Food marketers significantly invest in targeting the adolescent group. Adolescence is defined as the period of transition between childhood and adulthood, and according to the WHO, it can be defined as those individuals between 10 and 19 years of age [80]. Based on this definition, a large majority of adolescents are included in the age-based definition of 'child', i.e., a person under the age of 18 years according to the Convention on the Rights of the Child [81]. However, adolescents may be defined differently in different countries or within different research domains. For instance, the Center for Disease Control and Prevention's Youth Risk Behavior Surveillance System bases its data on individuals who are in high school (i.e., grades 9-12) rather than a specific age [82], while consumer behavioural and communication science fields assume that adolescence starts from 13 years and that by the age of 16 years an individual's consumer- and advertising related skills have reached adult-like levels [2]. In this thesis, adolescents are defined as individuals 12-17 years old, as this takes into account both of these two definitions.

Adolescents have become primary targets for food marketers on social media as they are 'early adopters' of new media practices and they are highly active social media users [6]. Since 2013, adolescents' television watching hours have declined dramatically, resulting in a 43% reduction in exposure to food advertisements on television up to 2017 [83].

Decreasing television viewing time among youth was also observed in the Netherlands, with a decline of 15% among teenagers each year up to 2018 [84], and in Australia, where a decline of 7% was observed in this age group from 2016 to 2017 [85]. These numbers are expected to have declined even further since adolescents have gradually replaced television viewing with activities on computers, tablets and smartphones. In 2019, almost 99% of Dutch adolescents of 12-18 years used a smartphone to access the Internet, and most of this time was spent on social media: among this age group 95% reported being on social media platforms [86]. This has led to adolescents being able to access social media independently, exposing them to any marketing content without their parents' control or awareness [87, 88]. In 2021, almost 36% of Dutch high school students reported being constantly accessible to family or friends on social media throughout the day [89]. In 2020, in Australia, adolescents 12-17 years old spent 14.4 hours a week online, using an average of four social media platforms. The most popular platforms were YouTube, Instagram and Facebook, although overall fewer adolescents accessed these platforms in 2020 compared to 2017. Instead, TikTok showed the highest growth among this age group, from 12% in 2017 to 38% in 2020 [90]. In the Netherlands, TikTok also showed the largest increase in popularity according to recent data, with the number of users rising from 1,7 million to 3 million between 2021 and 2022. Also, TikTok has the largest number of youngest subscribers compared to other social media platforms - almost half of the Dutch users are between 6-19 years old [91].

Moreover, adolescents are interesting targets for food marketers as they generally have more spending power than younger children, and thus spend billions of their own dollars annually, while also still influencing how additional billions are spent on household food purchases [6, 61]. Specifically, American research showed that 30% of the grocery bills are driven by adolescents' (13-19 years) preferences and eating behaviours. Adolescents' favourite meal on the day is dinner, preferably pizza, and 45% of parents said their child is often involved in deciding what the mealtime menu should look like [92]. Moreover, adolescents are regarded as future adult consumers. Evidence shows that brand preferences and brand loyalty are formed and maintained during adolescence, and thus targeting this age group may stimulate brand loyalty in adult life [61, 93].

The new marketing techniques used on social media – typically characterized by the blurring of advertising with entertainment and social networks, are theorized to influence how adolescents process food marketing messages, making them particularly vulnerable targets.

1.4.1. Theories explaining adolescents' unique vulnerability

According to traditional information processing theories, individuals attend to and actively process marketing messages before making a conscious and rational decision about product purchases [94]. As proposed by the previously mentioned hierarchy of effects models such as AIDA, the rational consumer is supposed to pass through different stages before the ultimate purchase [37]. Additionally, communication theories suggest that when an individual recognises that a message is advertising and has the cognitive ability to consider the information and make an informed decision, referred to as persuasion knowledge, they can defend themselves against persuasive attempts [95]. It is assumed that children with less cognitive maturity, i.e., under 11 or 12 years of age have the most cognitive difficulty processing persuasive messages, as it is only from these ages they become more critical towards advertising [96]. Also, children are only able to activate knowledge of advertising tactics to defend against advertising exposure by the ages 12-14 years [97]. Yet, researchers have started to raise the question of whether individuals – including children and adolescents - are indeed able to defend themselves against a commercial message once they have recognised and understand its persuasive intent, but also whether children under 12 are more vulnerable to marketing messages than adolescents [2, 4, 5]. Research showed that adolescents express significant enjoyment and engagement with advertising, even though they are highly sceptical towards a message [98]. Therefore, older children or adolescents who have a higher level of persuasion knowledge may not necessarily be less influenced by food marketing than younger children – especially when displayed on social media [99].

Persuasive commercial food messages, referred to as 'food cues' in the Reactivity to Embedded Food Cues in Advertising Model (REFCAM), trigger physiological and psychological responses in individuals, resulting in eating behaviours [40]. On the one hand, these effects are influenced by so-called 'message factors', i.e., the features of messages with embedded food cues, and on the other hand by 'individual dispositional factors', which determine the susceptibility to food cues in marketing messages [40]. As demonstrated by previous research, the unique developmental stage of adolescents makes them vulnerable and less capable of resisting food marketing messages, particularly when they are disseminated on social media, which has unique characteristics that differentiate from traditional media channels [100]. Specifically, according to Berlo's Source Message Channel Receiver (SMCR) model of communication [101], SMFM food brand promotions may be encoded by brands, influencers, and social

media users (source) into messages, which are in turn disseminated visually through a social media platform (channel), and hence decoded by adolescents (receiver). It may be theorized that both encoding and decoding processes have changed with the shift from traditional food marketing to SMFM, which may play a key role in adolescents' limited resistance to SMFM messages. Below, several theories are reviewed that could explain how these processes have changed.

Dual process models and social cognitive theories suggest that highly persuasive and integrated marketing messages such as those displayed in social media, largely lead to implicit beliefs, attitudes and behaviours, i.e., without any rational, conscious processing [2, 5, 99]. Adolescents are assumed to be cognitively capable of processing persuasive messages at the most elaborate level, and they are also found to be more sceptical and critical towards the commercial environment than younger children [96, 102]. Yet, food marketing messages in social media may be particularly difficult to defend against, as the hidden product placements on these platforms make them less recognisable as marketing, activate implicit processing mechanisms, and are not likely to elicit an individual's persuasion knowledge [95]. Also, these implicit effects may lead to more impulsive behaviours [2]. This particularly impacts the adolescent age group, since hormones and the brain development stage in adolescence lead to a reduced ability to inhibit impulsive behaviours, and increased reward sensitivity [100, 102]. The main brain area involved in stimulating implicit and impulsive behavioural responses is the amygdala. The pre-frontal cortex inhibits these impulsive behaviours by triggering the planning of appropriate behavioural responses, but it only matures late in adolescence [102]. Hence, adolescents are more likely to engage in risky or less healthy behaviours, for instance, they may be especially attracted to EDNP food products that can provide immediate gratification. Indeed, adolescents who are exposed to less healthy compared with healthier digital food pictures showed increased activation in reward-related brain areas [103]. Furthermore, adolescents' underdeveloped brain and pre-frontal cortex also affects their processing of emotional content, resulting in limited emotional control [102]. According to the 'mere exposure effect', repeated exposure to brands, even in the absence of any positive stimuli, can already generate positive brand attitudes [104]. Moreover, food marketers often apply implicit emotional persuasion techniques to target adolescents by means of 'affective conditioning'. Through repeated exposure to attractive marketing stimuli that are paired with their brand, marketers trigger positive brand images, brand preferences, and consumption among adolescents without their conscious

awareness [38]. In social media, emotional persuasion tactics may be highly effective, i.e., by using immersive narratives or entertainment- and humour-based approaches, augmented reality or online games, and engaging with social networks or involving social influencers [1].

A unique aspect of social media is its socialization influence, i.e., it offers marketers the ability to interact with consumers via social networks and apply stealth product placements via influencer endorsements [6]. This particularly seems to appeal to the unique developmental needs of adolescents as they are in the midst of their identity development, highly self-conscious and sensitive to social image or status [5, 102]. By the time children reach early adolescence, parental influence on their behaviours has largely declined [105]. Social identity theories describe how young people, in their strive for identity, seek to belong to certain social groups, which play a large role in their sense of 'self' [106]. Social media platforms enable adolescents to connect with peers, friends, and influencers, and hence they play a large role in transmitting norms, ideas, and behaviours [74, 107]. Adolescents particularly value peer norms and acceptance [108]. Consequently, they give careful consideration to the image they present on social media and tend to present a socially acceptable self-image by sharing content popular with friends or peers [109]. The ability to 'like' posts makes social media marketing highly interactive and can even lead adolescents to perceive brands as friends [6]. Yet, peers are found to be more trustworthy than brands, and the effects of social media marketing are larger when endorsed by peers [74]. In light of food consumption and eating behaviours, peers are regarded as the most influential source for shaping dietary behaviours of adolescents [110]. Eye-tracking research showed that adolescents look at EDNP food images longer when they are posted by peers than by celebrities, influencers or companies [74]. They seem to intend to manage peers' impressions of them by adjusting their eating patterns, to meet any perceived social norms [111]. Hence, young adolescents are largely influenced by the food choices of their peers, and more easily follow peers' risky behaviours and decision-making [1]. Concerningly, exchanges with peers were found to trigger unhealthy eating behaviours [111, 112]. Alternatively, peers were suggested to have a high potential to promote healthy dietary behaviours in adolescents, even more so than influencers [113].

Adolescents' peers or even direct friends may evolve to become social media influencers; hence they are regarded as credible, approachable, and relatable role models for adolescents [67]. Compared to traditional celebrities, individuals identify more with

social media influencers, feel more similar to them, and trust them more [114]. As adolescents can follow influencers' updates in a similar way to their friends, and these influencers themselves may appear to be 'ordinary' peer users even though they have large fan bases, adolescents may get the illusion of having developed a personal connection with these influencers, referred to as a 'parasocial relationship' [115, 116]. These effects may be explained by peer modelling or social learning theories, i.e., adolescents may learn and model influencers' behaviours, especially when they look up top or admire them [117]. An enhanced parasocial relationship with a video blogger (vlogger) on YouTube was found to positively impact brand perceptions and purchase intentions [110, 118]. When adolescents identify with a certain influencer and their brand-usage behaviour, they are likely to adopt this behaviour, as the positive affective responses towards the influencer may transfer onto the brand they use [119, 120].

In summary, due to the shift from traditional to social media, it is assumed that the processing of marketing messages has changed (Figure 1.2). Specifically, adolescents may have limited cognitive defences against the new marketing strategies used on social media, as they are still developing emotionally, socially and cognitively [1, 2, 121, 122]. Protecting adolescents against the negative influences of EDNP SMFM is key, and therefore the implementation of regulations that restrict adolescents' exposure to EDNP foods via social media is crucial. Concerningly, contemporary food marketing regulations do not include any restrictions on EDNP food marketing via social media platforms, and they are largely focused on marketing targeted at younger children (<12 years), as research on SMFM effects in adolescents is relatively scarce [38, 72, 123]. To put adolescent-targeted EDNP SMFM on the policy agenda, improving our understanding of its unique effects in adolescents through empirical research is essential.

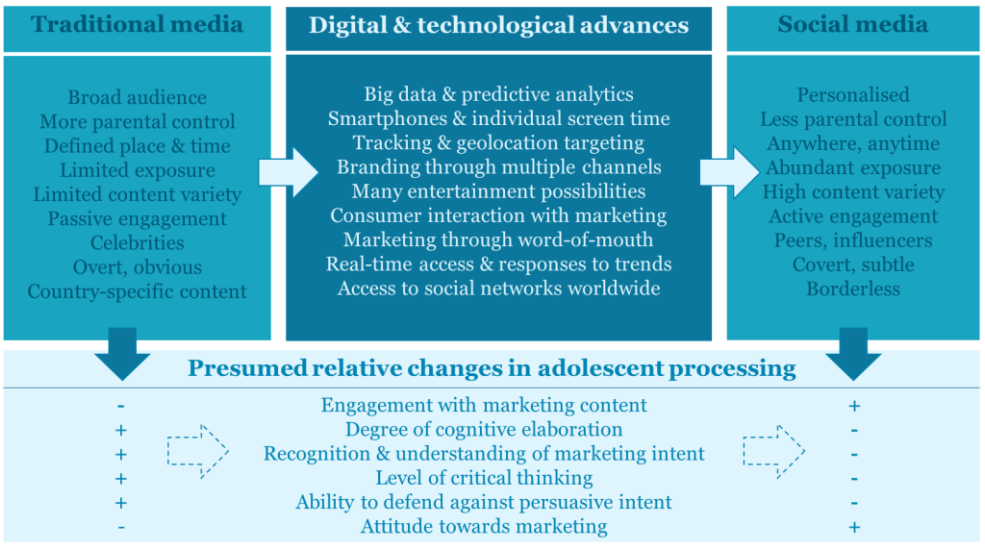

Figure 1.2. Visual representation of digital and technological changes in marketing from traditional media (i.e., television, radio, print) to social media platforms, and how this is presumed to influence marketing processing based on currently available theories. Processing changes are relative and reflect lower (-) versus higher (+). Overall, with the rise of social media, it is presumed that adolescents' engagement with marketing is much higher than with traditional media, and hence their cognitive elaboration and conscious awareness of marketing intent is relatively low. Compared to marketing on traditional media, this makes them less critical towards, and hence less capable of defending themselves against marketing on social media. At the same time, they develop more positive attitudes towards marketing content. Figure was created by the candidate based on existing literature, discussed in the main text.

1.4.2. Research on the nature and impact of adolescent-targeted SMFM

While there has been growing research interest in the SMFM field in recent years, there currently is very little evidence available on adolescents' exposure to SMFM. While food marketers have access to masses of online user data, for researchers accessing and gathering data from personal social media accounts is challenging, because of the dynamic and personalised nature of social media and the privacy and ethical issues related to studying it, particularly in minors, and additionally the difficulty in obtaining informed consent from (in)direct personal networks of participants [124].

Hence, to date most evidence on adolescents' exposure to food marketing on social media has been based on content analyses of specific social media brand-, influencer- or user-accounts or pages [8, 125-129], self-reported data on the frequency of exposure [21, 130-133], and adolescents' self-collection of data from their own social media accounts

[134-136]. There has been one study that measured adolescents' full food marketing exposure on a range of their favourite platforms and through objective screen recordings, although this study included data from 2018 [58]. It can be assumed that since 2018 the food marketing strategies and content of the major food brands have advanced significantly, considering the rapid developments in the digital environment [78]. Thus, further research is required to make policymakers aware of the extent and significance of adolescents' ongoing exposure to EDNP SMFM.

Potvin Kent et al., 2019, showed that, based on screen recordings of Canadian adolescents' two favourite social media platforms, they saw a mean of 2.6 food marketing posts per 10 minutes [58]. Altogether, studies on food promotions exposure, conducted in a range of different countries including Australia, Canada, Mexico, the UK, the USA, Germany, Belgium, New Zealand, Argentina, and Sweden, showed that adolescents were exposed to less healthy options most often, including sugary beverages, fast foods, and chocolate and confectionery [8, 21, 57, 58, 126, 130, 132-134, 136]. Adolescent-targeted promotions were often influenced by major food marketing campaigns, and increasingly concerned earned, or influencer- or peer-endorsed food content [8, 21, 58, 65, 128, 129, 134, 136, 137] and posts encouraging adolescent participation or interaction with the content [57, 65, 125, 127]. Some studies also indicated that the majority of EDNP food marketing was primarily targeted at adolescents and less frequently at younger children [58, 125, 130]. Other studies found that a relatively small proportion of the influencer or earned food content mentioning or showing branded food products were labelled as being sponsored or advertising [133, 136]. This suggests that there is limited transparency about commercial intent among influencers.

Adolescents' high exposure to EDNP food marketing may have implications for their dietary behaviours, as many studies have shown an association between younger children's exposure to food marketing and their attitude towards, preferences, or (intended) intake of these foods [10, 138-140]. However, to date, most evidence regarding impact has been based on food marketing on more traditional media such as television, or on advergaming, and its impact on children under 12 years old, with only limited studies focusing on adolescents and social media platforms [63, 103, 137, 140]. There is also little qualitative research on adolescents' perceptions and evaluations of social media food promotions available to date, although this could provide valuable insights into how marketing is perceived or experienced by this group [63]. Currently available qualitative studies showed that adolescents' most memorable aspects of food

marketing on digital platforms were images, colours, music, oversized portions, product novelty, price promotions and celebrities [141]. Adolescents acknowledged the effects of marketing on product awareness and desire, and, although to a lesser extent, on actual purchase and food intake [141]. Yet, they had no critical beliefs towards influencers and seemed to show empathy towards them, even if they received sponsorship [141]. Also, while adolescents thought they were aware of influencer marketing, in practice they often did not recognise their sponsored content [142]. Therefore, additional insights are needed into how adolescents define or identify different types of social media food promotions (e.g., paid, owned and earned food content), and which aspects of these promotions are (less) appealing to them.

The currently limited amount of research that investigated the effect of SMFM on dietary outcomes suggests that social media food promotions influence adolescents' food choices to some extent, but more data is required on the impact on their dietary patterns and health in the long term [137]. Most impact studies are based on adolescents' self-reported exposure to and engagement with food marketing on social media, and the association with their dietary intake through surveys [59, 131, 132]. These studies showed that exposure to and engagement with food marketing and/or food messages on social media in general [131, 132] and in YouTube videos [59] was positively associated with adolescent food-related attitudes and outcomes, and EDNP food intake. This may be explained by the fact that adolescents' engagement with social media EDNP food posts was found to be significantly higher than their engagement with healthy food posts [74, 143]. Additionally, previous survey-based studies on alcohol and tobacco marketing in digital media suggest that peer-endorsed marketing has a greater negative impact on adolescents' beliefs and use of these products than owned or paid media marketing [144]. However, there is only limited experimental evidence on the effects of social media food promotions on adolescent eating outcomes. One randomized controlled trial among adolescents aged 13-16 years that investigated the impact of healthy influencer marketing (i.e., Instagram) on adolescents' vegetable intake, found no significant effects [145]. Another experimental study that investigated the impact of less healthy and healthier culinary short-form social media videos (i.e., BuzzFeed's 'Tasty' channel on YouTube), found that fruit and vegetable liking among adolescent participants who were exposed to a sweet snack video was reduced, and they had higher intentions to eat sweet snacks. Furthermore, participants exposed to a fruit and vegetable video showed reduced liking of sweet snacks and higher intention to prepare healthy snacks [146]. Despite

popularity among the adolescent group, to date, no other studies have investigated the impact of food brand promotions on short-form social media videos (e.g., such as on TikTok) on adolescents' dietary outcomes.

1.5. Rationale for this thesis

An extensive body of research on the effects of traditional food marketing in younger children under 12 years shows that marketing stimulates children's attitudes towards, preferences for, and consumption of EDNP foods and drinks [10, 63]. Yet, it is debatable to what extent these results are translatable to the adolescent group, as adolescence is a distinctive developmental phase characterized by unique physical, cognitive, emotional and social changes. Research on the effects of SMFM in the adolescent group is limited, despite adolescents being highly active on social media, being important targets for food marketers and being considered cognitively vulnerable to food marketing messages, particularly when these are posted by peers and influencers and embedded into engaging and personalised social media content. In SMFM messages, brands can be subtly integrated into entertaining storylines, influencing how individuals (critically) evaluate or process them. Considering adolescents' declining television viewing hours and increasing activity on social media, it is essential to obtain better insights into the effects this may have among this age group. This thesis aims to investigate adolescents' *exposure* to SMFM, how they *evaluate* SMFM, and to what extent they are *persuaded* by SMFM.

1.5.1. Research questions and structure of this thesis

To address the main aim of this thesis, five research questions (RQ) have been formulated:

RQ 1: *How is adolescent-targeted SMFM defined, what factors contribute to its effectiveness, and what future research- and policy directions do experts recommend regarding SMFM targeted to adolescents?*

RQ2: *What quantity and type of unbranded and branded food promotions are adolescents exposed to on their favourite social media platforms?*

RQ3: *What are adolescents' opinions and views about social media food marketing in terms of appreciation, awareness and recall?*

RQ4: *How do adolescents define and identify food marketing on social media?*

RQ5: *Can a sponsorship disclosure in SMFM with low versus high integration of a food brand in the plot increase adolescents' recognition of advertising, understanding of persuasive intent, critical beliefs, and change brand outcomes?*

Since this thesis is part of a Dual Award Doctoral Degree (DADD), part of the studies was conducted at the University of Newcastle (Australia) and at Wageningen University & Research (the Netherlands). The RQs are addressed using a multi-methods approach, including two qualitative studies (Australia: n = 1, The Netherlands: n = 1), an observational study that involves a small qualitative component (Australia), and an experimental study (The Netherlands). Figure 1.3 shows the core themes of this thesis (in order): *framework, exposure, evaluation,* and *persuasion*.

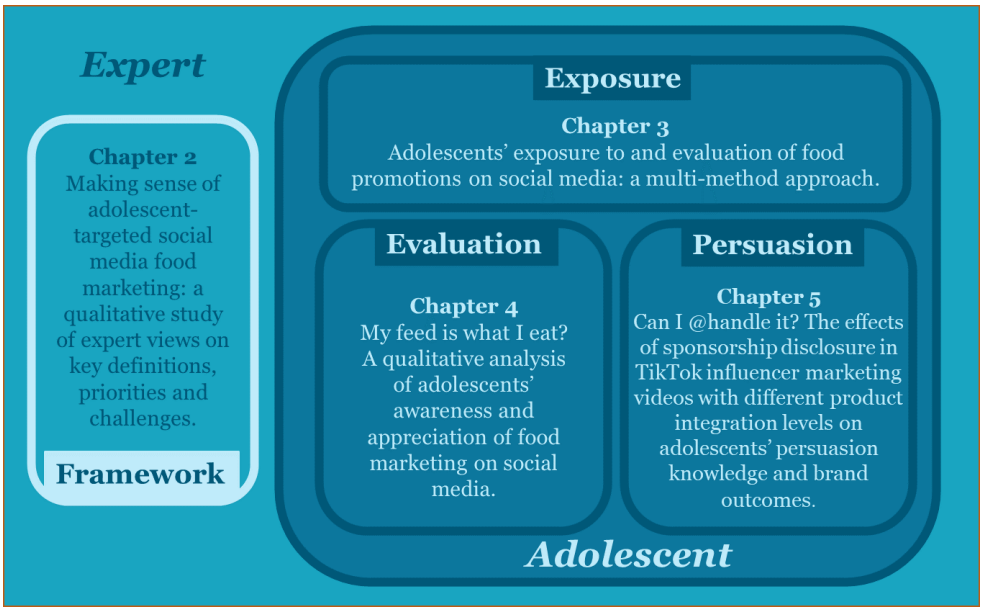

Figure 1.3. Overview of studies and topics of this thesis.

Chapter 1 of this thesis provided a background on the topic, relevance, research questions and main thesis structure.

Chapter 2 develops an initial *framework* for the following chapters and presents the results of a qualitative study that took place in May and June 2020. In this study, experts with multidisciplinary backgrounds (i.e., with clinical, research, policy or marketing expertise related to digital or social media and/or adolescent health or behaviour) were interviewed. They were asked to provide a perspective from their field on how to define

SMFM, on key factors involved in its effectiveness in targeting the adolescent group, and on future directions for empirical research and policies (***RQ1***).

To get better insight into the extent and nature of adolescent-targeted food promotions on social media and adolescents' evaluation of their own exposure, **Chapter 3** of this thesis describes the results of an observational study that took place in Australia and provides insights into the nature and extent of 13–16-year-old Australian adolescents' *exposure* to unbranded and branded food promotions on their favourite social media platforms (***RQ2***), and the appreciation and perceived awareness of SMFM targeted to them (***RQ3***). This was done through one-on-one interviews on Zoom that took place between October 2020 and June 2021 and were screen recorded and later analysed. First, adolescents were instructed to share their screen and visit a maximum of three of their favourite social media platforms for 10 minutes. After the social media activity, they were interviewed by the researcher.

To further the understanding of adolescents' perspectives on SMFM, **Chapter 4** reports the results of a qualitative study that took place in April 2020, on adolescents' *evaluation* of SMFM messages. Specifically, Dutch adolescents aged 13-16 years were interviewed about the criteria they use to define and identify SMFM targeted to them (***RQ4***), but also on their appreciation and awareness of SMFM (***RQ3***).

To gain more objective evidence on adolescents' level of critical processing of the levels of product integration in social media and to what extent their critical thinking can be enhanced, **Chapter 5** presents the results of an experimental study in Dutch adolescents 12-17 years old that was conducted in April and May 2022. This study investigated to what extent a protective sponsorship disclosure in an influencer TikTok video with low versus high integration of a food brand into the plot (***RQ5***) mitigated *persuasion* in adolescents. This study took place in secondary schools, and students were instructed to watch a TikTok video on their phone and fill in a questionnaire on their recognition of advertising, understanding of persuasive intent, critical beliefs, brand attitudes and product choice.

Lastly, in **Chapter 6** this thesis ends with a general discussion of the key findings of the studies and elaborates on implications, ethical and methodological issues, and future recommendations for research and policies.

Making sense of adolescent-targeted social media food marketing: a qualitative study of expert views on key definitions, priorities and challenges

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Abstract

Traditional food marketing stimulates adolescents' consumption of energy-dense, nutrient-poor foods. These dietary behaviours may track into adulthood and lead to weight gain, obesity and related non-communicable diseases. While social media use in adolescents has proliferated, little is known about the content of food marketing within these platforms, and how this impacts adolescents' dietary behaviours. This paper aimed to obtain expert insights on factors involved in the association between social media food marketing (SMFM) and adolescent dietary behaviours, and to explore their views on key priorities, challenges and strategies for future SMFM research and policies. One-on-one semi-structured interviews (n=17) were conducted with experts from Western Europe, Australia and North America, in the fields of public health (policy), nutrition science, social media marketing, adolescent medicine, clinical psychology, behavioural sciences, communication, food industry, social influencing, and social marketing. The experts' collective responses identified that the line between food content posted by social media users and food companies is blurred. Adolescents' processing of SMFM may be mostly implicit, involving social comparison, emotional engagement, and attaching symbolic meanings to foods. Mediating factors and adolescent-specific and SMFM-specific moderating factors potentially influencing adolescents' response to SMFM were summarised in a Social Ecological model. Experts agreed that there is limited scientific evidence on adolescent-targeted SMFM and there are no strict regulations in place to protect adolescents from unhealthy SMFM, while adolescents are active social media users who are cognitively vulnerable to implicit marketing tactics. Adolescent-targeted SMFM should be controlled by encouraging healthy food marketing or limiting junk food marketing. Also, prioritizing both quantitative research on SMFM exposure and its impact, and qualitative research to obtain adolescents' perspectives, is crucial to advocate for regulatory changes regarding adolescent-targeted SMFM content.

Keywords: food marketing; social media; eating behaviours; adolescent health; obesity

2.1. Introduction

Despite several calls for action in the past three decades, adolescents have largely been overlooked in global health and social policy, which has urged academics from a range of disciplines worldwide to develop strategies to advance adolescent health [147, 148]. The WHO indicated that globally more than one in six adolescents, i.e., individuals aged 10-19 years, was overweight in 2016 [149]. The prevalence of overweight and obesity in younger children seems to have stabilised over time, while the prevalence of overweight and obesity in adolescents aged between 11 and 19 years has increased with 10-11% between 1988-1994 and 2013-2014 [150, 151]. Compared to younger children, adolescents are less likely to consume a diet that aligns with dietary recommendations despite nutrient needs being the highest during this life stage [152, 153]. Adolescents' dietary patterns are generally characterized by frequent snacking, fast-food consumption, and meal skipping [154]. Unhealthy dietary behaviours established in adolescence can track into adulthood and increase risk of obesity and related non-communicable diseases such as type 2 diabetes or cardiovascular disease [27, 154-156]. One major factor influencing dietary behaviours is food marketing [10]. Food marketing refers to "*any communication that is designed to increase the recognition, appeal, and/or consumption of particular food products, brands and services*" [157]. Food marketers spend significant budgets to target the adolescent group in particular, as adolescents have more money to spend independently, they influence household purchases, and they are future adult consumers, guaranteeing brand loyalty into adulthood [40, 61]. The majority of food advertisements on traditional media such as television, which are directed to adolescents, promote energy-dense nutrient-poor (EDNP) foods and beverages such as sugary drinks, savoury snacks, confectionery, and fast foods, contributing to unhealthy eating behaviours [10, 34, 138, 140, 158-161]. Therefore, restriction of unhealthy food marketing to adolescents is currently regarded as one of the top priorities in global public health policies for tackling the childhood obesity rates [1, 162].

2.1.1. Social media food marketing

Recently, there has been a shift from traditional marketing towards digital marketing, with social media becoming an increasingly popular channel for marketers to promote foods and beverages [1]. This has raised concern among public health researchers and campaigners, as social media platforms offer a range of new possibilities for more

implicit persuasion techniques, blurring the boundaries between entertainment and advertising. Foods promoted by peers and social media influencers, and in games, contests, or short video clips, are now also part of the marketing landscape adolescents are exposed to, engaging them in emotional, entertaining experiences [1, 2]. It has been argued that adolescents are particularly vulnerable this type of content as they are still in a phase of cognitive development [10, 158].

Social media food marketing (SMFM) can reach large groups of adolescents simultaneously, as they are active social media users. American research showed that 95% adolescents have access to a smartphone and 45% report being online "almost constantly", referring to more than several times a day [7]. YouTube, Instagram and Snapchat are the most popular social media platforms among American adolescents [7]. In a Canadian 2019 study it was estimated that adolescents from 12 years old are exposed to more than 9000 SMFM exposures annually, which is six times more than the number of SMFM exposures in children under 12 years old [58].

Continued monitoring of SMFM content has increasingly become a priority, and global bodies have started initiatives to monitor what food and beverage advertising children see online [163]. However, the ethical and privacy aspects and the dynamic and personalised nature of social media makes the monitoring of content on these platforms highly challenging [124, 164]. As a result, the amount of evidence on adolescents' SMFM exposure and its impact is still limited. Marketing studies have documented the presence of marketing of EDNP foods and beverages on social media [165]. According to a recent analysis from the United States, all top 27 fast-food advertisers had Instagram, YouTube, Facebook and Twitter accounts, and 23 also had TikTok accounts [166]. Recent studies demonstrate that adolescents are highly exposed to EDNP food marketing on social media, posing a large threat for adolescent health [58, 136].

To date, food marketing restrictions have mostly focused on reducing unhealthy television advertisements amongst children up to 12 years [167, 168]. There is a paucity of policies to regulate marketing content on digital or social media, yet marketing of EDNP foods and beverages continues to be highly effective in reaching adolescents older than 12 years through both traditional brand marketing and social media user-generated content and peer networks [168].

2.1.2. The current study

Most evidence on the effect of food marketing on dietary behaviours is based on studies conducted on traditional media, mostly including children up to 12 years. While there is some initial evidence on the effect of exposure to specific types of SMFM (e.g., advergaming, influencer marketing), there is a large gap in knowledge on the complexity of different food marketing strategies used on social media platforms as a whole, and how these may impact adolescent dietary behaviours altogether. More evidence on the effects of SMFM exposure on adolescent eating behaviours is crucial for the development and implementation of policies to regulate adolescent-targeted SMFM. Defining a comprehensive and clear definition of SMFM for future discourse and research on SMFM exposure is therefore essential.

In the current study, expert interviews were conducted to gain overarching, multidisciplinary perspectives on definitions of SMFM, measures of adolescents' SMFM exposure, its effect on cognitive processes in adolescents as well as on their dietary behaviours, relevant research gaps in the (digital) food marketing literature, and opportunities and barriers for regulation or policy strategies. By including an interdisciplinary group of experts familiar with the SMFM field and those working with adolescents in clinical settings or behaviour related fields, this study aimed to offer a comprehensive agenda for future SMFM research, which may eventually inform policymakers.

2.2. Materials and Methods

2.2.1. Participants and procedures

This study was approved by the University of Newcastle's Human Research Ethics Committee, approval number: H-2019-0309. Expert interviews have been widely used as a method of qualitative empirical research in political and social research, since the early 1990s [169]. Particularly in exploratory research, expert interviews can be valuable tools to help gather insider knowledge about a topic in a time efficient manner. Not only does the researcher receive insights into the experts' own ideas, also to that of the broader organizational structure behind the experts' institution and their networks [170].

A broad range of stakeholders is involved in the implementation of SMFM. Therefore, in the current study individuals were deemed experts when they worked professionally in

research, policy, clinical or marketing fields relating to digital or social media, or adolescent health or behaviour. To obtain diverse perspectives from these fields, equal numbers of experts from both research and practice were contacted. While some overlap of expertise was allowed, inclusion of experts with the exact same area of expertise was avoided.

In the first round of data collection, experts with different areas of expertise were selected from author names listed in recent literature relating to (food) marketing on social media or digital platforms, from the researchers' networks, and through word of mouth. Although there was a focus on recruiting experts internationally, and attempts were made to find people from different regions worldwide, the expertise and background of the experts was the key factor for participant eligibility. The experts' country of residence and area of expertise were confirmed based on their LinkedIn profiles, ResearchGate, papers or reports they contributed to, or other (academic) websites detailing their current profession, expertise, and background. After the first multidisciplinary group of experts was invited and interviews were scheduled, additional experts were invited due to unavailability of experts, based on literature search and suggestions made by interviewees. Moreover, the number of experts invited and interviewed was determined based on the degree of data saturation, i.e., the point at which no new information or themes are observed in the data [171].

Experts were contacted by email, with a description of the main aim of the study, and an invitation to participate in a one-on-one 45-minute screen-recorded interview on Zoom. In this email, it was also mentioned that they were contacted as experts in a specific area of expertise, and it was requested whether they could give their perspective on SMFM targeting adolescents from this particular field. This also served as a verification of whether experts indeed felt they had sufficient expertise in this particular field to participate. The interviews were conducted in either Dutch or English depending on the preference of the interviewee and they were semi-structured, i.e., part of the questions aimed to get an unbiased view of the experts, while additional questions addressed a more detailed explanation. Before the interview started, experts were asked to give oral consent for being screen recorded and using their answers for further analysis and a potential publication.

2.2.2. Interview questions

The interview guideline is included in Appendix A. In the first part of the interview, experts were asked a few introductory questions about what they consider SMFM encompasses, how to define food marketing on social media, and differences between branded and non-branded social media food content were discussed. To trigger an initial discussion, two documents with examples of social media food content were shown via a link in the Zoom chat. One document contained branded examples (Appendix B) and the other document unbranded examples (Appendix C). These examples were collected from (children of) personal contacts of researchers within the research team, and they were selected from different social media platforms that are popular among adolescents (i.e., Instagram, Facebook, Snapchat, TikTok, YouTube). Moreover, the aim was to collect SMFM examples from different sources, i.e., influencers (influencer content), brands (owned or sponsored content), or social media users (user-generated content). Although most collected posts contained EDNP rather than nutrient-rich foods and beverages, the purpose was to collect and show the experts a variety of brands and foods or beverages within this collection. Subsequently, in Part 1 of the interview, individual- and message-related factors that could be relevant in explaining the effect of SMFM on adolescent dietary behaviours was addressed, as well as process-related factors, with an emphasis on psychological processes in adolescents in reaction to an SMFM message. The interview questions were focused on 13–16-year-old adolescents, as existing research distinguishes four phases in the development of children's persuasion processing, with adolescence being defined as 13 years and older. Generally, it is assumed that around the age of 16 adolescents' consumer- and advertising-related skills and experience have reached adult-like levels, they become more critical towards the commercial environment, and thus are capable of processing persuasive (marketing) messages at the most elaborate level [2]. Focusing on younger adolescents is crucial as they have not yet developed these skills as much as older adolescents. In Part 2 of the interview, experts were asked to provide their views on the largest research gaps, priorities for and challenges related to future SMFM research, and regulations and policies concerning SMFM.

Most of the interview questions were based on existing literature, with a specific focus on factors described in the Reactivity on Embedded Food Cues in Advertising Model (REFCAM) [40]. However, as only a limited amount of evidence was available on SMFM,

some of the questions also addressed implications for future policies or research on SMFM.

2.2.3. Data analysis

All Zoom recordings were automatically transcribed in Zoom and were checked afterwards by the interviewer for accuracy. To ensure anonymity, interview transcripts were each given a number. Three interviews were in Dutch and therefore had to be transcribed and translated to English by the first author. An independent Dutch researcher verified the translations. Subsequently, the NVivo Pro software package (version 12; QSR International, Inc.; Burlington, MA, USA) was used to further analyse the interviews, and code the data. First, a deductive coding approach was used [172], allowing for the breakdown of the data in discrete categories, leading to a pre-defined code list according to the structure of the interview questions. Next, two researchers developed a shared codebook based on a subset of the transcripts, after which they independently coded the rest of the interview transcripts, adding new codes, which resulted in a final code book. Subsequently, the researchers discussed their process of coding and their results. Any discrepancies between the coders was discussed until consensus was reached. Quotations were selected to illustrate the perspectives of the experts. Finally, a visual concept map of the different definitions and types of SMFM content mentioned by the experts was created, and a Social Ecological Model (SEM) was developed to summarise the multiple levels of relevant individual (micro-) and environmental (macro-) factors mentioned by experts. SEMs have been used in previous research on (adolescent) health as they provide useful frameworks for a better understanding of relevant factors or barriers that impact dietary behaviours [173, 174].

2.3. Results

2.3.1. Sample characteristics

Of a total of 38 invited experts, 17 (male: n=3; female: n=14) agreed to be interviewed in the period between 7 May 2020 and 17 June 2020.

Participants had backgrounds in public health (policy) research, nutrition science, adolescent medicine, social media marketing, , (clinical) psychology, behavioural sciences, (marketing) communication, food industry, social influencing, social marketing, and a youth organization. The majority of participants were from research backgrounds (i.e., 1, 2, 5, 6, 10, 12-15; Table 2.1). A minority of participants provided

rather practice-based perspectives (8, 9, 16, 17; Table 2.1) and some experts' perspectives could be considered a mix of both practice and research-evidence based (3, 4, 7, 11; Table 2.1). Experts with a research background had expertise in (social) marketing, communication, public health, behavioural psychology, nutrition, and food policy. Experts with a practice-based perspective had policy, advocacy or clinical expertise or experience with social media influencing, digital marketing, or implementing health-promotion programmes targeted to and in collaboration with adolescents. Experts from different parts of the world were contacted, i.e., Australia (*n*= 9), the Netherlands (*n*= 3), United Kingdom (*n*= 2), Belgium (*n*= 1), Canada (*n*= 1) and the United States (*n*= 1) (Table 2.1). Reasons for non-participation included unavailability due to (COVID-19 related) work circumstances, or a perceived lack of knowledge about the topic of SMFM. In the latter case, experts often forwarded contact details of alternative experts in this area.

2.3.2. Defining social media food marketing: definitions and conditions

The expert interviews revealed that food content on social media can on the one hand be created or disseminated by food companies with a clear commercial intent, and on the other hand by social media users or the general public, not necessarily with a commercial intent. The former is typically SMFM as it generally involves paid and owned food marketing content, i.e., content that brands pay to place on social media platforms and content created and shared by brands themselves, respectively. The latter was generally not seen as marketing, as it may refer to general food cues or user-generated food endorsements, i.e., food promotions shared by social media users and for which no payment is made. Overall, the discussions with the experts illustrated the complexity of defining different types of food content on social media, generally referred to as food promotions or endorsements. One of the experts illustrates this:

> *"So if it's general food, but generated from a brand, like a large… or even a food company… Then I'd question it, but if it's just, you know, an everyday person putting up what they had for breakfast or lunch, then I wouldn't say that's marketing."* (Researcher food policy and population health, Australia)

In between food advertising content disseminated by brands and food content shared by social media users there is a grey area of different types of food promotions, and experts noted the transparency about commercial intent or source of the message is often key to being able to define whether it is SMFM. Figure 2.1 shows a concept map of how experts

defined SMFM content, and to what extent and under what circumstances they considered social media food content SMFM, after having viewed branded and unbranded examples of social media food content.

Table 2.1. Area of expertise and country of residence of all experts interviewed (n=17).

Area of expertise	Country of residence
1. Behavioural Scientist	The Netherlands
2. Public Health Promotion Researcher	The Netherlands
3. Youth organisation Worker and Behavioural Scientist	The Netherlands
4. Research Dietician Adolescent Medicine	Australia
5. Public Health (Policy) Researcher	Australia
6. Researcher Food regulation and Governance for Population Nutrition	Australia
7. Social Media Influencer, Food and Nutrition Scientist	Australia
8. Policy and Regulatory Reform and Public Health Advocator	Australia
9. Social Media Marketing Freelancer	Australia
10. Social Marketing Researcher	Australia
11. Researcher and Clinical Psychologist	Australia
12. Researcher Food Policy and Population Health	Australia
13. Marketing Researcher and Consultant	United States
14. Public Health (Policy & Advocacy) Researcher	Canada
15. Marketing Communication Researcher	Belgium
16. Nutrition Manager at a large Food Company	United Kingdom
17. Marketer at large Social Media Platform	United Kingdom

2.3.2.1. Branded food content

After having viewed the branded examples of social media food content, all experts agreed that food content on social media can be considered SMFM when a post contains branded content, i.e., when a food brand is clearly visible or shown. However, one expert noted that there may be an exception to this, i.e., when a branded food is posted by the general public. This could be coincidental and not necessarily food marketing, and thus it would depend on the underlying intent of the message whether it can be considered SMFM:

> *"I don't think that every time a branded product appears on social media that it is food marketing. Because, you know, a teenager or anyone could just take a photo when they were at KFC or at... or any of those kinds of things. And I don't think that that it's necessarily marketing."* (Social media influencer and food and nutrition scientist, Australia)

2.3.2.2. Unbranded food content

After experts had viewed the unbranded examples of social media food content, there was no clear consensus on how to classify the display of general food items on social media, e.g., an image of a prepared meal or baked cookies. This would often depend on the source and intent of the content. General unbranded food items can be used to showcase of people's eating habits or lifestyle and thus endorse certain foods or drinks, without the intention to market a specific food product. One expert describes this as follows:

> *"I think a lot of the models love to show their green smoothie shakes and show how healthy they are, and therefore how beautiful they are. So they do always... they have these healthy food items placed in their Instagram feed."* (Social media marketing freelancer, Australia)

The expert referred to this content as "a different kind of food marketing", illustrating that they were unsure how to classify this type of food content. With the above example, one could imagine that products are being endorsed, while they do not have a marketing intent. Another type of content mentioned by two experts that could be considered a form of marketing, is when general food items are being shown as part of marketing a service. One expert said the following about this:

> *"I mean a nutritionist, or a personal trainer may use food as their marketing tool to show that they live a healthy lifestyle and that they should join their boot camp or their training, or something like that, so yes, it could be food marketing paid for by a large food company or using food to market your services."* (Social media marketing freelancer, Australia)

Overall, most experts either doubted or rejected the showcasing of general food items on social media (e.g., a prepared meal or baked cookies) as being SMFM, as this would not have a clear commercial intent. However, a minority of the experts did see the display of general, unbranded food items as relevant in the SMFM context. One expert described how these could be referred to as food cues:

> *"In my theoretical models I call this food cues. So food cues, they are crucial, they are essential to me, because they lead to people having certain thoughts, feelings or needs they didn't have before <…>. And that is connected to a certain brand, but you can look upon a brand as a figment of your imagination… In the end it's all about exposure to food cues, that's crucial to me."* (Behavioural scientist, the Netherlands)

Moreover, because the intent of food-related messages on social media is often unclear, transparency about marketing intent by means of disclosures would play an essential role in determining whether food content on social media is SMFM:

> *"If they are actually using or doing food marketing, they should be exposing or declaring their intent about that, but we can't always tell. So if they don't declare, we can't actually tell."* (Social marketing researcher, Australia)

2.3.2.3. Influencer marketing

Involvement of influencers or celebrities in social media food content was also mentioned as an important feature of SMFM content, by seven experts. However, unless messages or posts show a well-known celebrity with a brand, or a person is clearly paid to promote a product or brand, it was not always clear to the experts whether a message could be identified as influencer marketing. If influencer content is not paid for it could just be earned food content generated by a random social media user, unintentionally promoting a product.

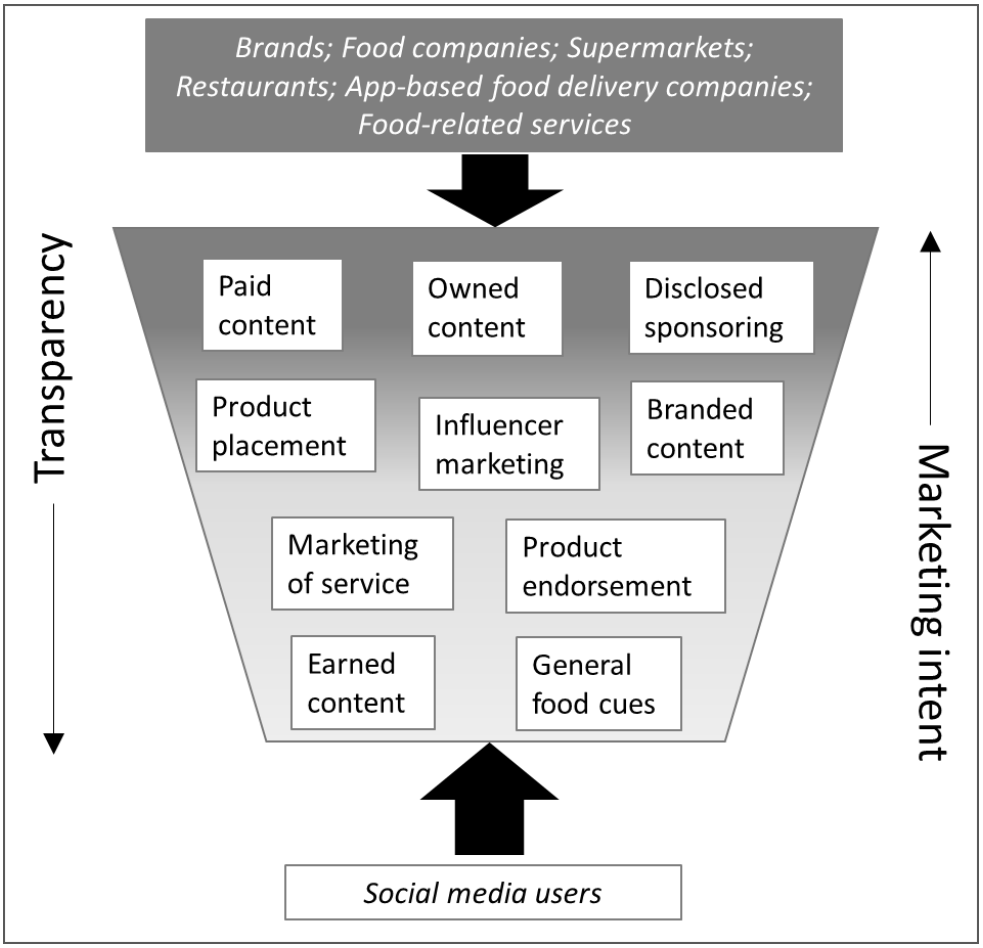

Figure 2.1. Concept map showing different types of food content on social media that experts mentioned when defining SMFM, after having viewed examples of branded and unbranded social media food content. According to experts, for content to be considered SMFM, this would often depend on the underlying marketing source or intent of a social media message or post, and the transparency about this source or intent would determine the probability that they are certain that it is SMFM. The dark area in the figure represents more certainty about marketing source/intent and greater probability of transparency about marketing source/intent. Paid content refers to content that brands pay to place on social media websites; Owned content refers to content created and shared by brands themselves; Product placement refers to a product or brand being clearly visible or mentioned in messages; Influencer marketing refers to product of brand promotion by popular individuals on social media; Earned content refers to content shared by social media users and for which no payment is made.

On the contrary, one expert believed that influencer marketing is not always paid for:

> *"But then sometimes, you know, people do share marketing that no one has paid them, but they're still working for the company for free."* (Public health (policy, advocacy) researcher, Canada)

This implies the definitions around influencer marketing are not always straightforward, and any commercial relationship with a brand or food company could make someone an influencer, making their content influencer marketing.

Yet, eleven experts mentioned payment as being a relevant factor for content to be classified as SMFM. While experts defined paid or sponsored food content as being SMFM, some of them discussed unpaid earned content could be seen as a form of indirect marketing. Also, taking into account the effect of a message on the receiver is relevant.

2.3.2.4. Earned food content

Another type of content mentioned by experts is earned food content. This refers to content generated by social media users that may be directly or indirectly related to or present a brand but does not always have a clear marketing purpose. Because this type of content concerns the voluntary, unpaid promotion of branded content by social media users and is usually a few steps removed from an original marketing campaign of a food brand, experts often doubted whether to classify this as food marketing or not:

> *"If it's earned, then it's almost, you know, it's out of the control of the brand in that case. Sort of, because I suppose, I don't know if you remember, I worked on [food brand], and there was a… We designed like a [food brand] circle of crisps that would just stand on their own, you know, and people were like building them on their desks. But we started that campaign and we started that idea, but because so many people were doing it, you know, it ended up just being everywhere on social media, which was earned advertising. We did not pay for that."* (Nutrition manager at a large food company, UK)

2.3.2.5. Effect on the receiver

In addition to the factors described in Figure 2.1, two experts mentioned that the effect of a marketing message on the receiver is a relevant condition to determine whether content is SMFM. One expert notes the following:

"When it has a certain marketing effect on the receiver, then it is marketing. So, there might be one or two postings in this [branded and unbranded examples] that are actually not paid at all. But still, it might have a marketing effect overall, so then it's a marketing post, I think." (Researcher food policy and population health, Australia)

Another expert noted that the receiver's recognition of the marketed product is considered a relevant requirement for social media food content to be considered marketing:

"So if the person seen it can recognise the product or the brand, that, I guess could be considered marketing. Whereas if they can't tell what it is, wouldn't be." (Marketing researcher and consultant, US)

One particular social media food-related message may have very different effects on different receivers, making it even more difficult to judge whether any content is SMFM.

2.3.2.6. Owned content, product placement, and product endorsement

Five experts mentioned that content created by a food company or brand, referred to as owned content, would classify as SMFM. Two experts specifically mentioned that product endorsement should take place, i.e., the benefits of a food product are promoted. Eight experts noted the relevance of clear product placement, or the product or food being the main focus of a message being essential when classifying food content as SMFM. One expert stated:

"I think if a brand is visible, or a specific food product is visible, it's still food marketing." (Research dietician adolescent medicine, Australia)

2.3.2.7. The role of social media platforms

The interview with a marketer from a large social media companies (UK) gave insight into the role of social media platforms in the marketing process. Food companies, brands, retailers or services that choose to use social media in their marketing campaigns are directly in contact with the account managers of these platforms for advice on what marketing strategies to use in their social media campaign:

"So my team are effectively kind of the first port of call for an advertiser, their account managers, so, you know, [large food company] aren't actually one of my clients, but let's say… let's just use them hypothetically. So they would call

> *up their account manager, and they would say, okay, look, we just signed our budget for next year. We're going to spend 10 million with [large social media company]. And then it's up to the account manager to pull together all of the experts that we have to make sure that we advise them on how to best spend that money for the best performance, because yeah, there's a lot of competition out there, [large online platform] obviously, [large online platform], [large social media platform], [large social media platform]…" (Marketer at large social media platform, UK).*

According to the same expert, testing the effectiveness of social media marketing campaigns on a particular social media platform is a relevant part of this process, because it determines what marketing strategies food companies spend their budgets on regarding this platform. This involves the expertise of the marketing science team within the social media company:

> *"There's many different testing options that we have on our platform to… if you're spending money on advertising, to decide what's gonna be effective. So you may do kind of what we call multi cell tests, where you have… Let's say you target 18 to 34s versus 34 to 44, in different locations around the world, or the country, all the different kind of targeting options that we have. Broad versus narrow, and all of this kind of stuff, and you know, you run that test to see which has been the most effective and then you put more budget into what's more effective."* (Marketer at large social media platform, UK).

2.3.3. Mediating and moderating factors involved in the effect of SMFM

In the second part of the interview, experts were asked what factors they found relevant in the effect of SMFM on adolescents' consumption or purchasing behaviour. All key factors identified in the expert interviews are summarised in the SEM in Figure 2.2 and indicated in *Italic* throughout the text.

2.3.3.1. Individual level - Mediating factors

Adolescents' reaction to SMFM instances depends largely on the type of message they are exposed to. A recurrent and overarching theme mentioned by a majority of experts was the *implicit* response to SMFM, i.e., adolescents are often not consciously aware that social media food content is marketing as it is covert, embedded in entertainment, and involves influencers and earned content. Yet, eventually these implicit responses will

have an effect when adolescents are exposed repeatedly over time. In contrast, five experts note that there occasionally is a conscious or *explicit* response to SMFM, especially when adolescents follow food companies, go to their websites, are actively looking at posts, want to learn more about a specific product or brand, or when the advertisement has a rather 'traditional' character and pops-up in their feed. In those cases they are more aware of them and will have more *active thoughts about the food* promoted:

> *"Then on the other hand, of course, there are some posts that elicit a lot of thoughts. For instance, if it's really an influencer that you admire a lot and maybe you're gonna spend a lot of time just looking at that one picture with all the texts involved, and you really want to learn about the brands, but that's something different. That's something that occasionally will happen. And of course that will have its own strong effects, just by that one post rather than other post needing, let's say, 100 exposures to a brand to have the same effect, but both happen I think."* (Researcher food policy and population Health, Australia)

In addition to the experts' distinction between an explicit and implicit response, they identified three key processes that are activated when adolescents are exposed to SMFM. One process identified is that SMFM can elicit *emotional engagement*, i.e., adolescents like the content, think the content is cool, fun, enjoyable, and they experience pleasure, affinity, happiness, or even guilt. According to one expert, the latter could refer to an adolescent who ate something unhealthy and next see a beautiful model eating a healthy salad on social media. Also, seven experts mentioned that adolescents can have a direct craving or desire to consume the product.

A second identified process is adolescents' peer modelling or *social comparison* when they see SMFM messages. Thirteen experts talked about this topic, and some of them argued that adolescents are comparing themselves to others on social media, and how this could impact their reaction to SMFM messages. They may be comparing their own bodies to others' bodies, want to look like others, want to do what others do, and want to have what others have. One expert described how social media may trigger adolescents to compare their own body to a beauty ideal:

> "*So I think that the main thing that would be different for an adolescent in terms of the content that they view on their social media, would be that it's just*

> *perpetuating seeing this beauty ideal over and over again. I mean, they get it in many other forms, like, non-marketing forms on their social media feed as well, but this would just be adding to that unhealthy ideal and the distance they feel between their actual bodies and that ideal."* (Researcher and clinical psychologist, Australia)

Five experts mentioned adolescents' admiration of a role model, i.e., celebrities, influencers or other peers they look up to as part of the social comparison. Moreover, some messages on social media can make them feel like they have to conform to social norms, i.e., eat or behave in a certain way, depending on what they see others do on social media. This would not necessarily make them consume or buy something right away, but make them link the product in the shop to the SMFM message they saw earlier, as illustrated by one expert:

> *"…That process wouldn't be like "Oh, pretty girl. Pretty girl has pistachios. If I eat pistachios, I'll be a pretty girl", like… Not that explicit, but I think over time, those things, like what we know about with psychology of course with associative learning, is that you know, next time that that adolescent goes to the shop, sees that that pistachio bar or whatever it is on the shelf, then they will have a positive feeling, potentially, for, or feeling of needing to attain that because they want to attain that ideal beauty image that was paired with it in the social media feed."* (Researcher and clinical psychologist, Australia)

Thirdly, SMFM messages can lead to adolescents *attaching certain meanings to the food* that are relevant to them or their lives. For example, they may associate the food with a certain theme such as a beauty ideal, lifestyle, food patterns or eating behaviours (including the normalisation of eating restraint versus excessive or unhealthy eating), or certain emotions (i.e., positive associations).

Subsequently, this will impact adolescents' brand awareness, brand preference, and brand recall. As illustrated in the previous quote, with continual exposure to SMFM this can increase their awareness of the brand, preference for the brand, but also whether they recall the brand next time they are in the shop:

> *"…There's been a bit of literature to show that it does increase people's preference loyalty over the long term… So if you get hooked on Coke from an early age, you're probably unlikely to buy Pepsi later on in life."* (Researcher

and clinical psychologist, Australia)

Finally, adolescents will have an urge or intention to act on things, whether this means going to the shop and buy something right away or engaging with the SMFM message. For example, one expert argues that adolescents feel the need to act on things to show they are independent from their parents:

> *"I think it might be to do with them wanting to exert their independence. So having it as a way that they see something and they know they can act on it. And they also have this underlying drive to want to act on things that shows that they're independent from their family or independent from their parents."* (Research dietician adolescent medicine, Australia)

Lastly, two experts mention that watching SMFM content, especially fast foods, will activate reward centres in the brain. This reward response mechanism is part of a feedback loop and this influences how adolescents experience the SMFM content the next time they see the food, and this may reinforce their behaviour over time, as illustrated by one expert:

> *"I think that that's it, and I suppose there is sort of a feedback loop, as it looks like a lot of fun, and it is a lot of fun, and your role models have already consumed it, you are going to consume it, it tastes really good, so every time you see those video clips that feeling is reinforced, making you appreciate and like the product even more."* (Behavioural scientist, the Netherlands)

2.3.3.2. Individual level - Moderating adolescent-related factors

Two experts mentioned that girls and boys may react to SMFM content in different ways, so *gender* would play an important role. Additionally, according to two experts, adolescents' *ethnicity* is also a relevant factor making adolescents more vulnerable, i.e., from research in the USA it was found that black and Hispanic children are being targeted more extensively by online advertising [175]. Also, *educational level* of adolescents was mentioned by one expert and *socio-economic status* by two experts. Furthermore, *Body Mass Index (BMI)* was mentioned by one expert, as overweight or obese adolescents may have a different *attentional bias* than adolescents with a normal weight. Specifically, overweight adolescents would be more easily distracted by food cues and also think about food more frequently. Several other psychological factors were mentioned (i.e., by twelve experts in total). Ten experts mentioned adolescents'

impulsivity. According to those experts, adolescents' decision-making skills are not fully developed yet, and therefore they have less risk perception or critical thinking skills to see through social media advertising:

> *"Because adolescents think they're savvy and they think they know how to see through things, but adolescents don't necessarily have the processing skills developed yet to be able to distinguish between a celebrity who is authentic and a celebrity who is making money. So I think it's probably harder for adolescents, because they probably still got a little bit of that belief in aesthetics, but think they're critical thinkers, and they're probably not quite there yet."* (Social media influencer, food and nutrition scientist, Australia)

However, two experts believe that, while adolescents may not think about the implications of their actions and weigh the risks because they are not fully cognitively developed, anyone, including adults, would have difficulty to critically view online marketing and make healthier decisions based on that.

The above quote also illustrates another factor mentioned by eight experts, i.e., *independence*. Adolescents feel like they are in control, are able to make their own decisions, and they don't see themselves as vulnerable. This may result in them wanting to be independent from their families, but may also influence how they act on things.

Furthermore, experts mentioned that adolescents' attitudes towards food are still developing and more fully developed in adulthood. This relates to a factor mentioned by one expert, i.e., experience. Adolescents are typically *inexperienced* with the world and life in general, and therefore cannot compare situations with previous experiences. Moreover, five experts mention *identity* formation, i.e., the development of their individual identity, as being a key developmental factor in adolescence that plays a role in how adolescents react to SMFM messages:

> *"And I guess you're establishing that identity when you're an adolescent, so you're probably more susceptible to taking cues from other people about how you should behave for that identity, but that probably fits in with the whole group mentality…"* (Social media influencer, nutrition and food scientist, Australia)

2.3.3.3. Social and physical environment - Moderating adolescent-related factors

The above quote directly relates to factors in the social level of Figure 2.2. Thirteen experts mentioned the importance of socialisation, i.e., fitting in with the social norms, belonging to certain social peer groups, and being more socially impressionable as a relevant factor in adolescence. Directly related to this is the importance of *role models,* i.e., *celebrities, social influencers*, *friends* and *peers*, while adolescents rather seem to move away from their *family, parents* or *educators*, to exert their independence. Especially peer pressure or peer interaction is considered as a central factor in adolescents' lives, influencing their dietary choices, and this was mentioned by thirteen experts. One expert stated:

> *"I think that what makes this group a very unique or just a special group, is that they are particularly sensitive to what their friends and peers think, and what they do. So that social reward is very important."* (Youth organisation worker and behavioural scientist, The Netherlands)

Furthermore, *online access* and *buying power* were considered import environmental factors influencing adolescents' response to SMFM content. With regard to the first, eight experts mentioned the constant access adolescents have to online media, because they have their phones with them all the time and they have more free time, leading to higher social media exposure in this age group than adults and younger children. With regard to buying power, seven experts said that adolescents from around 12 years often get their own pocket money and have more control over what food they purchase and consume. This is often linked to them being developmentally more independent to be able to make their own decisions. Only one expert disagreed and believed the 13 to 16 year-olds would not have their own money and thus not necessarily more buying power. Furthermore, *upbringing* was mentioned by three experts, referring to advertising and food exposure when being younger. This may depend on family eating traditions, food access or food affordability within different countries.

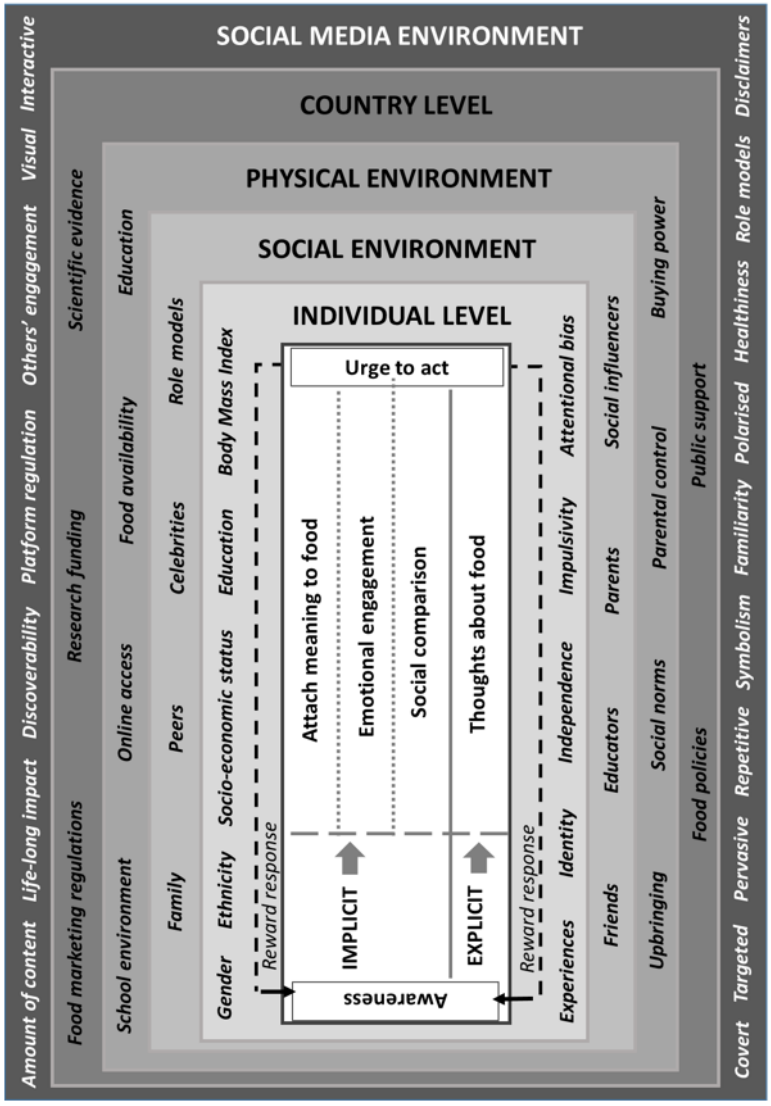

Figure 2.2. Social Ecological model describing how social media food marketing (SMFM) may impact adolescents' dietary behaviours on different levels (i.e., on individual, social, physical environment, country, and social media environment levels). Adolescents' processing of SMFM on an individual level may be mostly implicit, which involves a connection to the product or brand, emotional engagement, and social comparison, which may lead to an intention or urge to purchase or consume the product or brand. When SMFM processing occurs explicitly, adolescents are conscious of and actively think about the brand or product, also leading to an urge or intention to purchase it. Once adolescents purchase or consume the product a reward centres in the brain may encourage them to purchase or consume the product again. All factors in the model are a summary of key factors mentioned throughout the expert interviews.

One expert specifically referred to the social skills or resilience to deal with setbacks, taught by parents or guardians:

> *"...This also means that relatively less communicative and social skills are being taught from childhood, but also resilience, which should be taught in adolescence, so are you able to deal with something you don't like or are you able to accept setbacks, are you able to resist, are you able to recover, are you able to accept or deal with loss. You should be about taught this, also in adolescence, and that happens more often in families with a higher social economic status and higher incomes, and where the parents have a higher educational level."* (Senior Public health promotion researcher, The Netherlands)

2.3.3.4. Social media environment - Moderating SMFM-related factors

The experts mentioned several characteristics of SMFM that make it particularly effective in targeting adolescents. One key characteristic of SMFM mentioned by twelve experts is the *covert* nature of SMFM, and how it is typically embedded in entertainment. Specifically, most experts believed more classical type of advertisements would not have as much of an impact as they are too obvious, and therefore the hidden nature of SMFM makes it so influential. One expert said the following:

> *"...If it's obvious that it's an ad, it can be off-putting. And then they would not engage with it. But if it's embedded in something that they're doing, then... and it's not really in your face, then I think, then they are very likely to interact with that."* (Researcher food regulation and governance for population nutrition, Australia)

As referred to above, and mentioned by fourteen experts, SMFM typically has an engaging and *interactive* nature, making it so appealing to adolescents. They can actively be involved and contribute to content, making them feel part of it, by reacting, creating, tagging, sharing, liking, playing a game, joining a contest, signing up for giveaways, etc. One expert elaborates on how their study in young people showed that engagement with content is very influential:

> *"But interestingly, if I recall correctly, the more people engaged with the material, so, you know, liking and sharing and whatever, and not just viewing*

> *them, the more they were likely to have that influence."* (Public health (policy) researcher, Australia)

Moreover, eight experts note the *pervasive* nature of SMFM, i.e., it is easily accessible as adolescents carry their phones with them constantly, it is present on multiple online platforms, and therefore it has a particular large reach. The *repetitiveness* of SMFM may contribute to this, because the same SMFM message can be shown multiple times on one or even several online platforms. Additionally, eight researchers mention how SMFM messages are typically *targeted* and personalised to fit the ideas, values and preferences of the adolescent specifically, based on their activities online and the demographic group they belong to. This makes social media very different from mass or traditional media:

> *"…Imagine McDonald's would have ads that are really specific that, you know, going to pop up in adolescents' feeds and they would be, have more kind of young attractive, kind of, bodies, whereas their ads on billboards and their ads on TV will have more like a family focus because it's such a broader audience, you don't know who you're targeting and who's gonna walk past the bus stop, see the billboard, or who's going to be watching on TV."* (Researcher and clinical psychologist, Australia)

Moreover, by using brand *symbolism*, i.e., creating an image around a brand, social media food advertisers can anticipate on adolescents' desire to develop a certain identity, live a certain lifestyle, fit into the social norms, or be like peers or influencers they admire. Eleven experts mentioned how a brand can relate to adolescents by creating such an image. For instance, experts mentioned how products or brands can be associated with independence, health, risk taking (i.e., extreme sports), humour, fun, positive emotions, friendship, success, glamour and social status. Also, according to two experts, the consumption of certain products or eating behaviours is normalised, influencing adolescents' food choice.

This leads to a relevant content-related factor mentioned by five experts, i.e., the *healthiness* of the food promoted. Four of the five experts argued that unhealthy foods are significantly more present on social media compared to healthy foods, whereas two experts also emphasise the unhealthy, excessive portion sizes shown. One expert specifically mentioned the impact of marketing of snacks to the adolescent group:

> *"So when there is advertising on social media, this would often be appealing*

snacks, since adolescents in that age group can mostly decide on snacks themselves. They can't really make a decision on what's for dinner, because that mostly depends on the family." (Public health promotion researcher, The Netherlands)

On the contrary, a fourth expert noted a rise in awareness of healthy eating, and that unhealthy food marketing would rather have dominated in the 80s and 90s. In addition to the unhealthy food representation and portion sizes mentioned, three experts also mention how SMFM content is *polarised* and skewed, i.e., food or portion sizes are either very healthy or unhealthy, as people tend to share extremes on social media. One expert said the following:

"That's partly due to the bragging culture on social media, but they will be more likely to post all kinds of excessive and highly marketed foods than they are to just post a regular meal that they eat six days a week, so they will only post the seventh day where they go to McDonald's and have a... Yeah, too many hamburgers, for instance, with Coke, etc. So it will probably affect even that type of behaviour." (Marketing communication researcher, Belgium)

Especially when certain *role models* are present in a SMFM message (i.e., influencers, celebrities or peers) may normalise certain food patterns, according to fourteen experts. Relevant adolescent-specific factors mentioned earlier include the importance of role models, and therefore having them present in SMFM, and generally influence how adolescents see the world. One expert argues adolescents may be influenced most by those role models to whom they can directly relate, which makes social media such a powerful medium for advertising:

"They're branded but they just look like someone... you know, pretty girls who are just in the car or doing something else and... I think it's powerful that they look just like a peer. Like, they just look like, you know, so if you feel like that beauty ideal is more attainable, it should be more attainable, so it's different. I think it's such a different ball game to when people used to compare their bodies with, you know, bodies... celebrity bodies." (Researcher and clinical psychologist, Australia)

In addition, four experts argued that seeing *others' engagement* with an SMFM message, i.e., mostly within their networks, would impact how they perceive it. Other content-

related factors include the *visual* appearance of SMFM messages (mentioned by five experts), i.e., they look appealing, fun, are aesthetically pleasing, use bright colours and imagery. Furthermore, content with a balance between *familiarity* versus new content (mentioned by one expert), but also the *discoverability* (mentioned by two experts) of interesting new products through social media is what attracts adolescents.

Besides, two experts noted that SMFM is mostly focused on targeting the adolescent group, leading to higher exposure and engagement in this age group. On the contrary, one expert (marketer on a large social media platform, United Kingdom) stated the opposite, by arguing that adolescents are generally not targeted a lot by food companies, as they don't have their own money and their parents still buy the groceries. Therefore, they would rather target people between 18 to 34 years old. Another relevant factor is limited *parental control* of and access (mentioned by two experts) to SMFM, i.e., parents do not know what their children see on their phones or online, and can therefore not limit exposure:

> *"So that's kind of one big difference between social media advertising and, you know, other forms of advertising, like, you know, outdoor advertising or TV advertising is… there's no parent ever there to mediate between the ad and the child."* (Public health (policy, advocacy) researcher, Canada)

Furthermore, one expert mentions the ability of SMFM to have a *life-long impact* on people, i.e., it follows them from a young age, throughout their lives, with the targeting strategies changing depending on age, and as adolescents from current generations have likely been exposed to SMFM from a young age, they are already differently impacted than adolescents from previous generations. Another factor is the *amount of content* in adolescents' feeds (mentioned by two experts), i.e., a large amount of advertisements in their feed will expose them more but this may not necessarily mean that they will process each advertisement consciously. Lastly, two experts emphasise that often there is not one component in particular that makes SMFM influential. Food advertisers create integrated campaigns, and the key to their effectiveness is how all the components of these campaigns work together, and it's the whole system that eventually generates an effect on the receiver.

2.3.4. Social media food marketing: priorities, strategies and challenges

In the next part of the interview, experts were asked what SMFM should ideally look like for the sake of adolescent health, and what relevant research questions need to be addressed. Some of the factors mentioned during this part of the interview are added to the SEM in Figure 2.2 and indicated in *Italic* throughout the text below.

2.3.4.1. What should SMFM ideally look like – strategies

From the experts' responses several themes were identified (Table 2.2). Two experts said SMFM content should not specifically change, but the focus should rather be on changing the food system as a whole, e.g., *food policies* (e.g., labelling, taxes, subsidies) and *food availability*. *Education* was also mentioned by six experts, i.e., increasing adolescents' media and advertising literacy and knowledge about healthy eating either in or outside schools, and also improve teachers' skills to teach about these topics. Related to this, three experts argued that when there would be more *public support* to change SMFM regulations, this will also impact SMFM-related policies.

Nine experts mentioned that healthy food should be marketed on social media. This includes showing healthy foods on social media, a balanced diet according to dietary guidelines, or using marketing to teach about healthy choices. Six experts mentioned there should be less or no unhealthy food marketing on social media, and there should be more *food marketing regulations* concerning adolescents, ideally with an international focus, as SMFM crosses borders. Six experts specifically mentioned controlling or restricting the ability of the advertiser to target children or adolescents, while two experts focused on controlling the access adolescents have. For instance, one expert mentioned tagging someone's age to their smartphone and limit all SMFM content to all persons under 18. Besides this, *parental control* of their child's social media use as well as *regulation by social media platforms* could help limiting adolescents' SMFM exposure. Four experts mentioned *disclaimers* of marketing intent should be shown to make consumers aware that content is advertising. Other strategies include using influencers to change influencer content, and showing more diverse content with different body types, genders, and ethnicities on social media. To change the SMFM content itself, one expert suggested to approach the food industry and pitch to them how they can apply healthy marketing strategies in an engaging way.

Table 2.2. Strategies and quotes to illustrate experts' views on the ideal SMFM content, to promote adolescent health.

Strategies	No. of experts	Quote example	Expert mentioning quote
SMFM content - Healthy food marketing - Less or no unhealthy food marketing - Ad disclosures - More diverse content - No change in SMFM content - Using influencers	 9 8 4 1 1 1	*"But I also think ads, especially on social media, they should have some sort of a disclaimer, that they are an ad, because I think it's also not always... it's definitely not always clear that something is an ad, especially the way celebrities do it where they might just be have a photo of themselves at the beach holding a Coke."*	Research dietician adolescent medicine, Australia
Policies - Control SMFM to adolescents - International, broad regulation	9 4	*"So if governments adopted that... those recommendations to, you know, reduce marketing to children being 18 years and under, then you're really making an effort to try to stop paid advertisements in the first instance from being allowed to be seen, on media that children access."*	Public health (policy) researcher, Australia
Education - Consumer education - Media (advertising) literacy - Students (schools) - Teachers (schools)	 4 3 2 1	*"I don't see any food and nutrition, really, you know, teachers are not skilled enough to teach on those topics."*	Nutrition manager at a large food company, United Kingdom
Food availability	5	*"...shape the environment in a way that we can develop a*	Public health promotion

Strategies	No. of experts	Quote example	Expert mentioning quote
		social norm. That won't happen within one day, but there could be a norm for high schools to have healthy canteens that only sell healthy foods, and to only have water taps and no vending machines with soft drinks."	researcher, The Netherlands
Self-regulation by social media platforms	3	*"I think that, in reality what would have more influence would be if you got the platforms on board to self-regulate."*	Social media influencer, food and nutrition scientist, Australia
Consumer demand, public support	3	*"If there was more, you know, more grassroots, you know, consumer demand for it, then there would be more political will to actually regulate what's going on."*	Marketing researcher and consultant, United States
Approach food industry	1	*"…Like for instance, if you went to one of those companies and it would… the way that you would pitch it is that it would give them an edge over others."*	Researcher and clinical psychologist, Australia
Parental control	1	*"…But I think, you know, between the ages of 13 and 16 I think there has to be some form of control from parents around the level of usage of social media."*	Marketer at a large social media platform, United Kingdom

2.3.4.2. What should SMFM ideally look like - challenges

Several experts noted that the complex nature of SMFM content makes it difficult to regulate it, for several reasons. First of all, one expert noted that getting rid of all marketing to adolescents would create constitutional challenges, because food

companies currently have the right to advertise to adults, and from a legal perspective adolescents 13-16 years are considered adults when it comes to food marketing. Furthermore, three experts mentioned that SMFM is borderless, and global regulations would have to be developed instead of national regulations. However, there is no global consensus on what food (pattern) is healthy or unhealthy, and dietary patterns may differ largely between countries. Additionally, one expert mentioned that the different types of nutrient profiles that are currently used are not adequate as there is too much room for loopholes. Three experts mentioned that it is difficult to regulate SMFM because the food industry is too powerful and they would always find a way around regulation, for instance by increasingly using non-regulated or covert style marketing such as influencer marketing. Three experts mentioned that regulating earned marketing is particularly difficult because it is difficult to classify this type of content as SMFM. Lastly, two experts noted that food marketing is often not seen as harmful by consumers, rather as fun, and it is not as clear cut as tobacco or alcohol, because people need to eat anyway.

2.3.4.3. What SMFM research topics are relevant – priorities

Seven experts mentioned that more *scientific evidence* on SMFM is essential to set policy actions into motion. From the experts' responses, a few relevant research priorities were identified (Table 2.3). Firstly, investigating trends in social media use among adolescents, and doing a social network analysis of the (influential) peers within a group, i.e., what do they do and who are following their lead, is relevant. Two experts suggested that influencers can be involved in intervention studies to promote healthy eating. Moreover, nine experts addressed the importance of measuring adolescents' exposure to SMFM, i.e., its volume, the healthfulness of the products promoted, and the accounts that post SMFM. Two experts mentioned that getting insight into the food brands' activities and strategies on social media, including their underlying motives, is also key.

With regard to measuring SMFM impact qualitatively, experts noted that getting better insight into adolescents' opinions, awareness, and recall of SMFM content is important. One expert specifically noted that getting individual as well as group opinions is crucial, since adolescents may respond differently in a group setting. Additionally, one expert mentioned that understanding how adolescents can be best engaged to prepare them against SMFM messages in potential interventions, is also key.

Regarding quantitative analysis of SMFM impact, different relevant outcomes were mentioned. Six experts mentioned the impact on (eating) behaviours or diet and four

experts mentioned measuring adolescents' engagement or interaction with SMFM messages. Other outcomes mentioned include food preferences, intentions, knowledge, binge eating, and restrictive eating practices. Additionally, analysing the impact of the exposure variable (i.e., SMFM content), the effects of separate tactics that are part of a SMFM campaign, comparing the effects of social media content with versus without advertisements, and comparing the effects of healthy versus unhealthy SMFM is key. Understanding what moderators or mediators are involved in the impact of SMFM is also essential. Besides doing impact analyses, four experts emphasised that investigating ways to regulate or develop policies for SMFM is also essential.

2.3.4.4. What SMFM research topics are relevant – challenges

Five experts argued that quantifying the impact of SMFM is challenging, because people see food marketing in all aspects of their lives, making it difficult to isolate the impact of SMFM. Also, there are many other factors not related to marketing that may influence someone's dietary intake. Besides that, one expert mentioned that measuring effects on dietary intake and being able to show differences in intake between groups of people is challenging, depending on the accuracy of dietary assessment methods. Moreover, five experts argued that capturing exposure is difficult, because SMFM content is broadly or not clearly defined, and it's difficult to ask people what they saw because they may not recognise social media content as marketing. Another reason, mentioned partly in relation to this, is the ethical or privacy issue that arises when doing SMFM research, i.e., dealing with potential illegal, disturbing or life-threatening content is challenging, but also collecting information from people who have not given their consent to participate in research is questionable. Another challenging aspect of doing SMFM research is costs and time. One expert elaborated on the high costs and time-consuming nature of experimental trials, and another mentioned the challenge to get *research funding* for studies that are not looking at direct health impact. Moreover, another expert suggested that research would generally go too slow to capture the fast-moving digital landscape. Lastly, one expert mentioned the challenge of fragmented research, i.e., different research areas such as communication sciences and health sciences are studying SMFM in parallel.

Table 2.3. Research areas that experts considered important, the number of experts that mentioned them, and quotes of experts.

Research focus area	No. of experts	Quotes	Expert mentioning quote
More scientific evidence	7	*"But I think the monitoring is important, calling out these companies and sharing and then advocating for change."*	Policy and regulatory reform and public health advocator, Australia
Qualitative - Adolescents' opinions - Adolescents' awareness - Adolescents' recall - How to engage adolescents	7 4 1 1	*"...What kind of messages do you have to use with adolescents, and then is that impactful in terms of them saying "We don't want to see...", start to build that next generation of people who are pushing back against these unhealthy marketing and advertising."*	Researcher food policy and population health, Australia
Analysing SMFM content - Measuring exposure or volume - Brand activities - Non-scientific information	9 2 1	*"I think there's probably a few different things to investigate. I would think exposure. So how many times are they actually exposed to unhealthy food."*	Social marketing researcher, Australia
Impact research (outcome) - (Eating) behaviours, diet - Engagement - Attitudes - Emotions, cravings - Preferences - Intentions - Knowledge - Binge eating - Restrictive eating	6 4 2 2 1 1 1 1 1	*"So I think, you know, from a research perspective, it's really interesting to say what the sort of the affective responses might be on attitudes to brands and stuff. But I think the... So what really comes when you can quantify how it might change diet or in fact sort of weight outcomes because they're the endpoints that policymakers care about."*	Public health (policy) researcher, Australia

Research focus area	No. of experts	Quotes	Expert mentioning quote
Impact research (exposure) - Different elements of SMFM - Content with versus without ads - Healthy versus unhealthy marketing - Social media versus other media	 2 1 1 1	*"I think it'll be interesting to look at if healthy foods... if they will market equally whether they would have the same influence."*	Research dietician adolescent medicine, Australia
Policy research	3	*"...And then we need some research on, you know, various policies that can be developed to protect them."*	Public health (policy & advocacy) researcher, Canada
Trends in social media use	2	*"...Like, how many people are shifting away from traditional media as well, into social media."*	Nutrition manager at a large food company, United Kingdom
Involving role models	2	*"I think you need to find some champions within their circles and using again that influence around them."*	Social marketing researcher, Australia
Influence of moderators, mediators	2	*"And a second part would be to really focus on dynamics, such as, for instance, social norm believes, etc. So, all kinds of moderators that... moderators or mediators that would really give us insights in why things work."*	Marketing communicati on researcher, Belgium

Research focus area	No. of experts	Quotes	Expert mentioning quote
Social network analysis	1	*"...on the effect of peers, so who are those peers, who are the most popular children in school, and what do they do. Who are following or not following their lead. So then you're doing a social network analysis."*	Behavioural scientist, The Netherlands
Industry perspectives	1	*"...What are these companies getting out of this, and what are their motivations, but also where are they and what are they doing and how are they doing it."*	Policy and regulatory reform and public health advocator, Australia

2.4. Discussion

The main aim of this study was to obtain perspectives of experts involved in SMFM (i.e., research or practice), or with expertise on adolescent health, on potential factors influencing the association between social media food marketing (SMFM) and adolescent dietary behaviours, and to prioritize research and policy actions in this area. Definitions and different types of social media food content that are considered relevant in the SMFM context were discussed during the expert interviews, and moderating and mediating factors that may play an important role in the effect of SMFM on adolescent dietary behaviours were identified.

Overall, the experts' responses showed that SMFM comes in many different forms, and SMFM definitions do not seem to be as straightforward as with traditional marketing, with the main difference being that social media users themselves can be involved in the marketing process, i.e., by contributing to food marketing free of charge, blurring the lines between advertising and food-related entertainment. Consequently, the marketing intent of food-related messages was often not clear to experts, particularly since disclaimers of commercial intent in food messages on social media is often lacking. Most experts did not reflect in-depth on any current actions taken against misleading advertising on social media, and rather seemed to focus on the absence of rules around SMFM. While there is indeed no strict regulations around SMFM as a whole, rules have been developed regarding influencer marketing disclosure. For instance, influencers in the UK who are misleading followers by not using any disclosure when advertising a product, break the consumer protection law and may face enforcement action from several authorities, e.g., the Competition and Markets Authority (CMA) [176]. Yet, the current rules rather seem to serve as guidelines instead of strict mandatory regulation, as influencers have still been found to breach them [177]. Possibly, the absence of any global clear mandatory regulations regarding SMFM, and breaching of current influencer marketing rules, made that experts did not acknowledge them as having a significant impact.

The blurring of advertising with entertainment may have large implications for dietary behaviours in adolescents. While SMFM is still largely an undefined and blurred concept, this study explored the current state of affairs, i.e., how experts define different types of social media food content, including SMFM, and how SMFM may be processed by adolescents. To date there is no empirical evidence yet on how adolescents process

SMFM messages, therefore conclusions on this matter are still merely based on consumer psychology theories. The experts' responses to the interview questions suggest adolescents' responses to SMFM content may be complex, depending on both the characteristics of the message itself and the characteristics of the adolescents. Most experts suggested that adolescents may process SMFM messages largely implicitly. This relates to the automatic persuasion process described by Buijzen et al [2], which may typically be activated when consumers are exposed to highly embedded advertising messages, and characterised by minimal cognitive elaboration, generating attitude change through affect-based learning mechanisms. In short, exposure to a certain food brand or product may result in more fluent processing when the brand is encountered again, leading to a sense of familiarity and a positive affect towards the brand [2]. Logically, if adolescents' processing of SMFM would be described by a typical marketing communication model such as a Hierarchy-Of-Effects (HOE) model [178], one could argue SMFM is most likely to trigger the affective phase in adolescents (i.e., liking, preference), and less likely to activate the cognitive phase (brand knowledge, awareness). Moreover, within the SMFM concept, the affective phase may encompass a variety of other responses, i.e., based on the views of the experts this would include social comparison, emotional engagement and attaching certain meanings to a brand, eventually leading to a behavioural phase (i.e., purchase) in adolescents. However, since the current study is based on expert opinions and perspectives and no quantitative, empirical evidence is available to date, a SMFM-specific theoretical framework would need to be developed and empirically studied by means of experimental testing in order to better understand SMFM processing mechanisms in adolescents.

As argued by the experts interviewed in this study, when exposed to SMFM messages, adolescents are being emotionally engaged, and SMFM messages mostly evoke positive emotions, or desire towards the product or brand promoted. Existing evidence shows that adolescents typically have only limited adaptive internal emotion regulation, given the increased emotionality and the rapid developmental changes during adolescence, also increasing their impulsivity [179]. Therefore, affective responses to advertising, mostly measured by ad liking or attitude towards the ad, were found to be strong predictors of purchase [5].

Not only does SMFM emotionally engage adolescents in a different way than marketing on traditional media because it is interactive and entertaining in many different ways, involving competitions, contests, advergames and videos, but also because it is typically

personalised and related to their personal values, ideas, and things they are interested or involved in already. In particular, experts mention certain meanings or images may be attached to a food marketed on social media, such as a particular lifestyle, body image, social status, social norm, or success, which may enhance adolescents' connection with the brand. Existing literature indeed suggests that while adolescents may become more critical and sceptical towards commercial messages and are capable of processing persuasive messages at the most elaborate level, they are still in a phase of identity formation, with a high degree of self-consciousness and social anxiety [102]. This makes self-presentation and conformity to the peer group very important and increases their susceptibility to consumer symbolism, e.g., social status, physical attractiveness and body image [102]. Moreover, previous research has shown how aligning with adolescents' values to change their behaviours – something also typically done by food brands marketing on social media – can be very effective in an intervention setting, even if it would move adolescents away from consuming junk foods [180].

In relation to adolescents' search for identity, social approval and fitting into a group, experts argue that the involvement of role models in SMFM makes it particularly effective, because adolescents are often comparing themselves to others. Especially on social media this social comparison or peer modelling plays an important role, since not only famous celebrities but also influencers and peers whom they trust and can directly relate to are promoting foods on social media, which is argued to be much more powerful [68, 181]. This relates to the concept of prototype perception which was introduced in the Prototype Willingness Model (PWM) [182], defined as adolescents' image of a peer typically showing a certain health-related risky behaviour, such as junk food consumption. More specifically, adolescents' evaluation of a prototype engaging in unhealthy behaviours (e.g., junk food consumption) was found to play a large role in adolescents' food choices, i.e., a more favourable evaluation of unhealthy prototypes is more likely to result in consumption of unhealthy foods in adolescents [183]. This may have large implications for adolescent health. Prototype perception is part of the so-called 'social reaction pathway' of the PWM, which has previously been found to be key in the impulsive and risky behaviours of adolescents on social media specifically, as opposed to the 'reasoned path', and would rather explain adolescents' implicit processing pathway of SMFM messages [184]. The influence of role models has recently become of interest in behavioural research. An increasing amount of studies are focussing on social influencers and their potential to promote healthy foods [145, 185],

or on online social networks, and the influence of influential peers in these networks [186].

Several mediating and moderating factors identified in this study may be related to themes or factors identified in previous studies in adolescents. Yet, to date no research has investigated empirically how SMFM impacts adolescents' dietary behaviours, and therefore we can only suggest how SMFM instances may be processed by adolescents. Clearly, more scientific evidence on SMFM targeted to adolescents is required.

Overall, this study contributes to the evidence base by providing unique insights into SMFM and how it may affect adolescents' eating behaviours, by presenting the perspectives of an interdisciplinary group of experts with practitioner and/or scientific expertise in digital or social media marketing and/or adolescent health. This offers both researchers and policymakers valuable insights into current knowledge around SMFM and recommendations on future SMFM research and policies. Testing the experts' proposed hypotheses and views by means of experiments or observational studies is key, as a larger evidence base may promote the implementation of stricter regulations concerning adolescent-targeted SMFM in the future. However, this study has a few limitations that may have influenced the results and hence their interpretation. First of all, the experts' area of expertise was determined by the researchers based on their online presentation (e.g., LinkedIn, ResearchGate, (personal) websites, etc.) and then confirmed by the invited experts themselves. The researchers' and invited participants' interpretation of their area of expertise may have influenced who did and did not participate. Secondly, while there was an initial focus on recruiting experts from different regions to gain a global perspective, the background and expertise of the experts was the main decisive factor. In the end, the recruited expert group was largely a convenience sample, with a limited number of regions (i.e., Australia, Western Europe, North America) being represented. Consequently, the findings do not take into account any particular health and advertising contexts of other regions globally, e.g., developing countries. Therefore, more research into expert perspectives on a global level is recommended. Yet, because the purpose of this study was to recruit experts with many different areas of expertise, the results of this study are based on multidimensional insights (i.e., from clinical, research, policy, marketing perspectives), which is beneficial as there are many different stakeholders that play a role in addressing changes in SMFM to improve adolescent eating behaviours and health.

According to food marketing research on traditional media, being exposed to junk food repetitively enhances preferences and consumption of these foods in children, contributing to the high obesity rates and related non-communicable diseases from childhood [10, 78]. While limited to no evidence is available on the actual impact of SMFM targeted to adolescents to date, these findings may have significant implications for adolescent health. According to recent evidence, adolescents above 12 years are being extensively targeted with unhealthy digital food marketing, and to a larger extend than younger children [7]. Yet, regulations around digital food marketing are largely non-existent [168]. Besides this, current food marketing regulations focusing on food marketing on traditional media such as television only include children up to 12 years old, while adolescents' developing cognitive abilities would make them highly vulnerable to the targeted and personalised nature of SMFM instances [78, 168]. Health campaigners' hopes are now pinned on a recently proposed ban on all online junk food advertising in the UK, for which the consultation is closed at the time of submission of this manuscript [187].

Creating clear, universal SMFM content definitions and developing a firmer evidence base is highly essential for shaping the (inter)national regulatory landscape around SMFM content targeted to adolescents. Research on the monitoring of SMFM content targeted to children and adolescents through artificial intelligence and machine learning is still in its infancy [78, 188], but this illustrates how researchers may need to upgrade their methodologies, initiate research groups with multi-disciplinary expertise, and become innovative with regard to technologies in order to keep up with the fast-changing digital landscape. However, regulations to control social media food marketing may not change from one day to another and policy developments need to gradually gain public support over the long term, such as with the regulation derived from Article 13 of the WHO's Framework Convention on Tobacco Control, which restricts tobacco marketing to all ages [78]. Although it has been argued that increased advertising literacy may not enable children to defend themselves effectively against affective, entertaining and embedded advertising tactics [4], focusing on increasing consumers' knowledge and awareness of social media marketing tactics from an early age may help increase public support of regulations controlling SMFM content targeted to adolescents, and potentially speed up (inter)national policy developments in this area.

Adolescents' exposure to and evaluation of food promotions on social media: a multi-method approach

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Abstract

Background: Traditional food marketing, mostly involving advertisement of nutrient-poor and energy-dense foods, has the effect of enhancing attitudes, preferences and increasing intake of marketed foods in adolescents, with detrimental consequences for health. While the use of social media applications in adolescents has proliferated, little is known about the content of food promotions within these applications. The aim of this study was to investigate adolescents' exposure to and evaluation of social media food promotions (SMFPs).

Methods: Australian adolescents aged 13-16 years joined one-on-one Zoom meetings with the researcher on the device they normally used for social media. Participants shared their screen and visited up to three of their favourite social media platforms for 10 minutes each, during which the researcher pointed out examples of SMFPs to participants. Next, participants answered questions about their awareness and appreciation of SMFPs. Screenshots of SMFPs were de-identified and analysed.

Results: The study included 35 adolescents aged 14.4 (±1.2) years (boys: n=18; girls: n=17). Instagram, Snapchat and YouTube were the most favoured social media platforms. During a total of 1000 minutes of viewing time, 1801 unbranded (n=1221) and branded (n=580) SMFPs were identified. Participants viewed a median rate (IQR) of 12.0 (6.3-20) SMFPs per 10 minutes, with a median rate of 6.0 (3-11) non-core SMFPs per 10 minutes. A majority of SMFPs (62%) were embedded in celebrity influencer or entertaining content (e.g., vlogs, cooking videos, streamed TV content). In total, 60% of the participants said they had sometimes, rarely or never noticed the SMFPs pointed out by the researcher themselves. Participants largely remembered non-core foods or brands (77%). Almost half (49%) of participants liked SMFPs, while only 6% disliked them.

Conclusions: This study contributes to a relatively unexplored research area. The outcomes show adolescents' SMFP exposure mostly concerns unhealthy foods, shown in advertisements and other food-related posts, which are integrated into a wide variety of entertainment that is appreciated by adolescents. The results emphasize the need for more research on SMFPs, with particular focus on the impact on adolescent dietary behaviours, and clearer definitions and stricter regulations regarding adolescent-targeted social media food marketing.

Keywords: social media; food; marketing; promotions; adolescents

3.1. Introduction

Adolescents are among the most frequent consumers of snacks and fast-foods, and it has been noted across the literature that, as a group, they tend to skip meals or eat away from home [154]. These dietary behaviours are associated with an increased risk for weight gain and diet-related diseases such as type 2 diabetes or heart disease [154]. Food marketing of nutrient-poor, energy-dense foods, significantly contributes to adolescents' consumption of these foods [10, 138, 140]. This impact of food promotions on adolescents' consumption patterns can be explained by a cascade of effects, through which exposure to food promotions impacts adolescents' cognitive stages (i.e., awareness) and affective stages (i.e., appreciation or liking), and hence unhealthy food purchases or consumption [189]. This is comparable to the hierarchy of effects (HoE) models that underpin social marketing effects [190] and that guide food marketers in predicting adolescents' purchasing behaviour and encourage consumption of their brands [191].

In recent years, social media has become a particularly popular channel for marketers to promote foods or beverages to adolescents, as they are one the most digitally-driven segments of the population. A 2018-2019 study found a subset of Australian adolescents 13-17 years spent approximately 30 hours per week on web-based media using mobile devices, desktop and laptop computers, and are most active on social media applications including Instagram, Facebook, Snapchat and music streaming apps [134]. However, trends in digital media are constantly changing, with new social media applications appearing and becoming popular among adolescents within a short period of time [192]. Compared to TV and print, social media offers food marketers a range of new possibilities to influence adolescents' cognitive and affective stages and hence consumption. Namely, social media enables more implicit and personalised persuasion techniques that engage adolescents in emotional and entertaining experiences, encouraging them to share these experiences with their friends [1]. On social media users can contribute to the food marketing process, resulting in either influencer- or user-generated marketing content, blurring the lines between online peer activities and advertising [144, 193]. This leads to messages with high levels of food integration, with peers or influencers handling or consuming the product, which has been found to increase children's attention to or choice of the product promoted [194].

While adolescents generally have a higher cognitive ability than younger children, it is suggested they are still vulnerable to highly integrated social media food marketing as they are in the key stage of identity development, making them want to conform to a certain image or peer group [2, 193]. Additionally, due to hormonal and neurological changes, adolescents may be more impulsive and likely to follow their peers' risky behaviours instead of accepting guidance from parents or adults [1, 195]. For instance, adolescents were found to be more likely to believe their peers consume more non-core foods than core foods, suggesting that social media food messages may shape normative perceptions, and trigger unhealthy eating in adolescents [132]. Indeed, adolescents' self-reported exposure to and engagement with non-core food marketing or food messages on social media have been positively associated with their self-reported intake of non-core foods [131, 132].

Social media food marketing (SMFM) affects adolescents globally because of its borderless nature, yet food marketing regulations are currently focused on children under 12 years and do not take into account the more overt and persuasive marketing techniques applied in digital media [168]. There have been no strict global mandatory regulations regarding adolescent-targeted SMFM to date. Therefore, continuous monitoring of the nature, extent and impact of food marketing to adolescents is warranted, as more complete evidence on all media marketing channels can inform further development and strengthening of regulations and policies [140, 163]. However, objective measurement of exposure to SMFM is practically difficult due to the dynamic and personalised nature of SMFM. Amongst others, ethical and privacy aspects now play a major role when wishing to access and investigate personal social media accounts, because informed consent cannot be obtained from all members or connections within the user's network [124]. As a result, some studies on adolescent SMFM exposure used self-reported data based on questionnaires about frequency of exposure [131, 132]. Other exposure studies were focused on one platform and had methodological limitations such as restrictions to the type of screen recorded (i.e., no smartphone) or type of data collected (i.e., only advertising or a fixed list of brands investigated) [196, 197]. Others relied on self-collection of social media content from adolescents' own social media accounts [134, 136]. To date, one study has conducted an objective measurement of adolescents' full exposure to SMFM, showing the majority concerns fast food, sugar-sweetened beverages and snacks [58]. However, there have been no real-time full exposure studies that compared the presence and nature of branded food messages to

unbranded food messages on social media, together referred to as social media food promotions (SMFPs) in this research. Also, objective measurements of adolescents' individual exposure to SMFPs have not yet been linked directly to adolescents' subjective interpretations of and experiences with SMFPs. In fact, qualitative studies on the impact of social media food marketing on diet-related outcomes in adolescents are highly limited [63]. The main objective of this study was to quantitatively investigate adolescents' real-time exposure to SMFPs. To obtain additional contextual understanding of how adolescents perceive the SMFPs they are exposed to, their perceptions towards SMFPs were qualitatively explored, guided by key components of the HoE approach, i.e., awareness and appreciation.

3.2. Methods

3.2.1. Study design

This study was approved by the Human Research Ethics Committee of the University of Newcastle, Australia (Ref no: H-2019-0309). In total, three different data collection methods were combined to obtain both quantitative (i.e., survey and observation of SMFP exposure) and qualitative data (i.e., interviews). The survey was mainly used to check participant eligibility and to describe sample characteristics. The main focus was on the quantitative analysis of adolescents' SMFP exposure. The subsequently collected qualitative interview data provided additional contextual understanding to the exposure data. Adding a qualitative component was deemed relevant as adolescents' perceptions of SMFPs would give more in-depth insights into how they experienced their SMFP exposure. The below paragraphs elaborate on the data collection methods in more detail. Quantitative and qualitative data were analysed and elaborated on in separate results sections, and the sets of results were eventually integrated during the interpretation or discussion phase.

3.2.2. Study setting and recruitment

Between October 2020 and June 2021, 13-16-year-olds were recruited to participate via researchers' networks (word of mouth, email, social media), flyers, and other media channels including local radio stations and a local newspaper in the Hunter and Newcastle region. The only other eligibility criterion was that the adolescent had to be active on at least one social media platform at least once a week.

The study was completely online, including a questionnaire and interview via Zoom. Parents and participants who expressed interest were sent information sheets describing the study procedures and consent forms which they were both asked to sign before participation. After receiving the signed consent forms, adolescent participants were asked to fill out an online eligibility screening questionnaire on Qualtrics XM Platform. This questionnaire also collected key demographic characteristics and data on participants' social media use, their favourite social media platforms (i.e., up to three and at least one), and which device(s) participants normally use to access these platforms (Appendix D & E).

Next, participants were directed to a website to book a date and time for a one-on-one Zoom interview with the principal researcher. Then the principal researcher sent participants a link to an online Zoom meeting, asking them to access the link on the device they used most frequently to access their social media accounts. If participants used different devices for different social media accounts, they were asked to switch between devices during the meeting.

3.2.3. Zoom session procedure

All Zoom sessions were held by the principal researcher, took up to 45 minutes and were screen-recorded. Zoom sessions commenced with the researcher introducing the study and describing the interview procedure. The researcher emphasized that the study purpose was to collect data on food content viewed by adolescents, not private data, and that this content would be de-identified and only anonymous data would be analysed. Parents were allowed to be present during this introduction, in case of questions and to meet the researcher. They were encouraged to leave after the introduction but could stay if this was the adolescent's preference.

As described in the information sheet and verbally at the start of the interview, the researcher notified the participant that the screen recording had started, and participants were asked to use the share screen function within Zoom. Participants were then asked to open their favourite social media platforms, as indicated in the online questionnaire, one by one. This was either app- or web-based, depending on how they would normally access the platforms. Next, they were instructed to do what they would normally do for 10 minutes on each platform, e.g., scroll through their feeds, comment, share, like, click on links, etc. This procedure aimed to capture a snapshot of participants' normal social media behaviour. The researcher monitored the time, and asked the

participant to close each social media platform after 10 minutes. During each 10-minute session, the principal researcher remained silent, except to point out examples of food content, food advertising, or food promotions to the participants if these appeared on screen.

After the scrolling activity, at the end of the Zoom session, adolescents were asked a series of questions to ascertain their appreciation and awareness of the SMFPs viewed (Appendix F). This took approx. 5-10 minutes for each participant. With regard to appreciation, participants were asked to think about the social media viewing session and indicate in general how much they liked food promotions or food ads on social media (i.e., 5-point Likert scale: 'Dislike very much' -> 'Like very much'), and on which of the viewed platforms they considered them to be most appealing. Moreover, they were asked to name types of food promotions or food ads they (dis)liked more than others (i.e., open-ended question). Two measures commonly used to assess level of awareness of stimuli [198] were investigated, i.e., recall and recognition. With regard to recall, participants were asked to name any food promotion or food ad from the viewing session they remembered in particular. To gain insight into the participants' perceived recognition of SMFPs, they were asked to think about the social media viewing session and indicate how often they thought they would have recognised the examples pointed out by the researcher themselves (i.e., 5-point Likert scale: 'Never' -> 'Always'). Participants were always asked why they had certain opinions, and were encouraged to mention examples from the platforms viewed, or to name examples from their social media platforms in general, if none or too few food promotions were encountered during the activity. After the interview, participants were mailed a $30 department store gift card. The study incentive value was increased to $60 in the latter phase of recruitment, to generate further participant interest and increase the recruitment rate.

3.2.4. Data processing and analysis

3.2.4.1. Selection of images

All Zoom screen recordings were securely stored for up to 14 days until both the principal researcher and a second researcher independently viewed each recording and made screen shots per social media posts (images or video) that contained any branded or unbranded food content. The full screen recording was then permanently deleted. One social media post could show several food items or brands, and could consist of several videos or photos, e.g., stories within Snapchat or Instagram, and therefore several screen

shots were made to keep as much relevant information about the social media post as possible. Food content included images or videos of food brands (i.e., logos or signs), foods (cartoon or real food), or texts mentioning food (brands). The latter included descriptions, hashtags or titles of posts, or posts in text format only, and excluded the comment section of posts, or the names of accounts. A food post was only selected when at least half of the food item or brand (name/logo) was visible. The shortest exposures were included by means of a slow-motion function, as it has been shown that people are able to predict the energy and macronutrient content of food images after exposure of less than 100 ms [199]. Only visual food content was included, with speech-based mentions of foods or brands excluded from coding. It was expected that some SMFPs may be hidden and unrecognisable. Therefore, to make sure all SMFM exposures were captured, the researchers compared their image selections, and combined all food-containing images into one set of food content images for each participant. Because the researchers had different backgrounds, i.e., European and Australian, they complemented one another regarding food and brand recognition, as many products or brands from different parts of the world were at least recognised by one of the two researchers.

3.2.4.2. Anonymising the image data

The principal researcher de-identified all retained images by blurring faces and names in the images of all social media posts, except for posts that were sponsored adverts. Next, the researcher deleted the identifiable images, and sent the participant an email with link to the de-identified selection of images from their social media feeds, to show them how they were de-identified and used for analysis. This gave participants an opportunity to withdraw data if preferred. Also, participants were informed that the original Zoom screen recording was deleted from the University's servers.

3.2.4.3. Coding of images

The two researchers independently viewed a subset (n=150) of de-identified images and coded them, according to a pre-defined coding scheme in Microsoft Excel. This scheme was largely constructed based on other studies in this area [58, 134, 136], and additionally included a variable on the level of food integration, as this was considered relevant in the social media context [2]. The researchers compared the two coded subsets and discussed differences. Based on these discussions, significant changes in the coding structure were applied. For instance, due to time constraints several variables, e.g., tone

of voice, message purpose, portion size or amount, were removed from the original dataset. The omitted variables were beyond the scope of the current analysis, and coding them would be rather complex and time-consuming. Next, a smaller subset of images (n=70) was coded independently, and only minor issues and differences were discussed and resolved with the research team. The principal researcher continued coding based on the updated coding scheme. Relevant coding variables included the source or content generator, type of content (i.e., paid content, owned content, user-generated content, celebrity-generated content or content embedded in other web content), food classification (i.e., core, mixed, non-core, miscellaneous), food company promoted and level of integration. The coding of food classification was based on the International Network for Food and Obesity/Non-communicable Diseases Research, Monitoring, and Action Support (INFORMAS) food classification system, which is in line with a similar Australian analysis of adolescents' social media platforms in 2018/2019 [134]. Kelly et al. were contacted to discuss the application of this system to ensure consistent coding. Regarding miscellaneous foods, sub-categories were created including mixed dishes, composite foods or drinks, or miscellaneous single foods. The latter mostly concerns unbranded foods of which the nutrient composition was unknown, such as cheese, milk or bread. Mixed dishes were categorized as miscellaneous when the ingredient composition was not fully retrievable or when they contained only healthy choices. Appendix G shows decisions regarding to composite foods or mixed dishes, which were informed by previous research [134].

3.2.4.4. Data analysis associated with social media posts

Data analyses were conducted using SPSS for Windows version 25 (IBM Corporation). Socio-economic area was calculated based on postal code (low: Q1 and Q2; medium: Q3 and Q4; high: Q5), according to the Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage (IRSD) ranking for Australia, and similarly to the method of Gascoyne et al. [131]. Descriptive analyses were conducted on the characteristics of all social media posts, also including separate analyses for branded and unbranded posts.

First, the total number of social media food posts encountered per Zoom interview and per platform were analysed, after which the rates of social media food posts per 10 minutes were calculated based on the number of social media food posts per participant divided by the number of platforms viewed during the Zoom interview. The data did not

meet normality assumptions, based on the Shapiro-Wilk test of normality, and therefore median rates and interquartile range (IQR) were reported. Total numbers and median rates of unbranded and branded were compared using a Mann-Whitney U test.

3.2.4.5. Data analysis associated with the adolescent interviews

Answers to the Likert scale questions were analysed by means of descriptive analyses in SPSS. Answers to the open-ended questions were transcribed based on audio recordings. The qualitative interview was used to compliment the quantitative data and thus it was not the main focus of the analysis. For that reason, and due to the relatively high volume of quantitative data, coding of the interview transcripts was done by one researcher (first author) with input from the research team and pre- and post-analysis discussions with the second author. This author had also viewed all screen recordings, including the social media scrolling activity and participant responses to the interview questions. A directed thematic content analysis was conducted [200], i.e., an initial coding scheme was developed based on the interview guide. Since the main focus of this research was to use the HoE framework to qualitatively explore factors that may determine adolescents' consumption behaviour as a result of their exposure to food promotions, cognitive (awareness) and affective (appreciation, liking) factors were coded deductively. The coding scheme was further updated based on the interview transcripts. The analysis allowed for new themes to emerge inductively, in order to obtain full insight into adolescents' perceptions. Participants' quotes were selected to illustrate their reasoning behind certain ideas or views. Additionally, individual participants' responses were compared with the number and characteristics of posts they viewed during the social media scrolling activity, to provide further insight into potential links between opinions and actual exposure to SMFPs.

3.3. Results

3.3.1. Study population characteristics

3.3.1.1. Demographics

In total, 35 adolescents participated (boys: n=18; girls: n=17). The mean age of the sample was 14.4 (1.2) years, and the majority (n=32) resided in medium socio-economic areas (SEA) (Table 3.1). During the Zoom interview with two participants, a parent was present during part of the Zoom meeting.

3.3.1.2. Social media use

Participants reported using between two (n=2) and six (n=6) social media platforms in total, with an average of 4.6. The three social media platforms used most often among the participants were YouTube (97%), Instagram (94%) and Snapchat (77%). More than half of the participants reported using Instagram and Snapchat several times a day or more (i.e., 54% and 60%, resp.). The female/male ratio for Pinterest and TikTok use was skewed (83% and 65%, respectively).

Participants picked three favourite social media platforms, except three (n=3) who were active on only two platforms. While TikTok was not in the top three of most favourite platforms, daily TikTok use was relatively long compared to other platforms, i.e., more than half (53%) of TikTok users reported viewing their TikTok feeds for at least 1-2 hours a day. All participants (100%) viewed at least one of their favourite social media feeds on their mobile phone, and 66% reported using a computer at home, or a tablet or iPad (34%) when using social media. The participants' three main purposes for using their favourite social media platforms were to view posts or updates of friends (35%), messaging or talking to friends (33%), or following the news or latest trends (11%). A minority of participants (4%) used their favourite social media platforms to create or share content (Appendix H).

3.3.2. Analysis of social media food posts

A total of 100 social media viewing sessions took place on Zoom, each 10 minutes. The reason for two platforms not being viewed was that the participants indicated they used Snapchat and Discord only for messaging and/or did not prefer to show or use any other social media platform. For two other participants this was also the case, but they both viewed Pinterest instead of Snapchat during the Zoom session. For the same reason, another participant viewed Twitch instead of Discord.

In 1000 minutes of screen recordings, 1801 posts were identified that contained unbranded (n=1221) or branded (n=580) food content (Table 3.2). The overall median (interquartile range) rate of food posts viewed on social media accounts was 12.0 (6.3-20) per 10 minutes, with a median of 7.3 (2.7-11.3) unbranded and 5.3 (3.3-7.7) branded food posts. In 10 minutes, girls saw significantly more SMFPs than boys ($p<0.01$), with a median of 19.0 (12.3-25.8) versus 7.3 (3.9-12), respectively. No significant difference

in the median rate of food posts per 10 minutes was observed between participants from different ages and SEAs.

Table 3.1. Sociodemographic characteristics of participants (n=35) and their use of social media platforms

Sociodemographic variables	n (%)
Gender	
Male	18 (51)
Female	17 (49)
Age (years)	
13	11 (31)
14	8 (23)
15	8 (23)
16	8 (23)
Socio-economic area[a]	
Low	13 (37)
Medium	19 (54)
High	3 (9)
Social media platform users*	
YouTube	34 (97)
Instagram	33 (94)
Snapchat	27 (77)
TikTok	23 (66)
Pinterest	18 (51)
Facebook	13 (37)
Reddit	6 (17)
Twitch	2 (6)
Yolo	2 (6)
Spotify	1 (3)
Discord	1 (3)
Twitter	1 (3)
WhatsApp	1 (3)

*Participants could select multiple responses

[a] Classification based on the postal area (Low: Q1 and Q2; Medium: Q3 and Q4; High: Q5) according to the Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-Economic Disadvantage (IRSD) ranking for Australia [201].

3.3.2.1. Social media platform

Of all nine favourite social media platforms analysed, most food posts were encountered on Instagram (n=574), Pinterest (n=570) and Snapchat (n=305). The majority of food posts on these platforms were unbranded (56%, 87% and 72%, respectively). Pinterest had the highest median rate of exposure to food-containing posts per 10 minutes (i.e.,

53.0) from the seven Pinterest accounts analysed in this study. For Instagram and Snapchat the median rate of exposure to food content per 10 minutes was much lower, i.e., 16.0 (8-22.3) and 11.5 (7-15.8), respectively, on >20 accounts viewed in this study. On YouTube, relatively equal median exposure rates of branded and unbranded food posts where viewed (i.e., 3.0 per 10 minutes), and for TikTok the median rate per 10 minutes was higher for branded compared to unbranded posts (5.0 versus 4.0, respectively).

3.3.2.2. Food classification

Of all posts, 13% showed exclusively core foods and 57% showed exclusively non-core foods. A minority of posts contained a mix of core and non-core foods (i.e., 4%). The rest of the posts could not be classified as such, as they showed only brand logos (e.g., restaurants where any food can be served) (5%) or they were coded as miscellaneous (21%). Most miscellaneous foods concerned mixed dishes (14%), followed by single foods (5%), mixed drinks (2%) or a combination of those (1%). The median exposure rate of posts with only non-core foods per 10 minutes was 6.0 (3-11), and the median rate for posts with only core foods was much lower, i.e., 1.5 (0.7-3). Posts showing only non-core foods were mostly promotions embedded in entertaining content (n=225), paid promotions (n=129), or celebrity content (n=121), and they were most frequently from Instagram (n=368), Pinterest (n=299), or Snapchat (n=174). Promotions showing exclusively core foods were mostly branded (i.e., 6%). For posts promoting exclusively non-core foods, the number of unbranded and branded foods were more equal (63% versus 37%, respectively).

3.3.2.3. Type of content & source

For 38% of the posts the content generator could not be identified. Many of these posts were shown in pre-view format, when the participant scrolled past but did not click on it (e.g., this happened a lot on Pinterest). Moreover, in social media platforms such as Snapchat an account page could be viewed, but the number of followers was not always visible, making it impossible to categorize the account. The social media food posts for which the source and thus type of content could be determined, the majority was food content embedded in entertainment (36%) or celebrity-generated content (26%). These mostly included food content from non-food related creative channels (25%) and celebrity influencers with >300K followers (17%), respectively. Celebrity posts and entertaining content mostly contained unbranded foods (62% and 73%, respectively).

Examples of posts that showed food embedded in entertainment include streaming content of football games with brand names on players' shirts or on the field, 'satisfying' video channels where foods were the main subject, and recipe videos. Of all posts of which the source could be identified, owned posts were found the least (i.e., 5%), while the number of paid posts was higher (i.e., 23%). For both paid and owned posts the majority contained branded foods (75% and 78%, respectively), and most of these came from food brands. Unbranded food content shown in paid or sponsored posts were mostly generated by non-food companies that were showing foods or drinks in their posts to market their product or service. An example of this was a kitchenware company, which demonstrated the use of their products by including foods in their posts. Some paid content was posted by sources other than food companies, including influencer paid partnerships (i.e., from all levels from everyday influencers to celebrity influencers) (n=8) or even paid ads by creative channels such as recipe blogs or websites (n=6).

3.3.2.4. Food brand promoted

Social media food posts mostly promoted food brands (n=335) or chain restaurants (n=168). This resulted in a median exposure rate of 2.7 (1.7-4.3) for food brands or manufacturers and 1.0 (0.7-2) for chain restaurants per 10 minutes. Delivery services, supermarkets and local restaurants were promoted the least (i.e., n=27-29), and the median exposure rate per 10 minutes was negligible. When food companies were being promoted, this was not always by the companies themselves. A majority of the promotions for food brands or manufacturers and chain restaurants of which the source was known were either influencer content or embedded in entertainment (n=161 and n=86, resp.).

3.3.2.5. Level of food integration

In most SMFPs there was a clear focus on the food without a person being present (median rate per 10 minutes: 5.0 (2-7.7)), or the food was being handled or held with the entire person visible or only their hands (median rate per 10 minutes: 4.0 (2-8)). Paid content mostly showed a clear focus on the food, while entertaining content mostly showed food being handled. A majority of both integration levels included unbranded foods (74% and 69%, respectively). In contrast, the majority of posts with a lower level of food integration, with little focus on the food, was branded (i.e., 60%). Examples of such food promotions were brand logos shown in the background of football games or on clothes. Thus, the lowest level of integration was most commonly seen in entertaining

content. Only 5% of all food posts showed a person consuming the food, and 46% of these were branded foods. Moreover, celebrity-generated content mostly showed this highest level of food integration. On Pinterest and Instagram foods were most often centrally placed in the post (i.e., 46% of all Instagram posts and 79% of all Pinterest posts), while for Snapchat, TikTok and YouTube most posts showed the food being handled (51%, 40%, 35%, respectively). Compared to other platforms, Instagram and YouTube showed the largest number of posts with food consumption (i.e., 5% of all Instagram posts and 13% of all YouTube posts).

Table 3.2. Characteristics of social media food posts participants were exposed to during the study.

Social media post (n=1801) from 100 screen recordings	Total number of social media food posts, n (%)			Median rate per 10 minutes (Interquartile range)		
	Unbranded	Branded	Total	Unbranded	Branded	Total
Total	**1221 (68)**	**580 (32)**	**1801**	7.3 (2.7-11.3)	5.3 (3.3-7.7)	12.0 (6.3-20)
Social media platforms[a]						
Instagram (n=26)	321 (56)	253 (44)	574	6.0 (4-11.8)	7.5 (3.8-12.5)	16.0 (8-22.3)
TikTok (n=15)	88 (57)	66 (43)	154	4.0 (4-7)	5.0 (2-6)	9.0 (7-11)
Snapchat (n=22)	220 (72)	85 (28)	305	8.0 (4.8-13)	2.5 (1-5)	11.5 (7-15.8)
YouTube (n=25)	89 (48)	95 (52)	184	3.0 (1-4.5)	3.0 (1-5)	6.0 (2-10.5)
Pinterest (n=7)	498 (87)	72 (13)	570	38.0 (12-71)	12.0 (4-15)	53.0 (19-83)
Food classification[b]						
Core	222 (94)	15 (6)	237	1.5 (0.7-3)	0 (0-0.3)	1.5 (0.7-3)
Non-core	641 (63)	379 (37)	1020	2.7 (1.3-5.3)	3.3 (2-5.7)	6.0 (3-11)
Only brand logo or name	N/A	91 (100)	91	N/A	0.7 (0.3-1.3)	0.7 (0.3-1.3)
Miscellaneous foods	313 (82)	69 (18)	382	2.0 (1-3)	0.7 (0.3-1)	2.7 (1.3-3.5)
Food brand promoted[c]						
Food manufacturer/brand	N/A	335 (100)	335	N/A	2.7 (1.7-4.3)	2.7 (1.7-4.3)
Supermarket/retailer	N/A	28 (100)	28	N/A	0 (0-0.5)	0 (0-0.5)
Chain restaurant/café	N/A	168 (100)	168	N/A	1.0 (0.7-2)	1.0 (0.7-2)
Local restaurant/café	N/A	29 (100)	29	N/A	0 (0-0.7)	0 (0-0.7)
Delivery service[d]	N/A	27 (100)	27	N/A	0 (0-0.3)	0 (0-0.3)
Type of food content, content generator						
Paid content[e]	62 (25)	191 (75)	253	0.3 (0-1)	1.7 (0.7-2.3)	2.0 (1-3.3)
Food manufacturer or brand	*13 (12)*	*96 (88)*	*109*			
Non-food company/shop	*39 (83)*	*8 (17)*	*47*			
Chain restaurant or café	*0 (0)*	*39 (100)*	*39*			
Owned food content[f]	13 (22)	47 (78)	60	0 (0-0.3)	0.3 (0-1)	0.3 (0-1)
Food manufacturer or brand	*2 (12)*	*15 (88)*	*17*			
Chain restaurant or café	*0 (0)*	*9 (100)*	*9*			
Non-food company/shop	*11 (73)*	*4 (27)*	*15*			

Social media post (n=1801) from 100 screen recordings	Total number of social media food posts, n (%)			Median rate per 10 minutes (Interquartile range)		
	Unbranded	Branded	Total	Unbranded	Branded	Total
User-generated food content	71 (65)	38 (35)	109	0.3 (0-1)	0 (0-0.5)	0.5 (0-1.3)
Everyday user (1-1,000 followers)	*21 (57)*	*16 (43)*	*37*			
Micro-influencer (1K-20K followers)	*50 (69)*	*22 (31)*	*72*			
Celebrity-generated food content	176 (62)	109 (38)	285	1.7 (0.5-2.7)	0.7 (0.3-1.7)	2.0 (0.7-4)
Celebrity influencers (>300K followers)	*115 (60)*	*76 (40)*	*191*			
Meso-influencers (20K-100K followers)	*30 (60)*	*20 (40)*	*50*			
Macro-influencers (100K-300K followers)	*31 (70)*	*13 (30)*	*44*			
Food content embedded in entertainment	297 (73)	108 (27)	405	2.3 (1-4)	0.7 (0-1.5)	3.3 (1-5.3)
Non-food related creative channel	*192 (69)*	*88 (31)*	*280*			
Food-related creative channel	*105 (84)*	*20 (16)*	*125*			
Unknown source	603 (87)	88 (13)	691			
Level of food integration[g]						
No focus on food/ in background	55 (40)	81 (60)	136	0.5 (0-0.7)	0.3 (0-1)	1.0 (0.7-2.5)
Focus on food/ clearly visible	676 (74)	236 (26)	912	2.0 (0.7-5)	1.5 (1-3.7)	5.0 (2-7.7)
Character handles or holds food	390 (69)	175 (31)	565	2.5 (1-5.3)	1.7 (0.3-2.3)	4.0 (2-8)
Character consumes food	47 (54)	41 (46)	88	0.3 (0-0.7)	0.3 (0-0.5)	0.7 (0.3-1.3)

[a] Only social media platforms used by >5 participants are shown, i.e., excluding Facebook (n=2), Twitter (n=1), Twitch (n=1) and Reddit (n=1).
[b] Based on the International Network for Food and Obesity/Non-Communicable diseases Research, Monitoring, and Action Support (INFORMAS) food classification system.
[c] Only top 5 most occurring shown. Also includes: (outdoor) markets, food or health-related apps/services, catering companies and food trucks.
[d] Included meal boxes and online restaurant or cafe ordering applications or websites.
[e] Only top 3 most occurring shown. Also includes: supermarket/retail, local restaurants, (outdoor) markets, food-related and non-food related creative channels, user- and celebrity-generated content, delivery services, food or health-related apps/services, and food trucks.
[f] Only top 3 most occurring shown. Also includes: supermarket/retail, (outdoor) markets, user- and celebrity-generated content, delivery services, food or health-related apps/services, catering companies and food trucks.
[g] Excludes promotions in text format or promotions in which no food or brand is shown (e.g., only in title or hashtags of post)

3.3.3. Appreciation and awareness of social media food promotions

3.3.3.1. Recognition of food content on social media

A minority of participants said they would have 'Never' (n=2) or 'Rarely' (n=2) noticed the food promotions themselves when they were pointed out to them by the researcher during the scrolling activity. Almost half of 35 participants (n=17) stated to have 'Sometimes' noticed the food promotions themselves, 12 participants had 'Often' notice them, and only one (n=1) participant had 'Always' noticed them.

Fifteen (n=15) participants indicated they were somewhat doubtful whether they were seeing food promotions on social media, in general or during the scrolling activity. The main reason for doubt was related to the covert and subtle way brands are embedded into entertaining themes or aspects of the post, distracting participants from the commercial intent (e.g., recipe videos, Menulog ad with rappers, or Red Bull logos hidden in posts about extreme sports), see Quote 1a, Table 3.3.

Yet, the majority of participants (n=18) indicated that they did not doubt the intent of food promotions or advertisements on social media, for mainly two reasons. Most participants said they did not pay attention to food promotions or advertisements (Quote 1c, Table 3.3), and some thought they would be able to recognise them (Quote 1b, Table 3.3).

3.3.3.2. Recall of food promotions

Three (n=3) participants could not recall any particular food promotion or food ad from the scrolling activity. The majority of participants (i.e., n=22) mostly recalled food companies when being asked which food promotions they remembered, while 10 participants mentioned only general foods.

In total, 28 different food brands were mentioned by participants. Food brands that were mentioned more than once by participants include KFC (n=6), Oreos (n=2), Redbull (n=2), KitKat (n=2), Gatorade (n=2). The majority of food brands mentioned (n=21) were non-core or from fast-food restaurants. Other promotions (n=7) were from meal delivery services (i.e., Menulog, Hello Fresh and Uber Eats), and from brands that sell core, non-core or miscellaneous products, including Baker's Delight, Wrigley's 5 Gum, Kellogg's and John West.

When participants mentioned unbranded foods, this mostly included non-core foods such as muffins, cakes, confectionery, ice cream, sausage rolls and donuts. Besides this, participants mentioned fruit smoothies, lasagne and chicken. One participant mentioned corn and two participants mentioned fruit.

Reasons for remembering SMFPs were largely related to the lay-out, presentation and type of product/brand promoted (Quotes 2a-c, Table 3.3). Being exposed to SMFPs frequently on one or several social media platforms was the most common reason mentioned by participants to remember them better (i.e., n=9) This was followed by the food promotion having a high quality or nice design, i.e., being colourful, shiny and vibrant (n=6), the food in the post looking tasty (n=5), posts standing out (n=4), liking the food brand in the post (n=3), and the food (brand) being prominent (n=3). Other reasons for remembering certain food promotions (i.e., each n=1) include being offered discounts on meal boxes, famous food brands or influencers being shown, simply because the researcher had pointed out the food post to the participant during the session, or it was the most recent food promotion they saw.

3.3.3.3. Appreciation of food promotions on social media

Almost half of participants (n=16) indicated to neither like nor dislike social media posts promoting foods and thus had no clear opinion. Yet, a majority of the participants who had an opinion on them liked food promotions on social media moderately (n=13) or very much (n=4), and only two participants disliked them moderately (n=1) or very much (n=1).

Most participants (n=17) found the food promotions on Instagram most appealing, followed by YouTube (n=7), Snapchat (n=5), Pinterest (n=3), TikTok (n=2). The participants' reasons for (dis)liking food promotions on social media can be summarised by three main key concepts: visual appeal, entertainment, temptation.

Overall, participants mentioned liking SMFPs with a high visual quality, e.g., that are appealing, aesthetic, vibrant, flashy, eye-catching, refreshing, satisfying, genuine (i.e., not fake), and they liked when more effort was put into creating them (Quote 3a, Table 3.3). In line with this, participants did not like plain food promotions that did not stand out. Also, the format of SMFPs was considered relevant by participants, since participants mostly preferred videos rather than photos, although a majority disliked long videos. Participants also disliked pop-up type food ads, which they cannot not skip and are forced to watch.

Table 3.3. Participant quotes related to the recognition, recall and appreciation of social media food promotions and marketing.

Topic	Quote
4. Recognition	
a. Doubtful about recognition	*"Sometimes they're going like 'Oh, buy this brand and bla, bla, bla…', but sometimes they're just sharing their recipes, and I'm not sure if they're marketing."* (AU07)
b. No doubt about recognition	*"I feel like I do recognise a lot of the food ads. I don't really doubt them. But the food ads I get, for example say McDonalds, I don't really go to McDonalds or like it. I guess some of the people I follow follow that. So yes I see and recognise them but I don't go and read through them."* (AU46)
c. No attention	*"I don't really think about it. I might have a quick look at it and scroll past or something."* (AU55)
5. Recall	
a. Lay-out	*"It's probably just the fact of different promotional art, and it's usually more colourful and everything."* (AU60)
b. Presentation	*"Because that YouTuber presenting it is extremely famous, and they repeated what they advertised multiple times…"* (AU18)
c. Type of product/ brand	*"Probably because I like Guzman y Gomez, and KFC is similar to Maccas. Those are probably the two main ones I go to."* (AU13)
6. Appreciation	
a. Visual appeal	*"They make the food look really aesthetic and pretty and make me kind of wanna eat it more."* (AU86)
b. Entertainment	*"I like watching them use the product, like putting it into, like, foods, I guess, using it. So recipes and stuff."* (AU39)
c. Temptation	*"I like more sort of dessert ads, and lolly ads, that sort of stuff, and soft drink ads, they catch my attention more because they're more the type of food that I like." (AU77)*

Participants repeatedly mentioned liking food promotions that were engaging, entertaining, funny, informative, aligned with their interests, or experimental and out-of-the-box. For example, entertaining content such as videos that show people making recipes were mentioned as appealing by some participants (Quote 3b, Table 3.3). In line with this, participants did not like food promotions that were repetitive or boring.

Furthermore, participants' replies suggest they were greatly tempted by the foods shown to them. Thus, they enjoyed seeing foods they normally like to eat and that looked tasty, including mainly non-core foods such as sweets, see Quote 3c, Table 3.3. Participants mentioned they did not like promotions showing foods or brands they don't like to eat, including fast food (companies), sweet foods, fruits, vegetables, liquor or beer companies. Reasons for dislike included foods being new to participants, having heard bad things about a company or food, strange food (combinations), or over the top food or brand promotions.

3.4. Discussion

This study aimed to give in-depth and unique insights into the nature and extent of food promotions encountered on social media by Australian adolescents during a real time social media viewing activity, and adolescents' appreciation, recall and perceived recognition of social media food promotions (SMFPs).

It was found adolescents are exposed to a median of 12.0 (i.e., 7.3 unbranded and 5.3 branded) SMFPs per 10 minutes. This is equal to more than 800 food promotions per week, assuming Australian adolescents spend about 1.6 hours on social media daily [202]. In their 2018-2019 data, Kelly et al. observed a weighted median of branded food exposures on the web that was almost half the amount of branded SMFPs in this study, i.e., 2.9 per 10 minutes [134], and Potvin Kent et al. found an even lower median of branded exposures on social media per 10 minutes, i.e., 2.0 [58] in or before 2018. This could be an indication that adolescents' food marketing exposure has largely increased since 2019. Within a few years, social media (use) may have changed significantly, for instance TikTok was not yet popular in or before 2018-2019, while the current study collected TikTok data from 15 participants. Moreover, the large difference between the results of these three studies may also be attributed to different study populations, i.e., Potvin Kent et al. collected data from Canadian adolescents. Also, differences in methodologies or research settings may have played a role. For instance, while the study by Kelly et al. captured social media data from adolescents in their natural environment (i.e., anywhere they may use social media such as at home or school), participants had control over the data being recorded. In the study by Potvin Kent et al. researchers had more control over the screen recordings, and the study took place in community centres. Additionally, Kelly et al. only included promotions visible for at least 1 second [134], while the current study included even the shortest exposures. Food decisions generally require

only limited cognitive processing and can be made in as little as 300 milliseconds [203]. Young adults were even found to be able to estimate energy and macronutrients from food images in less than 100 milliseconds [199], suggesting that measuring the shortest exposures is highly relevant, especially since the nature of social media allows for even shorter and implicit food promotions than traditional media such as TV.

The results of this study indicate the majority of adolescents' exposure to food promotions on social media concerns non-core foods, in line with previous studies [58, 134, 136]. Similar to this study, Kelly et al. found only 2-3% of branded foods were core foods [134]. This has implications for adolescent health, as exposure to non-core foods on digital media has been associated with a higher intake [131, 132, 140] and better recall of unhealthy foods [137]. In this study, non-core food promotions on social media were indeed remembered more frequently by participants compared to core foods, and they were more often appreciated. The latter may be explained by the source or type of content these non-core food promotions are characterized by, i.e., the majority was embedded in entertaining social media content such as cooking videos, 'satisfying' videos, streaming TV content or in vlogs or posts by celebrity influencers with >20K followers. The participants in this study generally liked SMFPs when they had the format of (shorter) videos, were entertaining, engaging, informative, experimental, funny, and showed people using the foods, while they disliked more traditional type of food advertisements popping up on their screen. This is in line with other research showing that social media food advertisements are generally seen as more appealing to adolescents than traditional or more obvious food advertising [121]. Of all branded SMFPs in this study of which the source could be retrieved, 72% were user-generated, celebrity-generated or from other entertaining channels. This is a much higher proportion compared to the findings from Kelly et al., who found 59% of all branded food promotions on the web were earned media impressions [134]. Potvin Kent et al. found an even lower percentage of this type of earned marketing exposures, i.e., 49%. This lower percentage of earned marketing in earlier studies may be explained by changes in strategies employed by food companies over time, with a transition towards more marketing through earned content. This suggests food marketers are increasingly relying on entertainment to persuade adolescents, and thus a peripheral or heuristic route to change their brand attitudes, rather than a central or systematic route. According to the Elaboration likelihood model (ELM), these two routes have significantly different implications, i.e., the first triggers more affect- and emotion-based mechanisms and unstable brand attitudes while the

latter triggers more elaboration or thoughtful consideration and stable brand attitudes [204]. This may be seen in parallel with the cognitive and affective stages underlying consumption behaviour as proposed by HoE models [191], and suggests that food marketers increasingly aim to elicit affective stages through peripheral marketing cues. Social cognitive theories predict that such affect-based marketing messages occur under low involvement conditions, increasing their persuasive effectiveness. Additionally, they propose that repeated exposure to emotional marketing will increase liking of brands though mere-exposure effects and directly prime consumer behaviours [5]. Concerningly, on social media peer-endorsed (earned) marketing blurs the boundaries between online peer activities and advertising and has a greater negative impact than owned or paid media marketing [144, 193], and advertising involving influencers or celebrities are remembered better by adolescents [137].

It was found 38% of all celebrity-generated posts showed branded foods. Yet, marketing disclosure was scarce, with only a small minority being labelled as paid partnerships, and it is likely that many more influencer or user-generated posts without a label were actually paid promotions. Qutteina et al. also found a minority of branded food posts showing a proper marketing disclosure [136]. Some influencers may tag a brand or product or mention them in a hashtag of their post, but this is very subtle and sometimes not even visible to the viewer, e.g., the viewer would need to expand the title. In 2017, the Australian media industry introduced new standards that require food marketing, including food promotions by web-based influencers, to be clearly identifiable from other (advertising) content [205]. However, these rather serve as guidelines and do not pose mandatory restrictions on influencers who are paid to promote food brands. This may have large implications for the adolescent group, as influencer or celebrity brand promotions on social media were found to lead to strong brand effects or increase immediate intake of the promoted foods [206, 207]. According to research by the Advertising Standards Authority (ASA) in the UK, consumers struggle to recognise influencer marketing, and using an ‘ad’ label upfront instead of submerging them in hashtags will increase recognition [208]. Using sponsorship disclosures in social media posts with influencers is particularly essential as posts by brand accounts would automatically elicit more scepticism among consumers [209]. However, previous research does not consistently show that children use disclosures to resist against persuasive messages. For instance, 9–11-year-olds who watched an influencer video promoting an unhealthy snack increased their consumption of this unhealthy snack

regardless of a disclosure being shown in the video, suggesting the disclosure did not make the children particularly sceptical towards the snack [206]. Moreover, previous work among early (12-14 years) and middle (15-16 years) adolescents showed that activation of knowledge of persuasion in response to a sponsored influencer video depends on the content of the disclosure and on the adolescent phase they are in. It was concluded that early adolescents need more informative disclosures that thoroughly explain about the intent of a persuasive message than middle adolescents, in order for them to use the disclosure to elicit their understanding of influencers' persuasive intent [210]. However, existing theories suggest that adolescents' cognitive abilities and understanding or knowledge of persuasive intent are not the only contributors to protecting them from persuasion. The Knowledge Persuasion Model (KPM) emphasizes that cognitive ability does not come automatically with age, but as a result of enhanced experience with and exposure to new types of persuasion messages over time [211]. Moreover, according to the more recently proposed Food Marketing Defense Model, besides awareness, understanding and ability, adolescents would need motivation to resist persuasive food messages [5]. Although some participants in the current study seemed interested in knowing more about the source of SMFPs or were somewhat sceptical towards commercial food messages, more than half either did not pay attention to SMFPs or said to not doubt their intent or source. This could suggest that adolescents partly lack the motivation to defend themselves against persuasive food messages. Concerningly, the majority (i.e., 60%) of participants thought they frequently failed to recognise SMFPs, as they said to have recognised them only 'Sometimes', 'Rarely' of 'Never' when they were pointed out to them by the researcher.

Particularly food marketing messages with higher levels of integration into entertainment have been hypothesized to limit children's capacity to recognise the commercial intent, leading to subconscious persuasion [212], which gradually enhances their implicit memory, attitude and preference of the (non-core) product over time [2, 213]. In this study a small minority of posts were found to have the highest level of food integration, i.e., showing a character's active consumption of food. This is in line with other research on YouTube and Instagram, although in these studies people were frequently shown holding the food [8, 126]. Indeed, a relatively large number of promotions observed in this study showed a product being handled or held by a person. Some participants specifically preferred SMFPs with influencers or people showing or handling the foods, i.e., they preferred posts with higher levels of food integration over

product placements. This is concerning, as the level of integration between a persuasive commercial message and its context is seen as a key feature of the current and future digital marketing environment [2, 40].

Adolescents were particularly exposed to SMFPs on Instagram, Pinterest and Snapchat. Notably, large numbers of food promotions were observed on Pinterest despite the relatively low number of participants having viewed this platform (n=7). This could be attributed to the format of Pinterest, with many posts being shown in preview format on the screen at once. Also, many posts on Pinterest showed recipes or aesthetic foods rather than branded (sponsored) posts, which explains the large amount of unbranded food posts viewed on this platform. Overall, this study showed a majority of food promotions on social media were unbranded (i.e., 68%). Only a small proportion of promotions for core foods were branded (i.e., 6%), and a relatively larger proportion of non-core food promotions were branded (i.e., 37%). Similarly, previous analyses on YouTube and Instagram found that food promotions were mostly unbranded, and that branded foods promotions mostly concerned non-core foods [8, 126]. This may be reflected in participants' memory of SMFPs in this study, as most of the food companies participants recalled were fast-food chains or non-core food brands.

This study has some methodological limitations. Participants' scrolling through their social media feeds may not have been representative to their normal scrolling behaviour for two reasons. Firstly, participants may have altered their social media behaviour because they knew the researcher was viewing their social media feeds with them on Zoom, and secondly, during part of the social media scrolling activity of two participants a parent was present. Secondly, the coding of composite foods or dishes was done according to the INFORMAS food classification system and partly in consultation with authors of a similar Australian study [134], yet the food classification of these type of foods is often ambiguous and it cannot be ruled out that differences in coding may exist, as their dataset only consists of branded food posts. As in this study many composite foods and some unbranded single foods such as milk, bread or cheese were difficult to classify based on INFORMAS, a large subset of SMFPs were coded as miscellaneous and no conclusion could be drawn on their classification. Furthermore, posts showing only the name or logo of a brand selling both core and non-core products were difficult to code as either 'core' or 'non-core', and were therefore not coded as such. However, this concerned only a small subset of all posts (i.e., 5%). Thirdly, the content generators of many SMFPs could not be identified, when posts were only viewed in preview format or

the number of followers could not be retrieved on the account page itself. Fourth, the current study included a convenience sample and only a small subset of the Australian adolescent population, and social media platforms of a larger number and more diverse group is potentially needed to obtain data more representative of the Australian adolescent population. Future studies would need to include adolescents from different regions worldwide, as social media usage and adolescent eating practices or health behaviours may differ largely across cultures [148, 214]. Lastly, this study was conducted during the COVID pandemic, which may have led to higher junk food marketing exposure [215].

Yet, the current study is the first study in this area to provide a valuable combination of insights into objective measurement of adolescents' SMFP exposure and adolescents' appreciation, recall and perceived recognition of SMFPs. A qualitative analysis of adolescents' perspectives is highly valuable, as reality is socially constructed and adolescents' subjective interpretation eventually determines their individual experiences [216]. Regarding the quantitative part of this study, measurements of SMFP exposure were conducted as objectively as possible, with real time recording of adolescents' social media feeds instead of content analyses of specific social media brand or influencer accounts, or participants' self-reported exposure or self-collected social media food marketing data, as applied in previous studies [8, 126, 129, 131, 132, 136]. To date, only two other studies conducted in Canada (i.e., in 2018 or before) and Australia (2018-2019) have measured children and adolescents' real-time exposure to food marketing on social media [58, 134]. Particularly, the non-experimental setting in this study and the researcher not being physically present or constantly visible by the participant during the scrolling activity may have resulted in a more natural setting and thus more natural social media behaviour. Also, the current study measured both unbranded and branded food promotions, giving more complete insights into adolescents' exposure to SMFPs.

Exposure research should be further extended across the globe and in larger population groups, and methodologies to measure adolescents' exposure to food marketing on social media should be optimised. Namely, while food companies use Artificial Intelligence (AI) to optimise their engaging and personalised social media marketing to adolescents, AI can also be used for research purposes, i.e., to monitor individuals' exposure to marketing [217]. Exposure data play an important role in the development and strengthening of food marketing regulations [163]. This study's findings acknowledge regulations on social media food marketing targeted to children > 12 years should be made stricter to protect

this vulnerable group against its implicit and potentially detrimental effects. Yet, unbranded food content is not likely to fall under the scope of any current or future food marketing regulations, while it contributes to adolescents' exposure to non-core food on social media almost twice as much as branded food content. Therefore, it may have as much impact on adolescents' dietary behaviours as branded content, especially when they are being shared by peers. Thus, a holistic approach should focus on tackling the effects of both branded and unbranded food content on social media by collaborating with social media influencers and teachers, to educate children about healthy food consumption and digital advertising from a young age. Ideally, this may create a future generation of influencers who encourage normal portion sizes, balanced diets, more realistic body sizes, and who motivate young people to be more sceptical towards digital media sources.

3.5. Conclusions

Based on real-time recordings of adolescents' favourite social media platforms, this study provides evidence on adolescents' concerningly high exposure to and appreciation of non-core and entertaining food promotions on social media, and lower exposure to and appreciation of core food promotions and traditional types of food advertising. It is hypothesized adolescents process these highly engaging SMFPs largely implicitly, and thus without their active awareness prolonged exposure may influence their eating behaviours. Yet, more empirical evidence on adolescents' exposure to SMFPs and the impact on adolescent consumption is warranted.

My feed is what I eat? A qualitative analysis of adolescents' awareness and appreciation of food marketing on social media

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My feed is what I eat? A qualitative analysis of adolescents' awareness and appreciation of food marketing on social media.

Abstract

Objective: Adolescents spend much time online and are exposed to much unhealthy social media food marketing (SMFM), which may encourage unhealthy food intake. The aim of this research was to investigate adolescents' perceptions towards SMFM, i.e., how they recognise and appreciate different forms of SMFM, on different social media platforms.

Design: Semi-structured one-on-one interviews were conducted, in which SMFM examples from Instagram, Snapchat, TikTok and YouTube were extensively discussed with adolescents. Interview transcripts were coded and thematically analysed.

Setting: Online, Skype.

Participants: 16 Dutch adolescents aged 13-16 years.

Results: Participants' criteria for defining, recognising and appreciating SMFM often related to the level of product integration. Participants perceived branded content as marketing when the product was clearly visible, accompanied by promotional texts, and promoted using a professional lay-out. Paid food content was most perceived as typical food marketing, although participants' recognition of sponsorship disclosures varied. Participants appreciated entertaining videos in which food brands were integrated more than traditional, sponsored advertisements. The reliability of the source (brand, celebrity, friend) determined to what extent adolescents appreciated the post. Non-core foods were highly appreciated in the social media context.

Conclusions: Adolescents are attracted to earned and entertaining SMFM promoting non-core foods, yet they generally do not perceive this as typical marketing. This study contributes to the ongoing debate on how adolescents can become more resilient to commercial messages that promote non-core foods and beverages. It is recommended that future studies further investigate the effects of highly integrated social media advertising formats promoting non-core foods.

Keywords: social media, adolescents, food marketing, qualitative analysis

4.1. Introduction

Young people are digital natives nowadays; they grow up surrounded by digital information and entertainment on screens [218]. In The Netherlands younger age groups were among the most active internet users in Europe [219]. In 2019, 96.2% of Dutch 12–25-year-olds used the internet almost daily, and almost all of them (99.1%) accessed the internet with their smartphone [220]. A large majority of this group (96.8%) is active on social media [220]. Dutch adolescents spent 160 minutes on social media per day in 2021, which was a 15-minute increase compared to 2020 [221]. Among Dutch adolescents 15-19 years old, WhatsApp, Instagram, YouTube and Snapchat were the most frequently used platforms in 2021. While Facebook use has decreased in the past years, TikTok use has been on the rise [221].

With the rise of social media, adolescents' food marketing landscape has transformed. Adolescents are considered an important target for social media food marketers because they are online frequently, they have more spending power than younger children, and they represent the future market. Also, their ease in using technology and their role in setting and following trends makes them interesting targets for digital marketing campaigns [6, 129]. Concerningly, adolescent-targeted food marketing on social media typically promotes nutrient-poor and energy-dense products that are embedded into entertainment [134, 136, 222]. Exposure to unhealthy food marketing may increase children's preference for and consumption of these foods [131, 132], which is concerning considering the rising obesity rates in younger age groups [26]. Yet, to date restrictions of unhealthy food and beverage marketing are merely focused on restricting TV food advertising amongst children under the age of 12 years [193]. Overall, more empirical evidence on the strategies used and their effects is warranted.

Hierarchy of Effects (HoE) models are typically applied by marketers to influence adolescents' consumption of their brands, i.e., by influencing cognitive (recognition, awareness) and affective (appreciation, liking) stages [191]. Social media enables food marketers to influence these stages in different ways than with traditional media, as they can tailor branded content to the specific preferences of adolescents through personalisation algorithms, and integrate this in entertaining content adolescents engage with already [6, 223]. For instance, food marketers involve social media personalities or celebrities as ambassadors of their brands [27, 28]. Additionally, companies may engage social media users and encourage dissemination (e.g., 'tag', 'like' or 'share') of branded content through peer-endorsed marketing that is free of charge [58, 134, 222]. This so-

called earned content may create the impression that brands are endorsed by friends [6]. As any social media user can make money by contributing to the marketing of brands, this has led to the emergence of influencers with lower numbers of followers who are much more relatable to adolescents than celebrity influencers [224]. Finally, companies can integrate their brands in a diverse range of other entertaining content on social media, including live streaming videos, games, recipe channels, sports videos, or artistic content [27, 28, 222]. Hence, the line between commercial and entertaining content is blurred on social media, making it more likely for adolescents to appreciate but problematic to recognise food advertising [193].

Recognising and understanding the persuasive effects of highly-integrated advertising formats may be particularly difficult for young adolescents, as they are in the middle of cognitive, social and personality development and not fully capable of critically or rationally processing persuasive messages [2, 225]. From adolescence, i.e., 13 years and older, children's cognitive processing abilities and consumer- and advertising-related skills improve and generally reach adult-like levels by age 16, making them better capable of critically processing persuasive messages [2]. Yet, adolescents' typically increased self-awareness and their strive to develop an own identity and belong to other peer groups may make them highly susceptible to persuasive social media marketing messages, particularly when disseminated by peers or influencers [102]. An Irish study involving focus group discussions, participant observations, and in-depth interviews to explore the advertising literacy of adolescent girls aged 12-14 years, showed that although the teenagers stated to be fully aware of the hidden advertisements, they did not recognise hidden commercial messages. Besides, participants were unaware of the persuasive intentions of the messages [226]. Another study on 12-16-year-old Dutch adolescents' advertising literacy of video influencer marketing showed similar discrepancies between reported and actual awareness of the commercial intent [142]. Also, their results showed that adolescents accept influencer branding and have compassion rather than a critical perspective [142]. An American study on 13–17-year-olds also found Instagram food advertisements were rated more positively than traditional-type advertisements and participants did not perceive the food ads in an Instagram format as marketing [121]. However, so far very few qualitative analyses have been conducted on the impact of unhealthy social media food marketing on diet-related outcomes in children [63].

To date it is unclear what processes underlie adolescents' recognition and appreciation of SMFM, i.e., what criteria adolescents use to identify or define food marketing on social

media and what aspects of SMFM makes them appreciate it in particular. Moreover, adolescents' perspectives on different types of food marketing (i.e., paid, owned, influencer and user-generated content), on different popular social media platforms (i.e., Instagram, Snapchat, YouTube and TikTok) have not yet been studied in detail. Thus, this study's aim was to qualitatively investigate how adolescents define and recognise SMFM, and what aspects of SMFM they appreciate, and why (not).

4.2. Methods

4.2.1. Pilot and sample

A semi-structured interview protocol was prepared in advance and tested during a pilot to evaluate the interview procedure technically. These two pilot interviews, in which a young adult and a young adolescent took part, also involved the collection of examples of social media food marketing content from their social media feeds, partly providing content for the stimulus set in the study. For the study, 13–16-year-old adolescents who were active on at least one of the four social media platforms investigated (i.e., Instagram, Snapchat, TikTok and YouTube) at least once a week were included. Participants were recruited via the personal contacts of the researchers, via email and WhatsApp. No information about the purpose of the study was given beforehand. The number of interviews that were held depended on the degree of saturation. Saturation is the point at which no new information or themes are observed in the data [171]. Participants received a digital €7,50 voucher after participation.

4.2.2. Interview procedure

In-depth semi-structured one-on-one interviews were conducted via Skype, between the 2nd and 24th of April 2020. Interviews were conducted in Dutch, the native language of all participants. They took 30-50 minutes and were conducted by the same researcher. Informed consent of both parents and participants was obtained orally, after which parents or participants left to another room. This enabled participants to speak freely, without being concerned about their parent listening. After basic demographic questions (i.e., age, gender, educational level, residence area), the participants were asked about their activity on Instagram, Snapchat, TikTok and YouTube. Despite its popularity, WhatsApp was not included in the study because the platform does not contain paid advertisements. If the participant used any of these four social media platforms at least once a week, five examples of SMFM that consisted of a mix of sponsored, owned,

influencer, earned and gaming content containing foods or beverage brands were shown for each platform. This was done using the screen sharing function within Skype. Next, participants answered questions relating to their appreciation of the examples, and to what extent they considered them to be advertising. After the examples were viewed, their experiences with social media food marketing in general were discussed. During the interview, the researcher frequently took the opportunity to ask the respondent in-depth why they thought or felt a certain way. The interview was completed when all the questions from the interview guide were covered. The full interview guide is shown in Table 4.1.

4.2.3. Stimulus set

A range of examples of food promotions from Instagram, Snapchat, YouTube and TikTok (n=20) were used as stimulus set for the interviews (Appendix I), based on relevant measures of characteristics of social media food content in previous studies (e.g., different types of foods/brands, and examples of paid, owned, earned and other entertaining branded food content) [222]. To complement the examples collected from the pilot, the main researcher collected examples via their own social media and from their personal contacts' (and their adolescent children's) social media accounts as well. Since previous research suggests that the definition of social media food marketing is debatable and paid advertisements do not merely reflect all marketing activities in social media [193], a wider variety of stimuli was used to represent food marketing in this study. Content from users and influencers in which a food brand name or logo is depicted were selected in the stimulus set as well. For some of those examples it was unclear whether the creators received a financial compensation for the post, as they showed branded food content but no sponsorship disclosure. This closely reflects reality, as proper disclosure practices often seem to be lacking on social media, particularly regarding earned or influencer marketing [136, 222]. Furthermore, the stimulus set included two examples (in Snapchat and YouTube) in which animated, unbranded foods were shown that were part of a sponsored game, to investigate the participants' opinion on alternative ways of sponsored content involving foods.

Table 4.1. Interview guide, translated from Dutch.

Questions	Answer options
Questions on demographics and social media use	
1. Gender	Boy Girl Other
2. Age	13-16 years
3. Province	One of 12 Dutch provinces
4. Education level	Pre-vocational education Senior general secondary education Pre-university education
5. Do you have an Instagram/ Snapchat/ TikTok/ YouTube account?[1] [If not, go to next platform]	Yes/ No
6. How often do you use Instagram/ Snapchat/ TikTok/ YouTube approximately?[1,2]	Once a month or less
Questions about platform-specific images (*n* = 5 per platform)	
7. To what extent do you like this Instagram/ Snapchat/ TikTok/ YouTube image?[1]	Dislike very much Dislike moderately Neither like nor dislike Like moderately Like very much
8. Why do you [answer to 7]?[1]	Open ended
9. Do you think this Instagram/ Snapchat/ TikTok/ YouTube image is a typical advertisement for foods or beverages?[1]	Yes/ No
10. Why do you think that?[1]	Open ended
General questions about social media food and beverage advertisements	
11. In general, how much do you like it when foods or beverages are being advertised on social media?	Dislike very much Dislike moderately Neither like nor dislike Like moderately Like very much
12. Think about the images I've showed you earlier, but also about your general experiences with social media. Why do you like certain types of food advertising more than others?	Format: photo, video, animation, games, other Source: brands, celebrities/influencers, friends or peers, other Type of food: certain types food foods or beverages, such as soft drinks, cake, vegetables, fruits, candy?

Questions	Answer options
13. On which social media platforms do you like food and beverage advertisements the most? Why?	Instagram Snapchat TikTok YouTube
14. How do you know if food content on social media is food advertising or not?	Open ended
15. Do you think there is a lot of food and beverage advertisements on social media? Why (not)?	Open ended
16. Do you think there is more food and beverage advertising on certain social media platforms? Why (not)?	Instagram Snapchat TikTok YouTube
17. Is there a specific food or beverage advertisement you still remember seeing on one of your social media accounts? If yes, why do you remember this in particular?	Name product/brand Source of post
18. To what extent do you think this interview has made you more aware of/ think more about food and beverage advertisements on social media?	Open ended

[1] Interviewer asked questions 5-10 for each platform separately
[2] Open question; if answer came down to less than once a week, the interviewer went on to questions about the next platform

4.2.4. Data analysis

The interviews were recorded and transcribed afterwards, in a standard verbatim style and kept anonymously. Next, a content analysis was done using ATLAS.Ti8. Since the nature of the study was explorative, analysis was done mostly based on inductive codes, with only a few deductive codes being selected beforehand. Inductive codes were obtained from the interviews in three different phases: open coding, axial coding and selective coding [227]. Open coding resulted in 1.647 fragments and a list of 348 codes. To make this list comprehensible, the codes were then divided into 13 code groups. A second researcher coded the interview transcripts independently and compared their main themes with the codes from the other researcher. Where needed, extra codes were created or overlapping codes were combined, but no codes were removed from the original coding structure. Quotes that illustrated the main concepts were translated from Dutch to English and checked by a second researcher. The participants' ratings of the stimulus set were categorised using labelling. These labels, together with the frequency

each label was used, were exported to Excel. This export was used to calculate weighted means and standard deviation for the examples individually, examples per platform, examples per source, and ratings of their appreciation of social media advertisement in general.

4.3. Results

4.3.1. Study sample

This study included Dutch adolescents (n=16) with a mean age of 14,5 years (SD=0,97). From this sample 50% (N=8) was female and 50% (N=8) was male. A higher proportion of participants were in pre-university education (i.e., 44%) compared to senior general secondary education (i.e., 31%) and pre-vocational education (i.e., 25%) (Table 4.2).

Table 4.2. Demographics of the study sample.

Variables	Participants (n = 16)
Gender	
Male	8
Female	8
Age (years)	
13	2
14	7
15	4
16	3
Level of education	
Pre-vocational education	4
Senior general secondary education	5
Pre-university education	7
Social media usage	
YouTube	16
Instagram	14
Snapchat	13
TikTok	10

4.3.2. Awareness of social media food marketing

Overall, participants thought they saw the most advertisements on Instagram and YouTube. Two participants stated they had never seen any advertisements related to food on social media and thus could not remember any particular advertisement seen recently. Six other participants did not remember seeing any food advertisement on their social

media recently as they admitted to not pay much attention to them in general. One participant said:

> *"When you said 'I'm going to ask you some questions about food advertisements on social media', the first thing I thought was: 'What advertisements?' I didn't really think about it."* – Girl, 16 years

Hence, a few participants seem to realise they are not always aware of SMFM in the first place. One participant noted that a lot of food marketing on social media triggers people subconsciously because of its appealing nature:

> *"Well, for example with those TikTok things… I think but am unsure whether they intended it like that, but I think that people are actually going to get it, you know. Also, it happens subconsciously. It mainly happens subconsciously. Even if it would be an intentional advertisement, people will still get it right away. Because it looks so appealing, people are still going to get it."* – Girl, 15 years

Adolescents used certain criteria to explain why they thought food content on social media was typically food marketing (Table 4.3).

4.3.2.1. Product focus

All participants agreed that products are being advertised on social media when a post clearly shows which brand and product is promoted. Thus, when the brand (logo) or product is obviously or frequently depicted or mentioned and the whole post revolves around the product, participants view it as marketing. However, six participants noted that when multiple brands are depicted, it is not clear whether something is being advertised. Their underlying reasoning for this was that brands do not collaborate.

Subtle product placements, i.e., where the brand is shown very quickly or the product is not clearly visible, were not seen as typical advertisements. For instance, for one example in which a can was placed on the floor inconspicuously next to an influencer-type person, half of the participants thought it was unclear what could be promoted. This example was not seen as marketing despite the 'Paid partnership' label included in the post, suggesting that the visibility of a brand or product is seen as a more important determinant of recognising advertising on social media.

4.3.2.2. Disclosure of sponsorship

In seven of the examples an explicit disclosure was mentioned, showing the commercial intention of the image, i.e., 'Sponsored', 'Ad' and 'Paid Partnership'. The latter disclosure was present in one example, but only observed by one participant. Half of the participants did not seem to notice a product and also did not think it was an advertisement. Nine participants recognised the examples with 'Sponsored' and 'Ad' labels as typical advertisements.

For instance, the use of disclosures clarified the difference between a recommendation based on a celebrity's opinion and a celebrity's advertising message. Additionally, the use of hashtags as a sponsorship disclosure was often not recognised by participants. Yet, several participants suggested brand (hash)tagging as a means of disclosure in influencer posts could be an indication of a post being an advertisement.

4.3.2.3. Type of content

The type of content was another important criterion for participants to determine whether social media content is food advertising. Several participants mentioned the relevance of paid content, specifically with regard to influencer content. Moreover, five participants thought that if they could see the full influencer video and description, the influencers would recommend the product displayed. Thus, if an influencer-type person would use and verbally endorse the product this would make it marketing rather than just entertainment. Additionally, participants mentioned the importance of the number of followers. If a user has more followers, the likelihood their post is seen as marketing is higher than for users with little followers, because they have more reach.

There was a general consensus about content generated by users or friends who are not influencers. Participants mostly agreed that if something was posted by a peer, it was not a typical advertisement, as the purpose of a social media user is not to sell a product and rather serves a personal goal. This was also often related to the lay-out of the post, i.e., user-generated content generally has a lower quality and is less professional, and hence it was perceived less like typical advertising.

Table 4.3. Adolescents' criteria for social media food content to be typical food advertising.

Criteria	Participants' perspectives	Illustrative quotes
1. Product focus		
a. Brand name/logo clearly shown	Clear brand presence is the most mentioned reason for participants to describe an example as a typical advertisement.	*"It says Ubereats 5 times, no that is exaggerated: 3 times. So, I would say it is an advertisement. I know that for sure."* – Boy, 16 years
b. Central brand theme	According to five participants, in an advertising post everything revolves around the (theme of the) product or brand promoted.	*"You see that it is from Diamant, but all the products are also connected to it. So the frying pan, and... frying oil. All of it is shown in the same theme as Diamant"* – Boy, 16 years
c. Number of brands shown	If multiple brands are shown social media content is not seen as typical advertising by six participants, as brands do not collaborate.	*"I think it looks less like an advertisement because there are two brands. I wouldn't think that two brands would work together to advertise."* – Boy, 15 years
d. Food product clearly shown	The majority found social media content typical advertising when a product is clearly pictured.	*"I don't see anything from a brand or any food or drinks. So, then I don't know what kind of advertisement it would be."* – Girl, 15 years

Criteria	Participants' perspectives	Illustrative quotes
2. Sponsorship disclosure		
a. Disclosure present	Nine participants mentioned that the image was like a typical advertisement, because of the disclosure being present.	*"Well, for example, if it's from a company itself, I immediately know that it's advertising when they show the product. And with some influencers it usually says "Ad" and then I know it. But if it is not there, I'm usually not able to distinguish it easily."* – Girl, 16 years
b. Brand hashtags or tagging	While the majority did not notice brand hashtags, five participants thought hashtags or tags makes content look more like an ad.	*"You see that it's an advertisement, because they tag the place it's coming from, so 'Master Delicious Dates'."* – Girl, 15 years
3. Type of content		
a. Paid content	Five participants mentioned payment as being an important factor to determine whether influencer-type content is advertising.	*"When these people don't get paid for it and they are not influenced by companies, I don't think it's advertising. Only when they would get any money at all, I think it is advertising."* – Boy, 14 years
b. Influencer content	Influencer content was rather seen as typical advertising when influencers use or verbally endorse a product, disclose their intent, are paid by a company, or have many followers.	*"Well, I think it would have to be an actual advertisement about consuming the food, and that someone says something like: 'These Mentos are super tasty'. But this is rather just about some sort of experiment, I think."* - Girl, 14 years
c. User-generated content	The majority of participants did not find content posted by a peer or other user to be typical food advertising. However, it could still have the same effect as a commercial post.	*"If someone who is not famous just posts something because he likes or eats the product, then I don't think it's advertising <...>. But it is possible that he just likes it and shows it for that purpose, but not for the company per se, but just to teach people about eating it."* – Girl, 14 years

Criteria	Participants' perspectives	Illustrative quotes
4. Promotional strategy		
a. Promotional text included	Nine participants mentioned promotional texts (e.g., product information or benefits) as a typical characteristic of advertisements.	*"You see the product, and the text above describes the product in a very positive way, that it contains no sugar. That is advertising."* - Boy, 14 years
b. Professionality & effort	The majority of participants found social media posts typical advertisements when more effort is put into them and they look professional, this makes it more appealing.	*"Advertisements are professional, because they have to make the product look tasty. With good light, with a good, big camera, and the product should be clearly visible. That's what makes it more attractive."* – Girls, 14 years
c. Encourage to act	Food advertisements typically encourage consumers to take action, i.e., win, click, download, purchase or consume	*"Well, it's often about whether you want to download the 'Jumbo App', and then you get something. Then you get this [the product promoted in the example]."* – Girl, 13 years

4.3.2.4. Promotional strategy

Related to participants' view on the 'professional' appearance of a social media post, participants mentioned that much more effort or thought is put into making actual food advertisements than just ordinary user-generated social media food promotions. Hence, the food in advertisements looks particularly appealing to make people want to consume or buy it. Additionally, the majority mentioned that the use of promotional texts in a post, i.e., brand quotes, information such as price or where to buy it, or texts describing benefits of the product, make it look like typical advertising.

Besides information about the product, participants mentioned that advertisements would usually encourage consumers to do something, e.g., get something for free, win something, download an app or click on a link.

4.3.2.5. Unintentional, unofficial or indirect advertising

Although participants perceived user-generated content and some influencer-type content not to be typical advertising as these types of posts are not professional, not purposefully marketing a product or they do not contain promotional texts or disclosures, they thought this type of content may still affect people's behaviour:

> *"No, it's not a typical advertisement, because this is not what the producers of those products have created it for. It's just more... It does have the effect of an advertisement, because it makes that people are more likely to buy it. Particularly children, because they feel like trying it out."* - Boy, 15 years

Since earned-type content does impact people's behaviours, several participants seemed to have difficulty categorising it. According to participants, the product is shown rather unintentionally or coincidentally, as the goal of the post is rather to entertain viewers than promote a product. Participants called this a different type of advertising, i.e., a 'promotion' instead of advertising, or 'indirect', 'untypical' or 'unofficial' advertising as the brand just happens to be there:

> *"No, I don't think it's an official advertisement. It is an advertisement... no, it is a little strange. It is an advertisement I think, but not official."* – Boy, 16 years

4.3.3. Appreciation of social media food marketing messages

On a scale from 1 to 5, participants' average rating of social media food marketing was rather positive, i.e., 3.25. Half (n=8) of the participants found the advertisements on

Instagram the most appealing, four participants found advertisements on YouTube the most appealing, and two participants found that Snapchat and TikTok showed the most appealing advertisements. Those answers were based on various arguments, as described below and in Table 4.4.

4.3.3.1. (Short) videos most appreciated format

Two respondents did not express a preference for a certain format. The majority (11 out of 16) expressed they prefer a video format for advertisements. This was based on the fact that a video gives more possibilities to inform and entertain than a picture. However, a criterion that was mentioned regularly is that the video should not be too long. Two participants preferred a photo, because it takes the least effort and time to watch. Moreover, some participants said to take more time to watch videos from influencers or peers in which a commercial message is integrated in entertainment rather than traditional ads from food companies, i.e., the ones that pop up on their screen and they cannot skip.

4.3.3.2. Appreciation of the source differs

The source of a social media food message is a relevant determinant for the participants' preferences. Overall, opinions about the preference of the source of social media food marketing messages were divided amongst participants. Some participants liked advertising content coming from certain brands when they knew them and thus what to expect of them. Also, they liked the higher quality and professionality of posts by brands.

On the other hand, some participants had a negative attitude towards paid advertisements coming from food companies, as they felt like they are repetitive and interrupt things they are watching on social media. Also, some participants did not seem to trust food companies, and they found company advertisements more fake and instead preferred influencers. The majority (n=10) viewed any involvement of influencers in social media content as something positive, especially when they knew and liked the influencer. One participant had a practical explanation for why she preferred an influencer as a source, namely that they mostly share a discount code with their followers.

However, some participants also reflected on the downside of influencers showing off their fit bodies or 'fit girls', i.e., they can make themselves or other people insecure. Yet, most doubts about influencer-type food marketing were based on trustworthiness, i.e., how much participants believed an influencer would give an honest review of products.

However, one participant stated that brand promotions by famous influencers are more trustworthy when they are followed by reliable others, like news channels. Overall, trustworthiness was an important reason for participants to like food promotions by friends or acquaintances.

4.3.3.3. Non-core foods appreciated more than core foods

Of all 12 participants who had an opinion about the preferred type of product being promoted on social media, one adolescent did not appreciate advertisements for fast food. The others preferred advertisements for non-core food products or brands over advertisements for core food products. Among those, six participants expressed a specific preference for candy and five participants expressed their preference for fast food like burgers, fries, or pizza.

A few participants noted how the advertisements of some product types were less applicable to them, i.e., because they would rely on their parents to buy them. Specifically, they were able to go to a store around the corner rather than to a store outside the city, and their parents were still in control of getting certain foods for them, including mostly vegetables or foods for dinner.

4.3.3.4. Appearance and presentation

Adolescents' appreciation of social media food content largely depended on the appearance of the content. The most frequently mentioned reason for positive appreciation of the advertisement, was that the promoted product is displayed in an appealing, almost perfect way. This related to the participants' notion that a social media food marketing post is more appreciated when more effort is put into making it, and hence when it looks more professional and is of high quality. Promotional posts of influencers with many followers were seen as more professional than those with little followers.

Furthermore, participants liked it when it was clear what the post was about, i.e., what product was promoted and more information about the product was given. Particularly, seven participants noted to like promotional posts that announced discounts or giveaways. However, four respondents said that content should not contain too many elements, because then it would become chaotic. Yet, the majority appreciated content with a lot of different stimuli, as without many stimuli the content would be boring and not entertaining enough. Overall, according to participants entertaining or funny posts

were a key reason to appreciate social media food marketing posts. Related to this, the design or lay-out of social media food marketing posts was a frequently mentioned factor to influence appreciation of social media food promotions. Generally, participants liked posts that stood out or grabbed their immediate attention, and twelve (n=12) participants appreciated the usage of bright colours more than dark colours.

Table 4.4. Argumentation regarding adolescents' appreciation of food marketing on social media.

Concept	**Response category**	**Preference of the majority**	**Key factors determining evaluation**
Format	- Video - Photo - No preference	Video	Short videos are preferred as they give possibilities to inform and entertain. Yet, participants take less time to watch traditional-type ads and more time to watch entertainment videos with integrated commercial messages.
Quote (Format)	*"Well, with a typical advertisement, I think a photo is the best. Because for a typical advertisement I wouldn't take the time to watch a whole video. If I can skip a video on YouTube, I always do so. And for indirect advertisements for example with StukTV or Dylan Haegens or something, it is nice in a video. Because I am not going to watch that video to see what they advertise in it. I watch it because I like Dylan Haegens for example, and then I'm actually told indirectly that I should buy it or that it is tasty or whatever."* – Boy, 15 years		
Source & type of content	- Brand - Friend/peer - Influencer/ celebrity	Mixed	Participants had different perspectives on which source is more reliable or trustworthy and mostly base their preference on this.
Quote (Source & type of content)	*"Because with some vloggers, or famous people who promote the product, they get paid for it. Of course, you can bribe people with money. And maybe they will only do it for the money: so they say it's tasty, while they actually don't like it at all. Or they haven't used it at all."* – Girl, 14 years		
Type of product	- Core - Non-core - No preference	Non-core foods	Clear preference for non-core products (i.e., fast food and candy).

Quote (type of product)	*"If I'd see an advertisement with all sorts of fruit and the ad looks pretty nice, and if I would see an advertisement of McDonalds, I would still like the McDonalds one more, even though the fruit advertisement would be thought out better"* – Girl, 13 years		
Appearance & presentation	- Amount of stimuli - Design/ lay-out - Appealing product	Mixed	Appreciation of lay-out: post stands out, is funny, grabs attention, and usage of bright versus dark colours.
Quote (Appearance & presentation)	*"It is often just a bit tastier and more perfect. The strawberries are just a bit redder, and the burgers are just a bit juicier… It does work, you get more excited for it."* – Girl, 15 years		

4.4. Discussion

The current study aimed to qualitatively investigate adolescents' underlying motives regarding their recognition, awareness and appreciation of various types of SMFM. Some adolescents perceived their SMFM exposure as low, or even stated they are never exposed to SMFM. However, several recent analyses have shown that adolescents are being highly exposed to food and beverage advertisements within social media applications [58, 134, 136, 222]. This suggests adolescents may be partly unaware of their high exposure to SMFM.

Overall, factors that determine adolescents' recognition and appreciation of SMFM seemed to be related to the degree to which brands are integrated into entertaining social media content. Adolescents generally seemed to describe food marketing on social media to be more like traditional advertisements such as on TV, i.e., prominent, appealing and professional looking product placements accompanied by clear product information and promotional texts. Yet, they seemed to appreciate and take more time to watch entertaining posts in which brands are highly integrated. Concerningly, these subtle brand placements were often not perceived as advertisements. This is in line with previous qualitative research showing that adolescents were mostly doubtful about the commercial intent of social media messages in which brands were subtly embedded in entertainment [222]. From the HoE perspective, by broadcasting earned, entertaining-embedded food marketing in social media, food marketers seem to elicit an affective phase in adolescents rather than a cognitive, conscious phase through which adolescents are actively aware of the brand content being targeted to them. Alarmingly, marketing practices on social media are increasingly relying on implicit brand placements,

generating automatic processes in adolescents. These processes do not require any cognitive elaboration and hence do not activate any consumer defences such as scepticism [2].

The adolescents in this study seemed to label the more highly integrated branded social media posts as a different type of 'marketing'. Yet, they thought these types of posts may still appeal to people and encourage them to consume, and hence function as 'unofficial' or 'indirect' advertising. Specifically, they assumed that the purpose of random users or friends posting branded food content on social media is to entertain, not to sell products or brands. Particularly when users were no social media influencers and thus had little followers or likes, adolescents perceived them as less professional and hence their post not as typical advertising. However, within social media nowadays any user has the potential to become a social media influencer [224]. In fact, brands seem to be largely interested in collaborating with several social media influencers with relatively little followers rather than one famous celebrity with many followers, as they gain more trust among consumers and thus elicit more positive brand attitudes [68, 228]. This may be concerning, as previous research showed exposure to social media influencer content depicting unhealthy snacks leads to increased intake of these snacks [185].

There was no clear consensus on whether branded food content on social media coming from influencers was typical food advertising, and this often seemed to be determined by how prominently products were featured or endorsed by influencers. This is in line with interpretations of previous research findings. De Jans et al (2020) observed that adolescents' advertising recognition of Instagram posts was equally high for sponsored content posted by brands and by influencers [229]. The authors explain this as the result of prominently featuring the product in both types of posts. Moreover, they attribute higher recognition to the proper disclosing practices used in these posts. Concerningly, in practice influencers do not always properly disclose their commercial intent on social media [136, 230]. This study mostly included branded influencer posts without any sponsorship disclosures. This may indeed have led to confusion about the commercial intent among some adolescents, as some of them mentioned the use of disclosures when describing typical social media influencer food advertising. Yet, the prominence of the product in the post often seemed to be a more decisive factor for adolescents to determine the commercial intent, regardless of any sponsorship disclosure being present. In fact, disclosures, especially the 'Paid Partnership' label, were not always noticed by the adolescents in this study. This may imply that even if the commercial intent would be

made more explicit, it would not increase adolescents' awareness of SMFM per definition. Previous research suggests that current platform-generated advertising disclosures are not sufficient to increase recognition of commercial intent among children [231]. For instance, showing a brand's logo in a platform-generated disclosure in a YouTube influencer video would more effectively increase children's recognition of advertising [231].

Overall, participants appreciated SMFM posts more when they were short videos, instantly grab their attention, are entertaining and informative, professional and of high-quality, and make the product look appealing. This is in line with recent findings by van der Bend et al [222], who found Australian adolescents like short videos, professional posts that are engaging, flashy and stand out [222]. Besides, this study found that adolescents prefer the promotion of non-core foods (i.e., candy and fast food) more than core foods. The preference for unhealthy foods on social media was found in several studies, including the qualitative analysis by van der Bend et al [222], and a quantitative study in which adolescents responded significantly more positively to unhealthy food advertising compared to healthy food and non-food advertising [74]. Concerningly, previous research showed that non-core foods are more often promoted than core foods on social media [58, 134]. Vassallo et al. (2018) found that brands mostly promote their non-core food menus on social media, neglecting alternatives of core alternatives [129]. This may have large implications for adolescent health, as exposure to non-core food marketing was found to stimulate consumption of these foods [10].

Adolescents' preferences for the source of SMFM (i.e., brand, influencer, friend) often depended on trustworthiness. Content from friends was generally considered more trustworthy or reliable than content from brands or influencers, and was therefore generally appreciated by adolescents. In line with this, previous studies have shown that trust in peers is the highest when it comes to consumption or purchase decisions [232]. On the other hand, content posted by friends was seen as less professional and therefore sometimes less appealing to adolescents. The reason why adolescents liked content posted by brands was because they knew the brand and were familiar with their products, and because of their professionality and effort put into the post. This was also concluded by De Jans et al (2020), who found that when adolescents' advertising recognition was high, they perceived brands as more credible than influencers, resulting in greater brand liking. This may be explained by the fact that brands have more expertise and knowledge about their products or service than influencers [229]. However, De Jans et al (2020)

showed that while brands are perceived as more credible than influencers, influencers are viewed as more admirable, resulting in greater brand liking among adolescents, regardless of the adolescents' level of recognition of the advertising intent [229]. The current study indeed showed that influencer content was appreciated more when the influencer had many followers or likes, as this would make their posts more professional, and when the influencer was familiar and likable. This selective appreciation based on influencer liking may have implications. Previous work found that 15-17 year olds who showed having persuasion knowledge and hence were capable of critical reflection regarding SMFM, did not choose to apply this knowledge and hence did not show any negative moral judgements towards influencer content when they had positive feelings towards an influencer [233]. This study showed only a minority of participants had critical viewpoints towards influencer marketing. Namely, some acknowledged that influencers enhance the social pressure felt by teenagers to look fit or slim, and others felt that the influencers' opinion may not be honest when they are sponsored by a brand. Yet, the question is whether adolescents would show an actual 'stop and think' response and cognitive control at the moment of their exposure. Research suggests this so-called situational advertising literacy may be low in adolescents, regardless of their general ability to recognise influencer content, understanding the selling intent and the economic model behind this content [142]. Moreover, in this study adolescents' critical responses were mostly focused on content from influencers they did not know, or influencer content in general. Positive affective evaluations of influencers they already follow and like may make adolescents less critical of influencer marketing [233].

This study has a few limitations. First of all, the stimulus set for the interviews has some drawbacks. Most examples showed non-core food promotions, because substantially more non-core food advertisements were encountered than core food advertisements when selecting the stimulus set. This may have resulted in examples of non-core food being on the top of the participants' minds, impacting their expressed preference for candy and fast food. An additional limitation concerning the selected stimulus set is that screenshots were used, also when examples of videos were shown. Thus, participants did not have full insight into the content of the videos, which might have affected their judgements regarding recognition and appreciation of social media food marketing videos. Furthermore, the participants may have given socially desirable responses because they were being interviewed. Moreover, while adolescents are considered better capable of cognitive control than younger children, and would hence be more critical and

sceptical towards marketing [2], it is questionable whether this 'cognitive control' will be switched on when they are in the moment of scrolling through their social media and looking at highly entertaining content. The current study merely provides insights into adolescents' opinions and the findings do not represent any actual behaviour. Lastly, a drawback of this study is the convenience adolescent sample included. A representative group of Dutch adolescents from different regions was included, yet the sample size limits the generalisation of the findings towards the target group. Future qualitative research among a more culturally diverse sample is needed to explore demographic differences in awareness and appreciation of social media food marketing strategies.

Yet, to our knowledge this is the first study to investigate what criteria adolescents' use to determine whether branded social media posts are typical advertisements and what criteria make they appreciate them more. The results provide underlying reasoning rather than mere insights into adolescents' awareness, recognition or advertising literacy, and focuses on different types of SMFM such as paid, owned, influencer and earned SMFM, on different social media platforms. It is recommended that future research focuses on the association between adolescents' criteria for appreciating and recognising SMFM and their actual consumption behaviour in a real-life setting. Further quantification of these effects is crucial, seeing adolescents' high appreciation of non-core food promotions on social media, and their difficulty to define the commercial intent of earned content post showing highly integrated or hidden food brands. Eventually, it is imperative that adolescents become more resilient to highly entertaining, earned social media advertising messages that promote non-core foods. SMFM has considerable possibilities to influence the dietary intake of adolescents, and several authors have emphasized public health authorities need to act with regulation or social counter-marketing campaigns as a way of combating the digital marketing of unhealthy food and beverages [8, 10, 58, 129, 140, 144, 167]. Although disclosures were not always noticed by adolescents, they seem to play a role in adolescents' recognition of SMFM, and thus should be considered in future marketing regulations.

4.1. Conclusion

In sum, this study showed that adolescents' definition, awareness, and appreciation of SMFM is influenced by the degree to which commercial messages are integrated into social media content. Adolescents generally seemed to doubt the commercial intent of entertaining, earned media in which food brands are inconspicuously presented, while at

the same time they showed high levels of appreciation of this type of content. The adolescents in this study tended to look at sponsorship disclosure in social media but not consistently, and also did not always recognise it, especially when the promoted product was not featured prominently. Concerningly, most adolescents appreciated seeing non-core foods such as candy or fast foods on social media, which may have large implications for their dietary behaviours and health. This research has attempted to contribute to the ongoing debate on how adolescents can become more resilient to commercial messages that promote unhealthy foods and beverages. Adolescents represent the future consumers in the market. In order to protect them, this study concludes that the effects of highly integrated social media advertising formats on adolescents' consumer defence strategies such as scepticism should be further revealed through future quantitative studies.

Can I @handle it? The effects of sponsorship disclosure in TikTok influencer marketing videos with different product integration levels on adolescents' persuasion knowledge and brand outcomes

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Abstract

TikTok influencer videos are becoming increasingly popular for promotional purposes and are appealing to adolescents. Yet, the products' level of integration into the storyline of such videos influences their recognisability as advertisements, which is concerning as they expose adolescents to unhealthy social media food marketing, leading to unhealthy consumption. This study investigated whether a sponsorship disclosure in a TikTok influencer video with different levels of product-plot integration increases adolescents' persuasion knowledge and impacts their brand outcomes. This between-subjects 2 x 2 experiment included 245 Dutch adolescents with a mean age of 13.6 (SD = 1.42). Participants watched a TikTok video in which the brand Doritos was shown passively or integrated into the storyline, with or without a disclosure. The sponsorship disclosure significantly increased recognition of advertising ($F_{(241)}$ = 4.48, p = 0.035) and understanding of persuasive intent ($F_{(241)}$ = 13.28, p = <0.001), regardless of product-plot integration level. Yet, brand attitude and product choice were not affected significantly by the disclosure. Overall, sponsorship disclosure in TikTok influencer videos helps create transparency and increase adolescents' recognition and understanding of commercial and persuasive intent. This study is the first to investigate disclosures in the context of popular short-format social media videos.

Keywords: influencer marketing; social media; TikTok, persuasion knowledge; adolescents; brand outcomes

5.1. Introduction

Adolescents spend an increasing amount of time on online platforms. Almost 99% of Dutch adolescents aged 12-18 years use a smartphone to visit the Internet [220]. The majority of the time adolescents use electronic devices is spent on social media platforms in particular, exposing them to new forms of marketing content that is blurred with entertainment [234]. On social media, marketers apply rather stealth product placements by subtly placing their products into a storyline that distracts adolescents from the commercial intent, for example by using their personal data to connect to their interest and encouraging them to actively engage with the content [1, 168, 193]. Another frequently used product placement technique on social media involves social media influencers who promote products or brands in video blogs (vlogs). Social media product placements are considered fundamentally different from television product placements and much more powerful, as the involvement of influencers has changed the contexts and storylines products are placed in [67, 168]. Influencers can incorporate product placement in various ways, from subtle background placements to prominent integration into the video's storyline (such as using or consuming the product). Adolescents' reactions and perceptions of the marketed product may be influenced by the level of product integration utilized by the influencer [235, 236]. Overall, adolescents may be less resistant and more trusting towards brand promotions from influencers than marketing communications from brands [67].

When influencers are intentionally advertising products in return for free promotional goods or payment, this content is referred to as influencer marketing [67]. Marketers have started to increasingly employ social media influencers in their campaigns. In fact, the influencer marketing industry is set to grow to about $16,4 billion in 2022 [237]. Nowadays any social media user can make money by (re-)creating content and contributing to the marketing of brands. Increased popularity and engagement with their posts may subsequently encourage them to initiate deals with brands that in turn help them post more creative content on their social media accounts [70]. Such nano-influencers typically have 1,000 to 10,000 followers and are much more relatable for adolescents, as compared to world famous mega- or macro-influencers with over 100,000 followers whose lives are much less attainable or realistic [224]. Since social media users view their relationship with influencers as friendship rather than fan ship [238], influencers may play an important role in brand building and increasing the effectiveness of social media brand promotions [239]. Consequently, brands have now

started hiring groups of nano-influencers for their campaigns instead of just one mega- or macro-influencer [224]. Particularly entertaining, short-format influencer videos that have become popular with the rise of social media video platform TikTok and can now also be viewed on platforms such as YouTube, Instagram and Snapchat, are popular for promotional purposes and are highly appreciated and viewed by adolescents [222]. TikTok is the fastest growing social media platform in the Netherlands, according to a 2022 report [240]. However, commercial TikTok influencer videos often blend in with regular entertaining content, making it difficult to recognise them as advertising. This may lower adolescents' awareness of and critical beliefs towards the persuasive intent of these videos [231, 241, 242].

Sponsorship disclosures can make the commercial intent of influencer marketing content more transparent and help adolescents recognise and understand the commercial intent of TikTok influencer marketing videos [110]. Yet, current regulations on the use of disclosures by influencers do not suffice as in practice many social media influencers do still not appropriately disclose commercial intent [71]. Specifically, in the Netherlands stricter legislative rules regarding influencer marketing that are being closely supervised by the Dutch Media Authority were only implemented recently (i.e., 1 July 2022), and cover paid marketing communications by influencers with more than 500,000 followers on TikTok. Thus, the Dutch Media Act does not include influencers with less followers and therefore these smaller influencers rely on self-regulatory guidelines and are not watched as closely [243]. To stimulate policy changes to help adolescents become aware of influencer marketing on TikTok, more research is needed on the effectiveness of sponsorship disclosure, in videos with different product placement levels.

This may be particularly important with regard to food marketing, as this has been argued to have a significant effect on adolescent health. Adolescents are exposed to large amounts of social media food marketing and food content nowadays, including on TikTok [58, 134, 136, 222]. Food promotions on social media were found to be highly appealing to adolescents, especially when they are entertaining, aesthetic, short format videos, and promote energy-dense nutrient-poor (EDNP) foods [222]. Concerningly, the majority of food promotions on social media targeting adolescents were evaluated as EDNP, and this may have the effect of stimulating adolescents' consumption of such foods, hence increasing their risk of obesity [10, 58, 134, 165, 222]. For instance, research showed that social media influencers have a large impact on dietary behaviours in children, i.e., they increased their EDNP food intake when being exposed to less healthy food messages

posted by influencers on Instagram and YouTube [185, 206]. Adolescents are particularly active on TikTok, enjoy short videos, and are susceptible to EDNP food marketing [102]. It is crucial to find ways to increase recognition of the commercial intent of TikTok influencer videos and enhance critical attitudes among adolescents [168, 209].

This research aims to provide new insights into the effectiveness of a sponsorship disclosure in a TikTok influencer video with different levels of product placement, in terms of adolescents' recognition and understanding of and critical beliefs towards the commercial intent and brand outcomes.

5.2. Theoretical underpinnings

5.2.1. Dual processing mechanisms

An individual's processing of advertising messages has frequently been described or explained using dual processing models [99], e.g., Petty and Cacioppo's Elaboration Likelihood Model (ELM) [204]. Dual processing models such as the ELM argue that central (explicit) or peripheral (implicit) processing routes are triggered when individuals are exposed to advertising messages [99, 204]. Implicit processing routes are triggered automatically and without cognitive effort, attention to or awareness of the message, and lead to more impulsive behaviours [2]. Thus, implicit attitudes may be developed without any intentional or explicit memory, and are rather related to increased perceptions of familiarity towards the product, which can result in liking or preferences for the product in the long term, referred to as the mere-exposure effect [235, 244]. Implicit attitudes have been shown to be a good predictor of behaviour [245]. On the contrary, explicit or systematic processing routes require cognitive effort, and lead to better recall and more deliberate decisions [99]. However, higher levels of explicit recall do not necessarily lead to liking or actual purchase or choice of a product [246, 247].

Research suggests that the way persuasive commercial messages are being processed largely depends on the maturity or age of the individual processing them [2]. Consumer and advertising skills undergo significant changes from early childhood to early adolescence [2]. Previous research suggests that younger children under 12 years are more sensitive to less elaborate and hence more implicit processing mechanisms and have more cognitive difficulty processing persuasive messages. Adolescents from 12-14 years are generally more capable of activating knowledge on advertising tactics and critically reflecting on persuasive messages compared to younger children [97].

Specifically, it is assumed that by the age of 16, adolescents' consumer- and advertiser-related skills and experience have reached adult-like levels [97]. Yet, adolescents are still considered a vulnerable group when it comes to processing persuasive messages, as they are more impulsive, socially impressionable, and self-conscious, being in the midst of their identity development [193]. Since conforming to their peer group or to a certain sub culture is important in the adolescent phase, adolescents may be more susceptible to advertising messages that focus on brand-related social status, image, or physical appearance, and to messages embedded within their social networks [2, 102]. Thus, adolescents from 12 years old are at a critical cognitive developmental stage for processing social media messages, and hence this age group is the main focus of the current study. Adolescents' understanding or recognition of persuasive intent, referred to as conceptual persuasion knowledge, can only be increased when they process a message more explicitly and with high cognitive elaboration [2]. This may be a reason why an increasing number of marketers seem to exploit children's and adolescents' underdeveloped consumer skills and intentionally apply tactics designed to influence them through implicit processing mechanisms [10]. Social media has led to a more complex commercial media environment for young people, where marketers use highly integrated tactics, causing advertising, information and entertainment to blend [2]. The level of integration of food cues in advertising may impact how young people process these messages [40]. As such, social media marketing presents new challenges for young people's processing of advertising and may impair their ability to recognise or critically reflect on them [2].

5.2.2. Sponsorship disclosures

Sponsorship disclosures inform consumers about the commercial intent of messages, so that they can distinguish advertising from other (entertaining) content and understand the persuasive intent [248]. Consequently, sponsorship disclosures may help increase consumers' critical beliefs towards the advertisement [249]. Altogether, an individual's ability to activate strategies to defend against persuasive messages is referred to as persuasion knowledge. In the literature this term is used interchangeably with advertising literacy. The concept of persuasion knowledge has frequently been used to investigate young consumers' susceptibility to advertising effects [194, 211]. Having a higher conceptual persuasion knowledge is argued to be the first step towards being able to recognise and understand the persuasive intent of messages. Additionally, being able to develop critical beliefs, or hold a critical attitude towards the persuasive intent of a

marketing message, is referred to as attitudinal persuasion knowledge, and this is suggested to be the second step in developing persuasion knowledge [250]. A higher attitudinal persuasion knowledge was found to negatively impact both brand desire and purchase intention in online social networking games [225, 251]. Moreover, persuasion knowledge can be separated into dispositional and situational persuasion knowledge, i.e., persuasion knowledge in general and in response to a specific instance of sponsored media content, respectively [250].

It has been argued that it is particularly important to use sponsorship disclosures in social media posts involving an influencer or character, as posts by brand accounts would already automatically elicit a higher level of conceptual persuasion knowledge among consumers [209]. However, currently many sponsored influencer vlogs can be published without any disclosure of marketing intent, as in many countries, including the Netherlands, there are no legislative regulations on sponsorship disclosures that cover all social media influencer marketing content targeted to children and adolescents [72, 230, 243].

Previous literature found conflicting evidence regarding sponsorship disclosure effects on adolescents' persuasion knowledge. For example, one study showed that advertising disclosure in sponsored vlogs increased adolescents' recognition of advertising and critical beliefs towards sponsored vlogs [110]. Another study showed that sponsorship disclosures in television marketing enhanced adolescents' understanding of persuasive intent while it did not mitigate persuasion or generate critical attitudes towards the brand [252]. The study authors suggested that sponsorship disclosures may have a fundamentally different effect on adolescents compared to adults, as they would need more opportunities to process brand placements, e.g., through longer disclosure exposure [252]. Yet, evidence on the impact of sponsorship disclosures among adolescents is still limited, especially when used in the popular short-format type videos such as on TikTok, while this could significantly help protect adolescents against the harmful effects of unhealthy food marketing on these types of platforms.

In the current research we focus on a short-format TikTok marketing video involving nano-influencers who promote Doritos. Previous research showed that a 'parasocial connection', i.e., feeling close to a social media influencer without personally knowing them, may impact the effectiveness of an influencer social media marketing post [253]. Hence the peer influencers involved in this study are unknown to the adolescent viewers,

since an already established parasocial connection may influence the effects of sponsorship disclosures differently among participants. Overall, we hypothesize the following:

> *H1: Influencer short-format social media videos with a sponsorship disclosure (vs no disclosure) lead to 1) more negative attitudes towards the brand promoted and 2) lower probability of choosing the product promoted (illustrated in Figure 5.1).*

We expect that these proposed direct associations may be (partly) explained by changes in adolescents' conceptual and attitudinal persuasion knowledge as a result of being exposed to the sponsorship disclosure. First of all, we hypothesize that conceptual persuasion knowledge levels increase as a result of exposure to sponsorship disclosure:

> *H2: Influencer short-format social media videos with a sponsorship disclosure (vs no disclosure) are more likely to lead to higher levels of conceptual persuasion knowledge in adolescents (illustrated in Figure 5.1).*

It has been suggested that young people who are able to understand the intention of persuasive messages are also more critical towards these types of messages [96, 211]. Thus, we hypothesize that conceptual persuasion knowledge positively impacts attitudinal persuasion knowledge.

> *H3**:** Higher levels of conceptual persuasion knowledge in adolescents will lead to an increase in their attitudinal persuasion knowledge (illustrated in Figure 5.1).*

Also, higher levels of persuasion knowledge suggests that more systematic processing is taking place, and this will impact the two outcome measures:

> *H4: When adolescents' attitudinal persuasion knowledge is increased, they 1) have more negative attitudes towards the brand promoted and 2) are less likely to choose the product promoted (illustrated in Figure 5.1).*

Yet, sponsorship disclosures will be most effective in increasing adolescents' conceptual and attitudinal persuasion knowledge when other cues in a persuasive commercial message might not help recognise it as advertising. Therefore, it is expected that the effectiveness of sponsorship disclosures may largely depend on the level of integration of the product or brand into a social media video.

5.2.3. Level of product-plot integration

Previous work suggests that marketing communications can be described along two different dimensions, i.e., 1) the degree to which the sponsor of the message or commercial intention of the message is disguised, and 2) the degree to which the persuasive message is secondary to the main message of communication [254]. Product placement is a marketing communication strategy highly relevant to both television and digital media. It concerns the commercial, unobtrusive integration of a product into other media content [255]. It can be a powerful strategy as it does not explicitly link the product in a scene to a brand or company, and the persuasive message is often secondary to the main communication of the scene. Hence, product placement can often be characterized by its prominence or plot integration [255-257]. Since product placement has a much more stealth nature than traditional advertising (e.g., commercial breaks during a movie), viewers may not immediately recognise the persuasion intent. Hence their persuasion knowledge, which would typically put them on guard in case of traditional advertising, is not enhanced [211].

There are many ways in which influencers can promote a product or brand in their social media videos, i.e., by applying either subtle or more obvious placements. The latter may involve showing, using, or verbally mentioning the product or brand. Specifically, previous studies used the degree of interaction between characters and food products, referred to as character-product interaction (CPI), as a measure for the level of product integration in a commercial message [194, 258]. When brands are being handled or consumed by the main character in the video, also referred to as highly integrated or interactive brands placements, this leads to enhanced explicit memory and recognition of the brand [213]. Movement and higher placement prominence may explain these explicit effects [259, 260]. Moreover, while CPI was found to increase brand recall, it also led to more positive brand attitudes than non-CPI or static placements [119, 194, 213, 235, 258].

Arguably, the effects of increased brand recall and recognition suggest that more explicit or systematic processing is taking place [2], which would expectedly lead to more critical processing. Yet, in the case of CPI, observed positive effects on brand attitude may be attributed to a parasocial connection. When adolescents feel a certain social connection with the influencer, and the influencer interacts with the product, viewers may develop positive attitudes towards the product due to an identification process [119]. On the

contrary, an influencer video may also trigger critical attitudes or beliefs towards the product, depending on the product's level of integration with the storyline of the video [213, 261]. CPI automatically generates a certain level of connection between the product and the plot, but may still involve multiple ways of product use and hence degree of product-plot integration. The extent to which products are connected to the storyline of a message was found to play an important role in its effects [261]. Specifically, messages that become too intrusive, i.e., with a high product-plot integration and thus an obvious focus on the product, are less likely to generate favourable effects on attitudes [261]. Thus, we hypothesized the following:

> *H5: A higher product-plot integration in a short-format social media influencer video leads to 1) more negative attitudes towards the brand promoted and 2) lower probability of choosing the product promoted (illustrated in Figure 5.1).*

Subsequently, we hypothesize that a high product-plot integration already works as a heuristic cue that may increase conceptual persuasion knowledge in adolescents, and therefore a disclosure may have a stronger effect in social media videos with a low product-plot integration. Hence, it is expected that the level of product-plot integration will moderate the sponsorship disclosure's impact on persuasion knowledge, which consequently influences brand attitude and product choice.

> *H6: The level of product-plot integration in a short-format social media influencer video moderates the effect of the sponsorship disclosure (vs no disclosure) on conceptual persuasion knowledge: The sponsorship disclosure has a larger effect when the message has a lower product-plot integration (vs higher product-plot integration) (illustrated in Figure 5.1).*

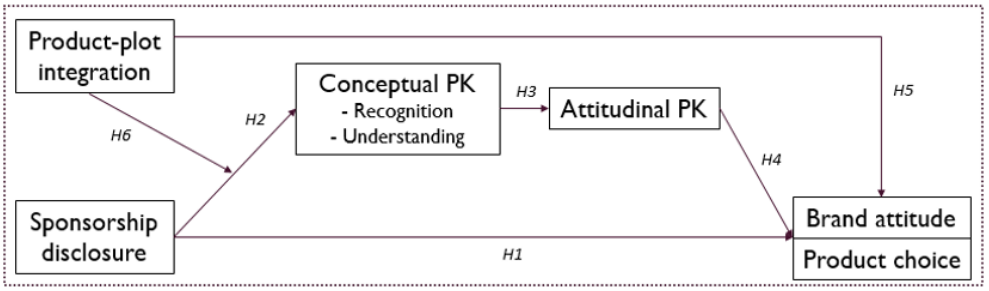

Figure 5.1. Moderated mediation model proposing how social media food marketing messages with a low vs high product-plot integration differently impact the presence of a disclosure of sponsorship on adolescents' conceptual and hence attitudinal persuasion knowledge, consequently influencing brand attitude and product choice. *PK = Persuasion knowledge, H = Hypothesis. "Recognition" = Recognition of advertising, "Understanding" = Understanding of persuasive intent.*

5.3. Methodology

5.3.1. Study design & sample

This school-based experimental study involves a between-subjects 2x2 factorial design, with level of product-plot integration (static placement vs. high plot integration) and sponsorship disclosure (no disclosure vs. disclosure) as the main experimental independent variables. Data were collected from a convenience sample of 262 Dutch adolescents, between 19 April 2022 and 25 May 2022. The experiment was pre-registered in Open Science Framework (OSF) on 24 June 2022, after data collection, before viewing the data and conducting statistical analysis. High school teachers who were informal contacts of the researchers were contacted to recruit participants from the first four classes in high school (i.e., 12-17 years old), as these include all educational levels. Participants were randomly assigned to an experimental condition using block randomisation, with roughly equal amounts of people being exposed to one of four experimental groups (see descriptions in section 2.3) using Qualtrics.

5.3.2. Study procedure

This study was approved by the Social Sciences Ethical Committee of Wageningen University & Research. Participants were not made aware of the study purpose before participation, which was to determine the response to a TikTok influencer marketing video promoting the chips brand Doritos. TikTok is highly popular among the adolescent group, and there has also been much interest in this social media platform for influencer

marketing purposes. Specifically, 70% of marketers identified TikTok as the main social media platform to focus their marketing efforts on, and increased their TikTok influencer marketing by 325% [262].

In a cover story, participants were informed that they were going to watch a 1-minute TikTok video, and that the aim of the study was to investigate their opinions on the TikTok video and on social media in general. Before the study took place in high school classes, parents were also informed about the study through information letters, which gave them the opportunity to object to their child's participation in the study before the data collection took place (i.e., passive consent). On the day of data collection, two researchers visited the school classes and first gave a short explanation to the teachers. They were made aware of the study purpose but asked to not provide any details about this to the students beforehand. After giving a short introduction to a class, students within the class were allocated into groups of 5-8 participants, depending on the length of the lesson and number of students in the classroom. Each group was separated from the classroom where the main lesson was held and led to another empty classroom or study space with no background noise or distractions. Participants were asked to bring their own phones or devices they used for social media, and their own headphones if they had any. The two researchers present during data collection made sure to provide participants with spare headphones if they did not have their own, or chargers in case their phone battery was low. In case participants' phones did not work or there were not enough headphones for Apple or Android phones, researchers provided them with spare Android phones. Next, the researchers provided a QR code which directed participants to a Qualtrics survey on their phone. The first questions in the survey asked participants to give consent to participate in the study. At this point students were able to either accept or decline participation. Next, they watched a video of a compilation of three TikTok videos. They were told to only watch the video once, and then click through to the next page. The time participants spent on the page was measured using the timing function in Qualtrics. On the page after the video, the questionnaire included items on (in order) attention, brand attitude, brand familiarity and regular consumption, conceptual and attitudinal persuasion knowledge, disclosure recognition, brand recall, liking of the video and people in the video, regular watching frequency of short form videos, and demographics (age, gender, educational level). In the end participants saw a message saying the questionnaire had ended, and they were invited to pick one of six crisp brand

flavours as a thank you gift (including the brand and flavour promoted in the TikTok video). This last choice question served as an implicit measure of product choice.

5.3.3. Stimulus material

The video shown to the participants was a compilation of three different TikTok videos that were merged into one video, which took in total 47 seconds. Each individual TikTok video took up about one third of the entire video. The compilation video was created by the researcher, who recorded their screen while scrolling through the three videos in TikTok. The first and third video were the same for all participants and showed a funny animal video and a video with people doing tricks, respectively. The second video was 18 seconds long and the main subject of study, although participants were not aware of this. It was chosen to add a video before and after the main video to make it look more realistic and less static (i.e., participants would get more an idea or feeling of scrolling through TikTok), and disguise the study aim.

The video of main interest for the study - the second in the compilation - was created by 19-year-old communication students. For these students, this was an assignment part of their study curriculum for which they got study credits, and they were experienced in creating TikTok videos. They created the video with input from one of their siblings who was in the target group (girl, 14 years). In the video, two friends of the communication students, a 19-year-old boy and girl, are playing the popular online game 'Among us' against each other on their laptop, while they are sitting next to each other on a couch. A blue bag of Doritos chips, flavour 'Cool American' is placed in between them. Both characters in the video fanatically try to win the game. In the beginning of the video, the text 'Tell me you're competitive without telling me you're competitive' is shown on the screen. This is a popular challenge which originally started on Twitter in 2019, in which people demonstrate or show something without literally explaining it in words or outright saying what they mean [263]. The TikTok video was shot partly from the front and the back of the couch, to be able to show viewers what game the characters were playing.

The video was manipulated in four different ways, and participants were randomly allocated to one of four experimental conditions (see illustrative screenshots of the video in Appendix J):

1. Low product-plot integration: video in which the bag of Doritos crisps is placed in between the two characters and is clearly visible but not touched or consumed. Disclosure: No sponsorship disclosure is shown (Appendix J, Figure 1).

2. High product-plot integration: video in which the bag of Doritos chips is initially placed in between the two characters and is then opened, consumed and thrown by the characters in the video as part of their competition and attempts to beat each other. As a result, the chips are also lying on the laptops of the characters and on the couch. Disclosure: no sponsorship disclosure is shown (Appendix J, Figure 2).

3. Low product-plot integration: video in which the bag of Doritos chips is placed in between the two characters and is clearly visible but not touched or consumed. Disclosure: a sponsorship disclosure is shown (S Appendix J, Figure 3).

4. High product-plot integration: video in which the bag of Doritos chips is initially placed in between the two characters and is then opened, consumed and thrown by the characters in the video as part of their competition and attempts to beat each other. As a result, the chips are also lying on the laptops of the characters and on the couch. Disclosure: a sponsorship disclosure is shown (Appendix J, Figure 4).

All videos played the same tune, which was picked from a list of tunes typically provided by the TikTok app. With regard to the product-plot integration, it was made sure that both videos (low, high) started and ended with the same shot (i.e., the bag of Doritos bag placed in between the characters), and the part in the middle showed a change in plot integration. With regard to the disclosure, previous work recommends certain requirements for disclosures to be effective with regard to generating persuasion knowledge [264]. Namely, they should be visible in text on the screen, in a spot where it is easily noticeable, with clear description of whom is paid by what brand to make the content, and it should be longer than 6 seconds (e.g., 10 seconds) [264]. A disclosure text in Dutch was added to the TikTok video after it was completed, saying “We are paid by Doritos to advertise in this video”. It was prominently shown in the upper centre of the screen, for 10 seconds, and visible 4 seconds after the start of the video. In the first 4 seconds of the video, a voice said ‘Tell me your competitive, without telling me your competitive’, while the same words appeared on the lower centre of the screen. It was chosen to not show both texts (i.e., disclosure and challenge line) simultaneously as this

would create too many stimuli at the same time and could result in participants not fully processing or seeing the disclosure.

Pre-testing of the video was carried out by showing it to three (n=3) teenagers 12-14 years, who were asked to indicate whether they would like the video if they saw it on TikTok, and they confirmed this. After the video was finalized, the researcher posted the video on their own TikTok page and made it public for less than 2 hours. Within this period, 6 likes were generated through different email addresses and contacts of the researcher, after which the video was made private again. Directly after this, the compilation of the three videos was created through screen recording by the researcher. This was done as quickly as possible, as the relatively low number of likes would make more sense when the video was just posted recently, and this would make it look less suspicious to the participants.

5.3.4. Measures

5.3.4.1. Brand attitude

To measure brand attitude, participants were told the brand Doritos was shown in the second TikTok video (in case participants were not able to answer the brand recall question). Next, they were asked for their opinion on the brand Doritos (1=dislike very much, 6=like very much). Additionally, they were asked to order three premium crisps brands (Doritos, Lays, Cheetos) in terms of liking. In this way, the relative liking of Doritos compared to other premium brands was also measured. So, Doritos got the highest score (3) when it was at the top of the list and the lowest score (1) when it was placed at the bottom of the list.

5.3.4.2. Product choice

After the 'official' questionnaire ended, there was one additional survey page on which participants were offered to pick a 'thank you'-gift as appreciation for their participation in the study. They were provided with images of in total six different chips bags of three premium brands (Doritos Cool American and Nacho Cheese, Lays Natural and Bugles Nacho Cheese, Cheetos Chipito and Nibb-its). A choice measure was considered to be relevant to the target group, as adolescents may still depend on their parents to buy things and hence measuring their intentions to purchase chips bags may not be realistic to them. Also, measuring intentions has a limited predictive value with regard to adolescents' actual choices, because they tend to act more spontaneously rather than through deliberative thought [119].

5.3.4.3. Conceptual persuasion knowledge

Two aspects of conceptual persuasion knowledge were measured with four items in total, and according to the same questions used by van Reijmersdal et al (2017), who specifically developed the questions for 13-17 years old Dutch adolescents [252]. Instead of 7-point scales, 6-point Likert scales were used, as adolescents more frequently pick neutral options (e.g., neither agree nor disagree) [265].

First of all, recognition of advertising was measured by asking participants to what extent (1=strongly disagree, 6=strongly agree) they believed the second TikTok video, in which the game 'Among us' was played, was advertisement.

Second, understanding of persuasive intent was measured by asking participants to indicate the extent to which they thought the TikTok video in which the game 'Among us' is played, was made to "make me like the brand", "sell Doritos", and "influence me" (1=strongly disagree, 6=strongly agree). The mean score of the three items was considered a sufficiently reliable measurement of the understanding of persuasive intent, as the value for Cronbach's Alpha was $\alpha = .70$.

For all analyses involving conceptual persuasion knowledge, effects were presented separately for recognition of advertising and understanding of persuasive intent, similar to previous authors [252].

5.3.4.4. Attitudinal persuasion knowledge

Attitudinal persuasion knowledge was also measured in the same way as done by van Reijmersdal et al (2017), with four items, i.e., by asking participants to what extent they agreed to statements about the TikTok video in which 'Among us' is played (1=strongly disagree, 6=strongly agree): "I think the video is "honest" (reversed), "trustworthy" (reversed), "convincing" (reversed), and "not credible". Again, Cronbach's alpha was determined to see whether the mean score of the four items could be used as a reliable measurement of attitudinal persuasion knowledge. Similar to the findings reported by van Reijmersdal et al [252], Cronbach's alpha was relatively low when including the four items ($\alpha = .50$). However, after removing the item "not credible", the Cronbach's alpha value improved to $\alpha = .60$, which was considered sufficient [266]. It is possible that the reverse scale for this particular item confused the participants.

5.3.4.5. Brand recall

Participants were told what the second video was about, i.e., a boy and girl playing the game 'Among us' on the computer. Next, participants were asked whether they recalled seeing any brands in this second TikTok video (Yes/No), and if yes, which brands (0= did not mention Doritos, 1=mentioned Doritos).

5.3.4.6. Control variables

In addition to the mediators and outcomes in the model, several control variables were measured to test randomization, or to check whether the effects of the disclosure and plot integration were not caused by other differences between the experimental groups. *Brand familiarity* was measured by asking participants whether they already knew the brand Doritos before seeing the video. *Regular brand consumption* was measured by asking participants how often they ate Doritos on average (1=never, 2=less than once a month, 3=two to three times a month, 4=weekly, 5=Daily). *Liking of the video and characters* in the video was measured by asking participants to give their opinion (1=dislike very much, 6=like very much) on the following questions: "What do you think of the video in which the game 'Among us' is played?" and "What do you think of the girl and boy in the video?". *Watching frequency of short form social media videos* was measured by asking participants "How often do you watch short form videos on social media (think of TikTok videos, Instagram Reels, Facebook reels, or YouTube Shorts)?". Answer categories were: 1=never, 2=less than once a month, 3=two to three times a month, 4=weekly, 5=Daily. Additionally, participants were asked about their *age*, *gender* and *educational level*. Finally, the *school locations* where the study was conducted were recorded as well.

5.3.4.7. Manipulation check

Participants' recognition or recall of the sponsorship disclosure was measured by asking those who were exposed to a disclosure whether they saw a textual disclosure in the second video, and if so which one, with the following options: the correct disclosure, two random disclosures that were related to the game 'Among us' specifically (i.e., not related to sponsorship or to the challenge 'Tell me without telling me'), and the option "I did not see any textual disclosure in the video".

5.3.4.8. Attention check

An attention check was conducted to determine whether participants paid attention to the experimental TikTok video. Participants were asked to indicate what topics were covered by the three TikTok videos they watched. They could pick three options from a list of six, of which three were referring to the correct three topics, two included imaginary topics and one "I don't know". Participants who did not select the topic of the experimental video (i.e., "A video in which a boy and girl play a game on the computer") as one of the three options, regardless of the other options they picked, were excluded from the analyses (n=17).

5.3.5. Data analysis

Statistical analysis was conducted using SPSS Version 28.0.1.1. Participants who had not finished the survey up to and including the demographic questions (age, gender, educational level) were excluded (n = 9); participants who completed all questions except for product choice were included, and product choice was set as missing.

With regard to manipulation effectiveness, it was checked whether participants who were exposed to the disclosure (i.e., two experimental groups) had actually seen the (correct) disclosure. A similar approach was used by van Reijmersdal et al [252] and Boerman et al [249].

Furthermore, before testing any of the main hypotheses, randomization was checked, by performing Chi Square analyses or analyses of variance to see whether the four experimental groups differed significantly with respect to gender, age, educational level, school location, brand familiarity, regular brand consumption, relative brand attitude, liking of the video and characters, attention to the video, and watching frequency of short form videos on social media. Tests were considered significant when $p < 0.05$. Based on this, it was decided which covariates were added into the models that were used to test the hypotheses.

To assess how the sponsorship disclosure impacts brand attitude (H1), its main effect was determined in a two-way ANOVA, in which sponsorship disclosure and level of product-plot integration were entered as independent variables and brand attitude as outcome. To determine the disclosure's impact on product choice, logistic regression was performed. Furthermore, the disclosure's effect on conceptual persuasion knowledge

(i.e., recognition of advertising and understanding of persuasive intent) was assessed using a two-way MANOVA (H2).

To test mediation effects by conceptual and attitudinal persuasion knowledge in serial (H3 and H4), Model 80 of the PROCESS version 4.1 in SPSS [267] was applied. Thus, it was determined how a sponsorship disclosure (vs no disclosure) shown in an influencer short-format social media video impacts adolescents' conceptual persuasion knowledge, and consequently attitudinal persuasion knowledge, and to what extent attitudinal persuasion subsequently affects brand attitudes and product choice.

The main effect of level of product-plot integration on brand attitude (H5) was assessed by means of a two-way ANOVA, and its impact on product choice was tested by means of a logistic regression.

To test H6, i.e., the moderating effect of level of product-plot integration on the association between sponsorship disclosure and conceptual persuasion knowledge (i.e., recognition of advertising and understanding of persuasive intent), a two-way MANOVA was conducted, with the interaction term as independent variable.

Lastly, to examine whether the effects of a sponsorship disclosure on conceptual, attitudinal persuasion knowledge, and consequently brand attitudes and product choice differ for levels of product-plot integration, a moderated multiple mediation analysis was conducted using PROCESS Model 85 [267]. Since this moderated mediation model does not allow for parallel mediators, as the first mediator recognition of advertising and subsequently understanding of persuasive intent were put into the model in separate analysis, for the two outcome variables.

5.4. Results

5.4.1. Sample characteristics and randomization check

A total of 245 Dutch adolescents with a mean age of 13.6 years (SD = 1.42) participated in the study (Table 5.1). None of the (parents of the) adolescents declined participation. The sample included 128 girls, 111 boys, and 6 indicated 'other' gender. Most participants followed a university preparatory educational level (59%). Furthermore, a large proportion of the sample was from high schools located in Amsterdam (43%) and Wageningen (43%).

The four experimental groups did not differ significantly ($p < .05$) with respect to age, $F_{(3, 241)} = .731$, $p = .534$, gender, $\chi^2_{(6)} = 4.982$, $p = .546$, educational level, $\chi^2_{(6)} = 2.358$, $p = .884$, brand consumption frequency, $F_{(3, 241)} = 1.724$, $p = .163$, watching frequency short-format videos, $F_{(3, 241)} = 1.415$, $p = .239$, school location, $\chi^2_{(12)} = 4.182$, $p = .980$, liking of the video, $F_{(3, 241)} = 1.085$, $p = .356$, liking of the characters, $F_{(3, 241)} = 1.599$, $p = .190$, relative brand liking, $F_{(3, 241)} = .158$, $p = .925$, brand familiarity, $\chi^2_{(3)} = 6.410$, $p = .093$. Therefore, it was concluded that the experimental groups were successfully randomized, and none of the control variables were added as covariates to the analyses.

5.4.2. Manipulation check

Of all 120 participants exposed to the sponsorship disclosure (49%), 46% ($n = 55$) had recognised the correct disclosure, 18% ($n = 21$) chose one of the two alternative, incorrect disclosures, and 37% (n = 44) said to have not seen any textual disclosure.

5.4.3. The effects of sponsorship disclosure

Direct effects of sponsorship disclosure on the measures of persuasion knowledge and brand outcomes are presented in Table 5.2. With regard to H1, it was found that the sponsorship disclosure did not significantly affect **brand attitude** ($F_{(241)} = 0.02$, $p = 0.894$). Also, the presence of the disclosure did not significantly decrease probability of **product choice** ($b = .04$, $OR = 1.04$, $p = .894$), compared to no disclosure (-2 Log Likelihood = 244.68, Nagelkerke $R^2 = 0$, $\chi^2_{(1)} = .02$). Thus, H1 was rejected. Logistic regression showed a significant and positive effect of disclosure on brand recall ($b = 2.04$, $OR = 7.71$, $p = < .001$), compared to no disclosure (-2 Log Likelihood = 283.2, Nagelkerke $R^2 = .274$, $\chi^2_{(1)} = 56.34$).

Table 5.1. Characteristics of the total sample and for each experimental condition (i.e., level of product-plot integration, sponsorship disclosure).

		Low product-plot integration		High product-plot integration	
	Total sample	**No disclosure**	**Disclosure**	**No disclosure**	**Disclosure**
N	**245**	**62**	**61**	**63**	**59**
Age in years, M (SD)	13.6 (1.42)	13.7 (1.37)	13.7 (1.43)	13.7 (1.45)	13.4 (1.41)
Gender, n (%)					
Male	128 (52)	30 (48)	29 (48)	36 (57)	33 (56)
Female	111 (45)	31 (50)	29 (48)	25 (40)	26 (44)
Other	6 (2)	1 (2)	3 (5)	2 (3)	0 (0)
Educational level, n (%)					
Preparatory vocational	19 (8)	7 (11)	3 (5)	4 (6)	5 (8)
Senior general	81 (33)	18 (29)	22 (36)	21 (33)	20 (34)
University preparatory	145 (59)	37 (60)	36 (59)	38 (60)	34 (58)

For H2, the analyses demonstrated that sponsorship disclosure had a significant, positive effect on the two measures of conceptual persuasion knowledge (Wilk's Lambda = 0.95, $F_{(240)} = 6.65$, $p = 0.002$, $eta^2 = 0.052$), as it increased both **recognition of advertising** ($F_{(241)} = 4.48$, $p = 0.035$) and **understanding of persuasive intent** ($F_{(241)} = 13.28$, $p = <0.001$). This is in line with our hypothesis.

PROCESS analyses conducted to assess the mediation effects proposed in Figure 5.1 showed no *indirect* effects on **brand attitude** via recognition of advertising, understanding of persuasive intent, or attitudinal persuasion knowledge, or via either

recognition of advertising or understanding of persuasive intent in serial with attitudinal persuasion knowledge (Table 5.3).

Table 5.2. Means of recognition of advertising, understanding of persuasive intent, attitudinal persuasion knowledge, brand attitude, and frequencies of product choice and brand recall for the disclosure conditions.

	Total sample	**No disclosure**	**Disclosure**
N	**245**	**125**	**120**
Recognition of advertising, M (SD)	3.81 (1.25)	3.65 (1.15)	3.98 (1.33)***
Understanding of persuasive intent, M (SD)	3.95 (1.06)	3.72 (1.09)	4.2 (0.97)*
Attitudinal persuasion knowledge, M (SD)	4.0 (0.91)	4.11 (0.91)	3.90 (.89)
Brand attitude, M (SD)	4.88 (.80)	4.90 (0.79)	4.88 (0.83)
Product choice, n (%)[a]	50 (21)	25 (21)	25 (21)
Brand recall, n (%)	125 (51)	35 (28)	90 (75)***

[a] n=7 missing values for this variable, percentages are calculated based on all non-missing cases.
*Significantly different compared to no disclosure: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Overall, the disclosure did not have a significant *total* effect on **brand attitude** in the total sample. Thus, mediation effects of disclosure on **brand attitude** were not in line with our hypotheses H3 and H4.

Additional mediation analyses regarding H3 and H4 showed a significant, positive *indirect* effect of disclosure on **product choice**, via understanding of persuasive intent (effect = .20, boot se = .11, CI .01; .45), which is the opposite effect of what was hypothesized. Furthermore, *indirect* effects of disclosure on **product choice** via either recognition of advertising or understanding of persuasive intent in serial with attitudinal persuasion knowledge, were not significant (p > 0.05). Thus, the proposed mediation

effect of conceptual persuasion knowledge and subsequently attitudinal persuasion knowledge was not supported.

Table 5.3. Mediation effects of disclosure on brand attitude and product choice in the total sample, via either recognition of advertising or understanding of persuasive intent, and attitudinal persuasion knowledge.

Type of effect	Independent variable	Mediator	Outcome variable	*b*	SE	BCA95 %CI
Direct	Disclosure	-	Brand attitude	-0.02	0.11	-0.23; 0.19
			Product choice	-0.07	0.33	-0.72; 0.58
Indirect	Disclosure	Recognition of advertising > attitudinal persuasion knowledge	Brand attitude	0.002	0.003	-0.001; 0.01
			Product choice	-0.005	0.008	-0.02; 0.006
Indirect	Disclosure	Understanding of persuasive intent > attitudinal persuasion knowledge	Brand attitude	-0.001	0.003	-0.01; 0.03
			Product choice	0.004	0.01	-0.01; 0.03
Total	Disclosure		Brand attitude	-0.01	0.10	-0.22; 0.19
			Product choice	-	-	-

SE = standard error; BCA95%CI = bias corrected and accelerated 95% confidence interval.

5.4.4. Level of product-plot integration

Table 5.4 shows the means of the measures of persuasion knowledge and brand outcome variables, for the two conditions of product-plot integration. With regard to H5, level of product-plot integration was found to have no significant effect on **brand attitude** ($F_{(241)}$ = .52, p = .473) and **product choice** (b = -.059, OR = .943, p = .854). Furthermore, no significant effect was found of product-plot integration on brand recall (p < .05).

Also, no significant effect was observed of the level of product-plot integration on recognition of advertising and understanding of persuasive intent: Wilk's Lambda = .99, $F_{(240)} = 1.02$, $p = .364$, $eta^2 = .008$. Regarding H6, the interaction effect of the disclosure and level of product-plot integration on **recognition of advertising** and **understanding of persuasive intent** was not significant (Wilk's Lambda = .98, $F_{(240)} = 2.90$, $p = .057$, $eta^2 = .024$). Thus, the disclosure did not have a significantly larger effect on the two conceptual persuasion knowledge measures when used in a video with a low product-plot integration, compared to the video with a high product-plot integration. Therefore, H6 was not supported. Figure 5.2 shows all direct effects of disclosure, moderated by level of product-plot integration, on all mediators and outcomes.

The mediation analysis on the effects showed no significant indirect effect of the interaction of disclosure and level of product-plot integration via the measures of persuasion knowledge on **brand attitude** and **product choice** (Table 5.5)**.**

Table 5.4. Means of recognition of advertising, understanding of persuasive intent, attitudinal persuasion knowledge, brand attitude, and frequencies of product choice for the conditions of product-plot integration.

	Total sample	Low product-plot integration	High product-plot integration
N	**245**	**123**	**122**
Recognition of advertising, M (SD)	3.81 (1.25)	3.83 (1.31)	3.80 (1.20)
Understanding of persuasive intent, M (SD)	3.95 (1.06)	4.04 (1.03)	3.87 (1.08)
Attitudinal persuasion knowledge, M (SD)	4.0 (0.91)	3.95 (0.89)	4.06 (0.92)
Brand attitude, M (SD)	4.88 (0.80)	4.92 (0.75)	4.84 (0.85)
Product choice, n (%)[a]	50 (21)	26 (21)	24 (21)
Brand recall, n (%)	125 (51)	58 (47)	67 (55)

[a] n=7 missing values for this variable, percentages are calculated based on all non-missing cases.
*Significantly different compared to no disclosure: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

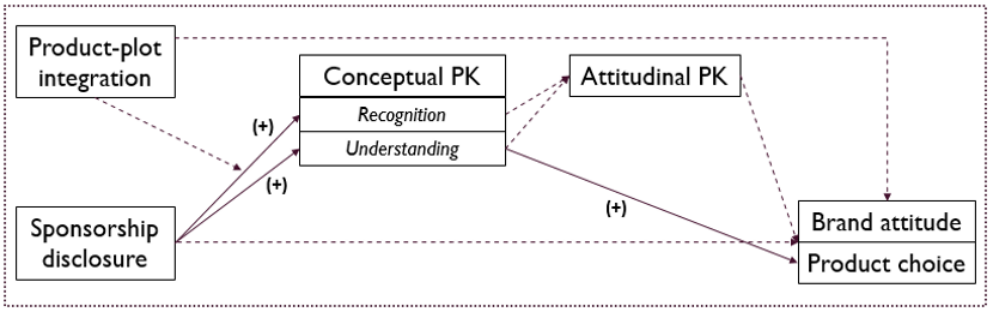

Figure 5.2. Overall moderated mediation model showing all direct, significant effects ($p < 0.05$) of level of product-plot integration and presence of a disclosure of sponsorship on adolescents' conceptual and attitudinal persuasion knowledge, and on brand attitude and product choice.
PK = Persuasion knowledge, H = Hypothesis. "Recognition" = Recognition of advertising, "Understanding" = Understanding of persuasive intent. (-) Significant negative effect, (+) Significant positive effect. Dotted line = no significant effect.

Table 5.5. Moderated mediation effects of disclosure on brand attitude and product choice, via either recognition of advertising or understanding of persuasive intent, and attitudinal persuasion knowledge, by level of product-plot integration.

Type of effect	Independent variable	Mediator	Outcome variable	*Modmed index*	SE	BCA95%CI
Direct	Discl * integr	-	Brand attitude	0.01[a]	0.21	-0.40; 0.42
			Product choice	0.24	0.65	-1.04; 1.53
Indirect	Discl * integr	Recognition of advertising > attitudinal persuasion knowledge	Brand attitude	0.002	0.003	-0.003; 0.01
			Product choice	-0.004	0.009	-0.03; 0.008
Indirect	Discl * integr	Understanding of persuasive intent > attitudinal persuasion knowledge	Brand attitude	<0.001	0.002	-0.004; 0.003
			Product choice	<0.001	0.005	-0.009; 0.01

Discl. = Disclosure; Integr. = Level of product-plot integration; Modmed index = moderated mediation index, which is an unstandardized regression coefficient of the moderated mediation effect; SE = standard error; BCA95%CI = bias corrected and accelerated 95% confidence interval.

[a] Unstandardized b-coefficient

5.5. Discussion

5.5.1. Main findings of this study

The current study investigated the effect of the presence of a prominent sponsorship disclosure in a TikTok influencer marketing video with a low versus high product-plot integration of the chips brand Doritos into the storyline on adolescents' persuasion knowledge, and consequently their attitude towards the promoted product, and product choice. Overall, the analyses demonstrated that the disclosure had significant direct and indirect effects on some of the mediators and outcomes measured in this study, while the level of product-plot integration did not have any significant direct or indirect effect. No moderation effect of product-plot integration on the relationship between sponsorship disclosure and the mediators and outcomes was observed.

5.2.1.1. Sponsorship disclosure

The current study investigated a textual, prominent sponsorship disclosure, which was placed in the upper part of the TikTok video for a duration of 9 seconds. This disclosure was developed in line with sponsorship disclosure criteria that were established previously by other authors [264], who also provided specific suggestions for the wording. This study's findings showed that, with regard to direct effects, the disclosure had a significant and positive impact on conceptual persuasion knowledge (i.e., both recognition of advertising and understanding persuasive intent), and thus made the advertising and persuasive intent more transparent to the adolescents. These effects are in line with several previous studies on television or online marketing that showed a positive impact of disclosure on conceptual persuasion knowledge, including recognition of advertising and/or understanding of persuasive intent [110, 209, 231, 249, 252, 268-270]. Some of these studies also found effects of the disclosure on attitudinal persuasion knowledge and/or brand attitudes. However, in the current study neither the disclosure nor a higher conceptual persuasion knowledge led to an increase in attitudinal persuasion knowledge and/or decrease in brand attitude. This contradicts the notion that an increase in conceptual persuasion knowledge as a result of exposure to sponsorship disclosure helps adolescents to cope accordingly with an advertisement through attitudinal persuasion knowledge [4], and hence mitigate brand attitude effects that lead to behavioural changes [249]. However, the findings showed that attitudinal persuasion knowledge and brand attitude were already relatively high across all conditions, and around 1/5 of the sample or more chose the product promoted, which is relatively high

as there were six products to choose from. The fact that attitudinal persuasion knowledge was already high regardless of the manipulation may be explained by the experimental setting; participants were likely to be more on guard than when they use TikTok in a real-world setting. Regarding the high brand attitude, this may be attributed to the fact that brands play a particularly relevant role in adolescents' lives, as they strive to develop their own identity and are sensitive to achieving social status [102, 271]. Adolescents may already have strong brand attitudes towards Doritos, as it could have an important social meaning and therefore help adolescents 'fit in' into their peer group. Hence, adolescents could have had relatively positive implicit associations with Doritos, and rather followed gut reactions that guided them to a certain product choice [272, 273]. Hence, brand attitude and product choice may not have changed significantly by exposure to just one TikTok video.

Several studies have found conflicting results when it comes to the disclosure's ability to mitigate persuasion [209, 210, 252, 270]. Like this study, van Reijmersdal et al (2017) concluded that a disclosure on television only had limited effects on persuasion knowledge, and did not mitigate persuasion [252]. Another study conducted among individuals in early (12-14 years) and mid (15-16 years) adolescence observed that the adolescent phase participants are in is crucial with respect to the effectiveness of a disclosure [210]. Namely, the authors suggest that in early adolescence more explicit information on advertising and intention of a post is needed for the disclosure to increase their conceptual persuasion knowledge than in mid adolescence, as older adolescents will have an increased understanding of influencers' persuasive intent just by showing a disclosure of advertising [210]. This supports other literature, which suggests adolescents' consumer and advertising skills to be underdeveloped until the age of 16, and that younger adolescents have less well-developed persuasion knowledge [274]. Those findings may partially explain the non-significant findings for attitudinal persuasion knowledge in the current sample. Most participants in this study (73%) were in early adolescence (12-14 years), which may explain the fact that no mitigation of persuasion took place, i.e., no significant changes in attitudinal persuasion knowledge, brand attitude and product choice were observed.

Regarding indirect effects of the disclosure on any of the outcomes, this study observed one remarkable effect in the total sample. Namely, it was observed that the disclosure led to a significantly higher chance of choosing the Doritos product, indirectly via a higher understanding of persuasive intent, which was the opposite of what was expected.

However, it should be noted that this effect was relatively small (effect = .20, boot se = .11, CI .01; .45). Interestingly, previous research suggests that influencers' clear communication about the advertising intent of their posts by using a sponsorship disclosure increases credibility of the influencer [275, 276]. Thus, followers may perceive influencers as more credible when they display advertising status, and this impacts their purchase intention positively [275, 276]. Thus, it is worthwhile to consider the conflicting effects that disclosures may have when used in the case of influencer posts. For example, disclosures may lead to higher persuasion knowledge and more negative product outcomes, or they may be a sign of transparency and trustworthiness and lead to more favourable product outcomes. Similarly, other work suggests that in case of stealthy product placements, such as sponsored influencer posts, being transparent about the posts' advertising nature, regardless of the commercial relationship, may result in less feelings of deception and consequently less negative consumer responses [268, 277].

5.2.1.2. Level of product-plot integration

The non-significant effects found for level of product-plot integration were not in line with previous studies on the effect of product-plot integration [235, 261]. Based on literature, it was expected that, if adolescents do not know certain influencers, then they have not developed any parasocial connections towards these influencers yet, and hence a high product-plot integration would lead to higher levels of persuasion knowledge and more negative attitudes towards the product and lower chance of product choice, compared to a low product-plot integration. It is possible that the plot integration manipulation was not successful, as none of the mediators and outcomes were significantly impacted.

Similar to the findings by Hoek et al (2020), it could have been that the relatively equal product prominence in the low versus high product-plot condition led to non-significant differences in effects between the two conditions [278]. Brand recall was found to be already relatively high in the low product-plot condition (i.e., 47%) and differed non-significantly from the high product-plot condition (i.e., 55%). It may be that exposure to a package of the brand Doritos in both conditions, in an equally prominent manner, led to relatively similar participant responses. Indeed, it was made sure that in both conditions the Doritos package and logo was equally well visible or close to the camera and shown in the video in equal duration, to make sure that one of these factors would not affect the actual manipulation to be studied, i.e., the degree to which the product was integrated into the plot.

Furthermore, the large amount of information that adolescents were exposed to when watching the TikTok video could have affected the results. Specifically, in case of cognitive overload, a message will most likely not be processed at all, or merely automatically [279]. Specifically, it is argued that younger adolescents are unable to 'stop and think' when they are overloaded with other elements related to a persuasive message, which limits their cognitive capacities [4]. According to the 'stop and think theory', for adolescents to use their persuasion knowledge as a critical defence, they need to first be able to stop to recognise and understand that the video is an advertisement. Secondly, they need to think about the commercial content which helps create potential critical beliefs to defend themselves [4]. The adolescents in this study may have been exposed to an overload of elements whilst watching the TikTok video. First, adolescents may have looked at the caption of the video, and the amount of likes and comments on the video which could have limited their cognitive capacity to think about the commercial content. Additionally, a woman's voice (i.e., default voice in TikTok) said *"Tell me you're competitive without telling me you're competitive"*, while the text was on screen. Previous research showed that memory is greater when a stimulus is spoken, as auditory information is more meaningful and thus processed more elaborately than visual information [261]. Participants may have been distracted by the voice and may not have paid sufficient attention to the disclosure. Additionally, the effect of the experimental video may have been attenuated as participants could have been distracted by the two other TikTok videos shown before and after the experimental video. At the same time, this is a true representation of TikTok, where adolescents are exposed to a blend of entertaining content and information within a very short period of time.

5.5.2. Strengths & limitations

Several studies have been published on influencer marketing and its effects in both television and digital media. To our knowledge, this is the first study to investigate the impact of TikTok influencer marketing on persuasion knowledge and brand outcomes in adolescents. The research setting of this experiment aimed to represent a real world experience of using TikTok as optimally as possible by showing adolescents a compilation of three TikTok videos, presented in a screen recording video. Yet, this setting did not allow adolescents to scroll through the three TikTok videos themselves, as these were presented via a video in a Qualtrics questionnaire rather than a TikTok app. As a consequence, adolescents may have paid more of attention to the video than in a real-life situation, as they had to watch the entire video without being able to scroll to the next

TikTok video. This may have led to more critical evaluations of the video. Alternatively, the adolescent participants may have been distracted by the unconventional experimental setting, i.e., the gathering of small groups of students who were guided to a separate classroom, and who were allowed to use their own phone for the study. Also, participants may have distracted others while completing the survey. Yet, the study took place in a social setting, i.e., among other peers, and this may also reflect the setting in which adolescents sometimes scroll through their social media.

Another drawback of this study is related to the manipulation of the independent variables in this study. First of all, the effectiveness of manipulating product-plot integration was not pre-tested and also no manipulation check was conducted afterwards. Moreover, a disclosure manipulation check was only performed for the group that was exposed to the disclosure. While it was observed that only a sub-group (46%) of the adolescents who were exposed remembered the correct disclosure, analyses were still conducted on the full sample. It was chosen to do no additional analyses on the sub-group, as it would have been a significantly smaller group compared to the control group, and comparison of this sub-group to the control group for which this manipulation check was not performed could result in bias. Namely, it could lead to selection of adolescents who were relatively more alert and hence potentially had a higher persuasion knowledge. Yet, one could question whether a manipulation check can fully reflect the effectiveness of a manipulation, as priming research shows that cues, in this case sponsorship disclosures or level of product-plot integration, are not always processed consciously but can drive individuals' decisions regardless [280].

Besides that, the way the survey was presented may have influenced the participants' responses. Namely, after the brand recall question participants were told that Doritos was shown in the second video. Also, all follow-up questions were about the second video in particular. This may have influenced advertising recognition or other persuasion knowledge measures.

This study also has some limitations regarding the adolescent sample and its representativeness of the adolescent group as a whole. Firstly, the sample was not equally distributed across educational levels, since the minority of adolescents (8%) followed a preparatory vocational secondary educational level. Persuasion knowledge may be affected by educational level, i.e., higher education was shown to be associated with more critical thinking [250]. Hence, a more representative group of adolescents would have

allowed for better comparisons across educational levels. Furthermore, most adolescents included in this study were 14 years or younger. Age may have a large impact on adolescents' processing skills and persuasion knowledge [2, 250], and hence future studies could consider including both a balance of younger and older adolescents.

Another drawback of this study is related to the brand that was chosen for the experimental video. As mentioned earlier, the adolescents in this study generally had a positive brand attitude towards Doritos. Relative brand attitudes towards Doritos (i.e., compared to Cheetos and Lays) was also high, as only 8.6% of adolescents expressed Doritos to be their least liked brand. Thus, Doritos was a popular brand among adolescents, and they may have had pre-existing preferences or associations with Doritos, which could have been deeply ingrained. This could explain the insignificant direct and indirect effects found on brand attitude and product choice. Future studies could account for existing brand attitudes by either measuring these with ample time before exposing participants to the experimental video, or by measuring brand attitudes towards different food brands in a different sample that is large enough. Ideally, one would select a food brand with rather neutral attitudes. Future studies could also investigate the effects of unknown or fictitious brands, or even unbranded, generic products, to account for the relation between brand familiarity and product choice, and brand attitude. Additionally, product choice may have been affected by taste preference (i.e., Doritos Nacho Cheese and Lay's Naturel are incomparable flavours). Therefore, future studies could also consider taste preferences as a control variable. Moreover, it can be of interest for future studies to include other (savoury) snacks in the choice measure. By adding in different snacks, adolescents' general impulsivity towards crisps can be measured. Despite all above considerations, by choosing a rather implicit measure of product choice, i.e., presenting Doritos as an appreciation gift after participation in the study, this fits well with the increased impulsivity that characterizes the adolescent phase [102].

5.5.3. Conclusions and implications

It can be concluded that the presence of a textual sponsorship disclosure increases transparency of the commercial and persuasive intent of a TikTok influencer marketing video, as adolescents were better able to recognise that the video was an advertisement, and understood better that the video had a persuasive nature. These effects were found regardless of a low or high integration of the product into the storyline. This suggests that

social media food marketing policies requiring sponsorship disclosure could be an effective first step towards creating more transparent TikTok influencer food marketing content. Specifically, it is recommended that brands and influencers aiming to advertise on TikTok apply a clearly visible textual disclosure in a similar, prominent manner as applied in the current study. This is particularly essential as current TikTok influencer practices do not seem to provide enough transparency on commercial intent [281]. Influencer content should integrate sponsorship disclosures, since marketing communications coming from brands already sufficiently signal their persuasive intent [209]. Particularly nano-influencers with lower numbers of followers currently do not fall under the Dutch influencer marketing regulations, and should therefore be required to also use disclosures. Yet, the current study found that increased transparency by the disclosure did not lead to more critical beliefs, attitudes, or altered product choice in adolescents. This suggests that, as posed by other theories, adolescents have more difficulty processing brand placements, as a result of their limited executive functioning skills (i.e., limited critical reflection or 'stop and think' response), and their identity formation and related susceptibility to social image, social status and brand symbolism [4, 97, 102, 252]. Yet, it is essential that research is continued on other, more optimal disclosure formats (e.g., wording, modality, duration, location) that increase transparency and subsequently generate behavioural impact. Moreover, investigating factors such as source (i.e., type of influencer) or type of product (i.e., generic, fictitious brand), along with disclosure effects may provide additional insights into the effectiveness of disclosures on TikTok. To our knowledge, the current research provides the first available evidence to inform future policies on the effects of protective sponsorship disclosure in popular short-format social media marketing videos targeted to adolescents. However, the current research also suggests that such policies may not be enough to mitigate persuasion, and perhaps the alternative policy focus should aim to protect adolescents against exposure to unhealthy food cues by restricting the promotion of unhealthy foods and beverages through brands and influencers on TikTok.

General discussion

6.1. Recap

A large body of evidence shows that marketing efforts are primarily focused on promoting energy-dense, nutrient-poor (EDNP) foods [76]. Concerningly, this may enhance adolescents' positive attitudes towards, preferences for and intake of these foods [10, 282]. As such, EDNP food marketing largely contributes to adolescents' obesogenic food environment, and this has significant implications for their health in the long term [76].

Over the past decades, the rapid rise of social media platforms has created many more possibilities for food marketers to employ engaging, personalised food marketing communications that are embedded in social networks and influencer content, hence blurring the lines between entertainment and advertising [1, 6]. Adolescents are highly active on social media, and therefore food marketers are particularly interested in targeting this age group on such platforms [6]. While adolescents from about 13 years old are hypothesized to be more critical towards food marketing as they have a more developed brain than younger children, they are still considered vulnerable to food marketing messages in different ways to younger children [38]. Namely, when exposed to SMFM within their social media networks, they are more sensitive to social and peer influences [38, 103]. Yet, research on the nature, extent and impact of SMFM is still in its infancy. The currently limited evidence on SMFM effects delays the implementation of evidence-based interventions to reduce the impact of adolescent-targeted EDNP food marketing on social media [63, 140, 168].

With the urgency to further explore adolescent-targeted SMFM, this thesis substantially expands the existing literature with evidence on SMFM nature, extent and impact in the adolescent group. The findings described in Chapters 2-5 are based on original research studies, which may directly inform other research within this area, but also policymakers who develop regulations to restrict minors' exposure to EDNP food marketing. In short, the studies in this thesis confirm that adolescents are exposed to large amounts of branded and unbranded EDNP food promotions on their favourite social media platforms. Moreover, they do not seem to be critical towards most of these promotions, as they are perceived to be highly entertaining and coming from trusted people in their social networks (i.e., peers and influencers). Yet, sponsorship disclosure may have the potential to help adolescents recognise and understand commercial and persuasive intent of these food promotions. The following section discusses the main findings of Chapters 2-5 in relation to the research questions (RQ) posed at the end of Chapter 1.

6.2. Overview of the main findings and conclusions

Chapter 2 addresses **RQ1** ("*How is SMFM defined, why is it so effective in targeting adolescents, and what future research- and policy directions are recommended regarding its effect on the adolescent group*"). The findings of this qualitative study, which involved expert interviews, showed that defining SMFM is less straightforward than for traditional media. This is because not only brands, companies and commercial organizations but also consumers can contribute to SMFM content. User-generated and unbranded food content are generally not considered SMFM. Prominent, branded content is more likely to be viewed SMFM, but ultimately sponsorship disclosure is key to identifying SMFM. Factors that make SMFM particularly effective in influencing adolescents are their individual traits (e.g., identity formation, independence, impulsivity), social environment (e.g., peers, influencers), physical environment (e.g., buying power, online access), regulations at country level, and SMFM features (e.g., personalisation, entertainment, role models, interaction). Altogether, these factors predispose adolescents to process SMFM subconsciously – most of the time they may not even be aware of its presence. The evidence base is very limited, and more research should focus on expanding evidence on SMFM exposure, engagement and impact specifically related to adolescents, but also provide in-depth qualitative insights from the adolescent group. Policies should include mandatory restrictions on EDNP food marketing on social media targeting adolescents and enforce the use of sponsorship disclosures. School education on nutrition and advertising or consumer skills should be updated to include contemporary SMFM.

Chapter 3 addresses **RQ2** ("*What unbranded and branded food content are adolescents exposed to on their favourite social media platforms?*") and **RQ3** ("*What are adolescents' opinions and views on social media food marketing in terms of appreciation, awareness and recall?*"). This multi-method study showed that Australian adolescents are exposed to large amounts of EDNP, entertaining and influencer-generated food promotions on social media. The majority is unbranded, but of all influencer content that is branded, only a small minority seems to disclose any sponsorship. While adolescents seem to doubt the intent of food promotions that are subtly integrated into entertainment, at the same time they highly appreciate these types of food promotions. Also, adolescents like EDNP, high-quality, influencer or peer-generated social media food promotions that stand out and are shown in short-form videos. EDNP food promotions are recalled more frequently than healthier food

promotions. In summary, Chapter 3 adds important objectively measured evidence to the currently limited literature and shows that adolescents are exposed to a large amount of EDNP, entertaining and influencer-generated food promotions, which are highly appreciated by a majority of them. Moreover, EDNP food promotions from brands seem to be on top of adolescents' minds, as they recalled them most often from their favourite platforms. These results support a need for stricter regulations regarding EDNP adolescent-targeted SMFM, including the use of sponsorship disclosures by influencers.

Chapter 4 addresses **RQ4** ("*How do adolescents define and identify food marketing on social media?*") and **RQ3** ("*What are adolescents' opinions and views on social media food marketing in terms of appreciation, awareness and recall?*"). This qualitative study showed that Dutch adolescents use several criteria for defining SMFM, which are generally related to the level of integration of products into social media posts. Their description of SMFM seemed comparable to more traditional forms of food advertising, i.e., prominent, paid and professional-looking posts accompanied by product informative, promotional texts. They were less sure about how to define 'earned' types of marketing (i.e., coming from peers or less famous influencers). Furthermore, this chapter provides additional support for adolescents' high appreciation of EDNP, entertaining, earned (i.e., user- or influencer-generated) social media food posts, mostly in short-form video format. While they enjoy the engaging and integrated nature of social media promotions, adolescents seem to doubt their intent. They appear to have a more classical definition of social media food advertising, i.e., prominent, appealing, paid and professional-looking posts accompanied by product information and promotional texts. Yet, sponsorship disclosures, mostly in the influencer context, were not always recognised. As the chapter merely examined adolescents' perceptions, more quantitative research is needed on how adolescents (critically) process highly embedded social media influencer food promotions and to what extent sponsorship disclosure can make them more critical of these posts.

Chapter 5 addresses **RQ5** ("*Can a sponsorship disclosure in SMFM with low versus high integration of a food brand in the plot increase adolescents' recognition of advertising, understanding of persuasive intent, critical beliefs, and change brand outcomes?*"), which was answered on the basis of an experimental study. It was found that a textual sponsorship disclosure has the potential to make TikTok influencer marketing more transparent to the adolescent group by increasing their recognition of advertising and understanding of persuasive intent (mediators). Yet, the disclosure used

in the study did not enhance adolescents' critical beliefs (mediator) or brand attitudes (outcome), and also did not affect their likelihood of choosing the product promoted in the TikTok influencer video (outcome). No effects were found of product-plot integration on any of the mediators or outcomes. Overall, the results presented in this chapter are the first to show the effects of sponsorship disclosure in TikTok influencer marketing. Sponsorship disclosure has the potential to make TikTok influencer marketing more transparent to the adolescent group: hence, it is recommended that a clearly visible textual sponsorship disclosure, similar to the one used in the current study, is applied as long as there is no other empirically proven alternative for TikTok videos. Yet, more optimal disclosure formats should be investigated in different types of TikTok marketing, for different types of influencers, products or brands, to get a better idea of the conditions of their effectiveness.

6.3. Theoretical contributions

This thesis provides the latest research insights into the nature, extent and impact of SMFM, which brings a valuable contribution to existing theories on message processing and persuasion. Such theories are crucial to take into consideration when developing research and policies to protect adolescents against unhealthy SMFM. Several relevant theories are discussed in the introductory chapter to explain the effects of SMFM in adolescents, from behavioural, psychological and communication perspectives. One of the models elaborated on is the REFCAM framework, which describes how food cues embedded in advertisements elicit certain physiological and psychological responses, which in turn impact food intake [40]. Importantly, these processes are influenced by message factors, i.e., the level of integration of food cues, and by individual differences such as weight status, attentional bias and impulsivity [40]. The REFCAM framework formed the basis for the qualitative expert interviews, and eventually led to a broader Socio-Ecological framework that does not only give insight into adolescents' presumed processes in response to SMFM cues in particular, but also into additional factors that influence these processes (i.e., related to the SMFM message, individual, social environment, physical environment and national level). The experts confirmed the importance of individual differences in processing advertising food cues on social media and highlighted additional individual factors that were not included in the original REFCAM framework but specific to SMFM and the adolescent group, including gender, ethnicity, socio-economic status, education level, previous experiences and independence. In addition, experts emphasized the importance of adolescents' limited

cognitive functioning and increased focus on identity formation. According to experts, the latter particularly enhances adolescents' susceptibility to SMFM, and it relates to one of the main message factors mentioned to be relevant with regard to social media, i.e., the involvement of peers, influencers or role models. The importance of social influence and comparison was mentioned previously to have important implications for adolescents in the social media context [103] and suggests that social identity and learning theories may be relevant for understanding or explaining SMFM effects on adolescents' processing mechanisms and behaviours.

Moreover, experts presumed that the stealth or covert nature of food cues in social media marketing makes adolescents more susceptible to SMFM, and this may be linked to the message factor specified by Folkvord et al (2016), i.e., the level of food cue integration. The level of integration is theorized to play a large role in newer forms of marketing such as SMFM, as food cues are more subtly integrated and therefore 'hidden' into entertainment. Buijzen et al (2010) suggest that the level of integration between a persuasive message and its context is a highly relevant characteristic of the currently commercialized media environment [2]. Yet, more detailed evidence on the types of food promotions present in social media is essential to better understand SMFM integration tactics, and to further develop and refine theoretical models of SMFM effects. This thesis' research contributed to the evidence base by providing a deeper understanding of what adolescents' real-time food marketing exposure looks like in the context of their personalised social media feeds. It was confirmed that the majority of food promotions targeted to adolescents were highly embedded in content posted by entertainment channels and influencers, clearly blurring the lines between food advertising and entertaining content. The implications of such highly integrated brand placements and blurring became apparent from the expert and adolescent interviews, as both groups seemed to reach no full consensus on how to define or identify SMFM. Yet, the discussion with the experts led to the conceptualization of a model that defines different types of food content found on social media and their presumed marketing intent and transparency. This model can provide valuable input for other researchers to use in potential frameworks or theories and help define what content is relevant in the SMFM context and associated policies.

Furthermore, the qualitative studies among adolescents fill an important gap in the theoretical literature, as they demonstrate that adolescents enjoy watching food promotions embedded in social media, especially when embedded in entertainment or

posted by influencers or peers, while they did not seem to critically reflect on them. This is in line with existing message processing theories that hypothesize that children process integrated food cues with limited cognitive elaboration, preventing them from critically evaluating such content and activating consumer defences such as persuasion knowledge [2, 179]. Yet, as adolescents disliked and skipped pop-up type food advertisements that interrupt what they are watching, from the perspective of the 'stop and think' theory proposed by Rozendaal et al (2011) [4], it seemed their consumer defences are activated at some points during their social media activity. This happens via the so-called 'stop and think' response, which shifts their attention away from the advertisements and leads them to think about skipping them. This suggests that in this situation they may be aware and understanding of the persuasive intent of advertising and even have the motivation or desire to resist, more likely fulfilling the necessary conditions for resisting food marketing proposed by the Food Marketing Defense Model (FMDM) [5]. Thus, based on their answers in the qualitative studies, it seemed like 13-16-year-old adolescents have the cognitive ability to defend themselves against more traditional forms of SMFM, in contrast to younger children, who were suggested to still lack the cognitive ability to generate this response according to previous authors, due to a lag in their brain- and cognitive development [4].

Yet, adolescents' reaction to skippable ads seems to be opposite to adolescents' reaction to highly embedded brand placements in entertaining social media content, as they seem to doubt the commercial intent of this type of content more often and seem less aware and understanding of their persuasive intent. In fact, this thesis showed that adolescents seem to have little knowledge regarding SMFM tactics overall. Namely, while some of them seemed to acknowledge the commercial intent of influencers with high numbers of followers, adolescents generally did not identify posts from entertaining channels, influencers with little followers or peers as advertising, or did not seem to care or think much about their intent. Overall, from a FMDM perspective, adolescents seem less motivated to resist these embedded forms of SMFM. They simply seemed to enjoy watching this content, which took up a large part of the total food content they viewed. Also, adolescents saw, and also recalled, a lot of unhealthy, tempting products and brands on their social media, which were often presented in a visually appealing way (e.g., cooking videos that made the food look extremely appealing), by popular entertaining channels, influencers or vloggers. The fact that such unhealthy food cues were more on top of adolescents' minds may be explained by their particular sensitivity to palatable

foods and their related rewarding outcomes (e.g., popularity, social status) [100]. From the perspective of message processing theories, this also suggests more cognitive resources may be required to process this type of content, and adolescents may primarily allocate all cognitive resources to and show higher cognitive elaboration of the entertaining or palatable context than the persuasive message itself [2]. Yet, even though the brand or persuasive message may not even be processed consciously, adolescents' implicit attitude and choice may be affected over time [2]. This is particularly concerning when unhealthy SMFM messages are shown repetitively over time and are associated with attractive themes or rewards personally relevant or related to adolescents' strive for identity or belonging, as it may lead to unhealthy food intake and compromise their health in the long term [100]. Overall, this thesis suggests that enhancing adolescents' ability and motivation to resist these types of SMFM, both highly relevant according to the FMDM, may be a large challenge in the current SMFM environment.

The question remains how adolescents may be stimulated to activate consumer defences in the case of highly embedded, entertaining and palatable SMFM. The Knowledge Persuasion Model suggests that individuals need knowledge about the goals and tactics of the persuasion agent, which they accumulate as a result of experience with various persuasion tactics, and they can eventually use this knowledge to defend themselves against persuasive messages [95]. More recent theories state that consumers first need to recognise advertising and understand persuasive intent (conceptual persuasion knowledge), to be able to develop critical attitudes and beliefs towards persuasive messages (attitudinal persuasion knowledge) [4, 249]. Yet, the previous paragraphs clearly suggest that adolescents do not have appropriate knowledge about SMFM goals and tactics and struggle to recognise and understand highly embedded forms of SMFM.

Sponsorship disclosure is a frequently investigated tool that can help increase conceptual and hence attitudinal persuasion knowledge, enabling the individual to mitigate persuasive intent [249]. Yet, it is crucial to understand the extent to which research on the effectiveness of disclosures can be generalized from one social media platform to another, as each platform is based on a different algorithm and shows content in a different format. Therefore, the research in this thesis is the first to provide an empirical test of persuasion knowledge processing theories and the effectiveness of sponsorship disclosure in the context of short-format TikTok videos. It was confirmed that a disclosure indeed results in more transparency by increasing adolescents' conceptual persuasion knowledge. In fact, the disclosure helped adolescents to recognise advertising

and understand persuasive intent in both subtle and more overt TikTok video brand placements. Yet, in contrast to theories that assume a higher conceptual persuasion knowledge automatically mitigates persuasion through attitudinal persuasion knowledge, this thesis showed conceptual persuasion knowledge does not lead to an increase in attitudinal persuasion knowledge, and also does not lead to altered brand attitudes or product choices. Since it is likely that the TikTok context required a large number of cognitive resources, this could either have led to a cognitive overload or too little cognitive resources being left for adolescents to process any persuasive or commercial aspect of the video. This may have been reinforced by adolescents' unique developmental stage which implies a limited cognitive capability, heightened focus on identity formation, conformity to peer groups, and related susceptibility to brand symbolism, especially when brands represent a higher social status. Overall, this study provides unique insights into the mechanisms and effectiveness of disclosures in a more contemporary social media environment that is characterized to be highly immersive, entertaining and short-paced.

6.4. Methodological strengths and limitations

The studies presented in this thesis contribute to the scientific literature on SMFM in several ways, including the methodological approaches taken. The second chapter provides a multi-disciplinary perspective on SMFM by presenting findings from interviews with experts with both practice- /or research-based backgrounds, from various fields including (social) marketing, digital marketing, psychology, communication, behavioural science, public health (policy), adolescent (health) behaviours, nutrition science and industry. Combining all these different fields is an asset of this study as, in practice, research on SMFM is fragmented and researchers from different areas only work and publish within their own disciplines, without bundling their knowledge. Yet, one limitation of the study is that experts did not have the opportunity to discuss their perspectives with each other, and focus groups could have provided an additional dynamic to the interview data collected. Also, the group of experts selected was a convenience sample and ideally involving more experts from other parts of the world, including developing countries, would represent perspectives from experts globally.

Continuous monitoring of children's food marketing exposure from both TV and digital media, across countries, over time and using consistent data collection methods, has been

stated to be fundamental to the development, strengthening and evaluation of food marketing regulations [78, 283], yet evidence on SMFM exposure is relatively scarce [168]. The exposure study in Chapter 3 is the first internationally to conduct a content analysis of adolescents' real-time exposure to unbranded and branded social media food promotions, and to additionally use the viewed content to discuss adolescents' evaluation of these promotions. This mixed-method approach, adding a qualitative approach to a largely quantitative study, is highly valuable, as it does not only provide insights into what content adolescents see, but also how they experience this. In addition, as the study was conducted via Zoom due to restrictions during the COVID-19 pandemic, participants could take part while being in their (likely) natural environment of using social media (i.e., largely at home). Consequently, they may have felt less 'observed' by the researcher and probably showed more natural behaviours than in an experimental laboratory setting. Furthermore, the online data collection approach made it easier for researchers to recruit participants, as recruiting for a face-to-face study involving the viewing of their social media feeds was a large challenge when initially trialled before COVID-19 restrictions discontinued this data collection method. Yet, while recruiting had become easier, processing of the data (i.e., watching all screen recordings and selecting and coding all food promotions by two researchers) was highly time-consuming and burdensome. For instance, the coding of food content was challenging, as currently no universal framework is available that can assist with coding the healthfulness of unbranded food content. Consequently, many foods were coded miscellaneous as their dietary quality could not be determined.

With the data collection method via Zoom, it seemed like most participants did not object to the viewing of their personal social media feeds by the researcher, and there was only one adolescent who specifically chose to not participate as they did not want to share their social media data. In fact, ethical or privacy issues play an important role in SMFM research. First of all, researchers need to be wary and know how to navigate sensitive or private data on an individual's social feeds that may put them in direct danger, e.g., posts that show disturbing images of people with eating disorders and/or normalize extreme dieting to the adolescent group. Second, researchers need to know how to treat data from users in the participants' direct network, as these people have not consented to participation in a content analysis study. These issues were all discussed with the Human Research Ethics Committee of the University of Newcastle before the start of the exposure study presented in this thesis and seemed to be problematic at first. Yet, after

careful consideration and taking into account alternative data processing approaches proposed by the researchers it was decided that the benefits of this research would outweigh the risks. After all, companies do also have access to extensive consumer (incl. adolescent) data and use this for commercial purposes. However, Ethics Committees in different countries seem to manage privacy and ethical issues involved in SMFM research in different ways. For example, one of the experts in Chapter 2, who was involved in a similar screen-recorded SMFM content analysis in Canada, noted that the Ethics Committee did not even consider the potential privacy and ethical objections of the study and approved the study right away. In contrast, from personal contact with a researcher in the UK, it was noted that these types of studies are being approved by UK Data Protection Officers but are facing major challenges in EU countries. Thus, different practices regarding ethics and data collection procedures are currently in place, and this challenges further research on SMFM in different countries worldwide. This may be difficult to overcome in the short term since data protection laws may differ largely between countries. Eventually, alternative approaches that may help monitor SMFM exposure in less time-consuming and burdensome ways, with fewer privacy or ethical issues, could be developed. Researchers at Deakin University are currently developing a promising world-first artificial intelligence tool to identify and monitor SMFM content on children's social media feeds [284].

Chapter 4 provides additional qualitative insights into SMFM impact on adolescents in terms of their appreciation and awareness of SMFM, and it also explores the criteria adolescents apply to define or identify food advertising on social media. This is crucial information, as it gives an impression of their level of recognition, understanding, knowledge or criticism towards non-traditional advertising formats. Yet, a downside of this study was the limited number of participants (n = 16) and the limited number of examples (n = 20) on which they based their evaluations, as these were all social media images or screenshots from videos and thus may not have given them the full information about the original video posts.

The study presented in Chapter 5 is the first to investigate the effects of sponsorship disclosure and product-plot integration in the context of short-form influencer videos on TikTok, using realistic stimulus material that was developed in co-creation with older adolescents. Studying potential approaches to enhance persuasion knowledge of, or critical attitudes towards, short-form videos among adolescents is highly valuable, as these videos are popular among this age group and contribute to their EDNP food

marketing exposure. Recruiting adolescents via secondary schools was found to be efficient as data from many adolescents could be collected at once, and adolescents were in their natural environment (i.e., at school and among their peers) while participating in the study. In real life, adolescents may also be surrounded by their peers while scrolling through social media. Yet, the study may have seemed somewhat unconventional as participants had to gather in small groups and watch a compilation of three TikTok videos that they could not scroll through themselves, while being told to not disturb others. Another limitation relates to the brand chosen for the video, i.e., Doritos, which is a familiar brand among adolescents and thus explains why their overall brand attitude was high when measured in the study. Participants may already have had pre-existing positive associations with Doritos that may have been deeply ingrained and difficult to change with just one short social media video. Using unbranded foods, fictitious brands, or brands with more neutral attitudes would have been more ideal in order to investigate disclosure and product-plot integration effects. Moreover, other methodological limitations relate to some of the measures studied, e.g., no proper manipulation checks were done for the level of product-plot integration or sponsorship disclosure. Disclosure recognition was measured, but only among participants who saw the disclosure, making additional analyses in sub-groups who recognised the disclosure impossible. Yet, a valuable aspect of this study, which was not part of the data collection and thus not specifically elaborated on in detail in Chapter 5, was a debrief, quiz and explanation of SMFM regulations to the participants after completing the study. This post-experiment activity did not only generate more interactivity between the researchers and participants, but it may also have created more awareness and understanding of SMFM among adolescents. Scientific intervention studies in the future to protect adolescents against EDNP marketing on social media may provide opportunities to educate adolescent participants in a similar way while contributing to the evidence base.

6.5. Practical implications

This thesis has multiple implications for several actors involved in SMFM effects, including the receivers of SMFM messages (i.e., adolescents), the senders of SMFM messages (i.e., marketers, influencers, social media users), the channels of SMFM messages (social media platforms) and policymakers. Altogether, 'downstream' (i.e., tackling problems after they have emerged) and 'upstream' (i.e., preventing problems from emerging) approaches involving these various actors are recommended below, with the final aim to protect adolescents against EDNP marketing on social media.

6.5.1. Downstream approaches

'Downstream' approaches act on adolescents' behaviours, to make them more resilient against SMFM. Based on the findings of this thesis and studies by other authors, the rise of social media and its popularity among EDNP food marketers appear to pose a threat to adolescent health in the long term. As shown in thesis Chapters 3 and 4, adolescents are not only exposed to large amounts of earned, EDNP food messages on their social media, but they are also cognitively vulnerable to these messages as they are highly attracted to their entertaining, fun, social and affect-based nature. Moreover, while adolescents were found to be able to increase their conceptual persuasion knowledge in response to an SMFM short-form video in Chapter 5, they did not seem to be able to activate attitudinal persuasion knowledge to effectively resist EDNP short-form video product placements. As argued in the previous section, adolescents' limited capacity to defend themselves against persuasive social media food promotions may be attributed to their cognitive limitations to regulate emotions and to their immature executive functioning, resulting in less motivation and capacity to generate a 'stop and think' response at the time of exposure. Increasing adolescents' ability and motivation to resist SMFM by enhancing their understanding of how they are being affected, and additionally, how they can effectively resist is key. This would imply that educational resources at schools should be broadened and place more emphasis on increasing adolescents' digital advertising literacy, with a particular focus on learning about the strategies employed by social media food marketers. Ideally, to guarantee successful implementation over time, such teaching approaches should be embedded within existing lessons on nutrition and physical activity education in schools, i.e., education about balancing healthy eating and physical activity. However, since distant outcomes such as future health generally have little motivational force, especially in the context of the tempting appeal of visually hedonic, unhealthy foods on social media [285], alternative approaches must be sought to internalize adolescents' motivations to resist. For example, to appeal to adolescents, teachers could apply values-alignment type teaching methods such as those used by Bryan et al (2019), i.e., by framing manipulative SMFM as incompatible with relevant adolescent values such as social justice, privacy rights or being able to make their own, independent choices [180]. The latter approach may not only enhance adolescents' understanding of persuasive, unhealthy SMFM effects and how to cope with them, but also increase their motivation to resist them, as values alignment was suggested to induce strong, internalized motivations [180]. Facilitating

both digital advertising and healthy lifestyle education classes in schools may not only help adolescents increase their insights into SMFM tactics and effects, but also generate a future generation of influencers that is more knowledgeable of healthy nutrition and aware of the potential consequences of brand collaborations and communications. Altogether, these approaches are especially useful in the current situation where no strict measures are being taken to regulate unhealthy adolescent-targeted SMFM.

Yet, triggering a more critical 'stop and think' response in adolescents at the time of their exposure remains a challenge as they are so engaged with and enjoy watching SMFM posts, and thus other strategies that can directly control SMFM content and prevent adolescents from being exposed to unhealthy SMFM in the first place are highly recommended.

6.5.2. Upstream approaches

'Upstream' approaches are particularly promising as they focus on shaping adolescents' food environment in a way that limits their exposure to EDNP food marketing. One of the main strategies in this regard is implementing adolescent-targeted SMFM regulations, through comprehensive policies that lead to decreased exposure to EDNP food promotions on digital platforms, and enforcement of sponsorship disclosure.

In the case of adolescents, regulating earned food promotions, particularly peer promotions of EDNP brands, would be key, as these are highly appreciated by adolescents and powerful in influencing adolescents' food-related attitudes and brand outcomes. Yet, regulating these types of promotions is challenging when social media users are posting about brands on a voluntary basis. With regard to influencer food marketing content that is paid for by food companies and that has a commercial intent, policies could both enforce the use of sponsorship disclosures and restrict the marketing of EDNP foods by influencers overall. To date, the use of sponsorship disclosures in online media is inconsistent, limited and inconspicuous [71]. Current regulations do not sufficiently protect the adolescent group from the highly persuasive, stealth food messages disseminated by influencers on social media [71, 168]. In the Netherlands, recent legislation has been developed specifically for influencers with more than 500,000 followers on TikTok [286]. Under the supervision of the Dutch Media Authority (DMA), these influencers must for instance comply with stricter regulations focused on better visibility of disclosures and transparency about product placements, risking large fines in cases of non-compliance [286]. However, influencers with less than 500,000

followers, who may gain more trust and may be much more relatable to adolescents than influencers with 500,000 followers or more, do not fall under these new regulations and only follow non-enforceable guidelines [238]. Recent work has indicated confusion about the complexity of such guidelines among practitioners of disclosures (including influencers, online media agencies, advertisers and advertising agencies), but also conflicting considerations of these practitioners to use online sponsorship disclosures [71]. To make advertising intent more transparent on social media, influencers should be educated to increase their understanding and awareness of existing guidelines or regulations on disclosures. In addition, it is important to emphasize their moral responsibility to be transparent about commercial intent and inform them of the benefits of disclosing sponsorship, such as increasing their credibility among consumers [71].

Besides enforcing the use of sponsorship disclosures among influencers, it is key that the overall extent of EDNP food marketing to adolescents on social media is limited. In 2010, the WHO developed a set of recommendations to guide countries worldwide in the development or strengthening of regulations to protect children from the harmful effects of EDNP food marketing, although the definition of 'children' is not clearly specified [287]. Yet, up to now, most regulations are self-regulatory codes of practices implemented by food industries. These industry-induced practices, which are voluntary in nature, have been under criticism because of the weak nutritional criteria they are based on and their ineffectiveness in protecting children against EDNP marketing [38]. Moreover, many self-regulatory codes have primarily targeted younger children, as a significantly larger amount of research on television marketing in younger children under 12 years has shown that they are cognitively vulnerable to the persuasive effects of EDNP food marketing and relatively little evidence on this is available in the adolescent group [38, 123]. In 2005, the Institute of Medicine (US) concluded in their review of food and drink advertisements targeted to children and adolescents that there was "insufficient evidence" that food marketing negatively impacts adolescents 12-18 years old [60]. Not long after that, in 2007, the UK was the first country to introduce statutory legislation to protect younger children against exposure to EDNP advertising on television [62]. Yet, more recently, emerging evidence suggests that adolescents are uniquely vulnerable to junk food marketing, potentially even more than younger children, especially on social or digital media platforms [100].

Up to now, adolescents are often not regarded as a uniquely vulnerable group in public health research and social policies [288]. For instance, globally oriented action plans

such as those from the UN Decade of Action on Nutrition (2016-2025), the Sustainable Development Goals for nutrition, and the WHO's global action plan for the prevention and control of non-communicable diseases, do not specify any actions or targets regarding older children or the adolescent group in particular [288]. Despite several pleas from around 2009 to protect older children and adolescents (> 12 years) through legislation [5], to date marketers worldwide have increased the marketing of EDNP products (such as sugary drinks, non-core snacks, fast food and candy) to adolescents and young adults without any penalties [38]. For instance, food industries state that adolescents can "make good choices" for themselves, and food brands are simply providing what they want [1, 289]. Yet, from a children's rights perspective, the Convention on the Rights of the Child (CRC) poses that all children, including adolescents under 18 years old, should be protected from harm, including the harm that unhealthy food marketing may cause [290]. According to the CRC, the food industry has the responsibility, under the United Nations Guiding Principles on Business and Human Rights, to not violate human rights. However, in case the food industry fails to fulfil this responsibility, it is recommended that governments should take the necessary measures to facilitate the protection of these human rights [290].

Yet, relatively little action is taken by governments to protect the adolescent group from EDNP food marketing, especially on social media platforms, while the findings in this thesis and other recent studies show that these marketing channels significantly contribute to adolescents' EDNP food marketing exposure [168]. In fact, most government-generated regulations are still focused on protecting younger children against food advertising on traditional media (television) [72]. According to the NOURISHING database, developed by the World Cancer Research Fund to provide an overview of policy measures internationally to promote healthy diets and reduce obesity rates [291], several countries worldwide have mandatory governmental-led food marketing regulations in place focusing on newer types of food marketing tactics such as product placement or celebrity marketing. Yet, the regulations that include digital media according to the database (i.e., in Chile, Portugal, South Korea, Brazil, Canada, Peru) use rather vague definitions to describe what type of channels they cover (e.g., by using general terms such as 'the Internet', 'digital marketing' or 'websites'), do not specify particular social media platforms or content the regulations apply to, are only focused on specific types of products or content, and apply varying age limits (i.e., under 13 years, under 14 years, under 16 years, under 18 years or 12-18 years). The UK government began

announcing an upcoming ban on online food marketing to children in 2022, but has recently pushed back its implementation to October 2025, reportedly in light of the unprecedented global economic situation and to give the food industry time to prepare for the ban [292]. In the Netherlands, only a small part of marketing regulations is covered by the Dutch Media Law, including advertising and product placement in and around television programmes that are targeted to children under 12 years, and more recently these regulations extended to influencer content posted by influencers with more than 500,000 followers on YouTube, TikTok or Instagram [243]. In Australia, there currently is one government-initiated regulation in place that protects children under 15 years old against food advertising around children's television programmes [293]. With regard to social media, the recently evolved self-regulatory Australian Code of Ethics merely provides guidance on disclosures for advertisers and influencers [294]. Yet, with influencer- and social media marketing increasing, including the incorrect use or lack of disclosures within this context, the Australian Competition and Consumer Commission (ACCC) recently launched an inquiry into social media services, of which the findings are expected after March 2023 [295].

Thus, while some countries are starting to consider digital platforms in their food marketing regulations, it can be concluded that SMFM is still poorly covered. This may be due to the fact that marketing content on social media is borderless in nature and not well-defined to date, as discussed by experts in the second chapter of this thesis and by other authors [11]. Digital marketing restrictions are mostly self-regulatory guidelines implemented by the industry, which are poorly implemented and followed, as they are based on different nutrition profiles or recommendations, and they do not include adolescents [1, 38, 72]. It is recommended that for all EDNP food marketing restrictions the age range is adjusted to also include adolescents up to at least 18 years. Yet, 'adolescent-directed' content should be clearly defined, as restrictions on 'child-directed' marketing are currently being circumvented by food businesses, i.e., products are targeted to a broad audience but still attract young children [38]. Alternatively, adolescents' access to social media platforms and hence SMFM could be restricted by involving social media platforms in the development of regulations, as also mentioned by experts in the second chapter. For instance, to diminish internet addiction among children, the Chinese version of TikTok, i.e., Douyin, introduced a 'youth mode' that restricts authenticated users under 14 years of age to access the app for longer than 40 minutes, and between 10.00 pm and 6.00 am [296]. Yet, most social media platforms

generally do not seem to have any comprehensive policies on restricting the marketing of EDNP foods to children or adolescents, yet some have developed several policies restricting the marketing of alcohol, tobacco, gambling, and/or weight loss [297].

As mentioned by experts in the second chapter and by other authors [38, 168], more societal will or support is needed to restrict EDNP food marketing to children and adolescents. In particular, drawing on the experiences and challenges with marketing regulations for tobacco and alcohol industries is essential, although the restriction of food marketing may be a larger challenge as food, unlike tobacco, is not directly considered harmful. It is key that public health researchers continue their empirical research on its effect in adolescents in particular and use this to advocate for change to regulators and governments. The more governments are conveying the message that EDNP food marketing on social media is harmful to adolescents, the more existing regulatory frameworks may be challenged [38].

6.6. Directions for future research

As stated above, it is crucial that researchers expand the evidence base on adolescent-targeted SMFM, as this may help develop and confirm theoretical theories and models that explain its effects. This can eventually increase governmental support and realize changes to regulatory frameworks that are still mainly focused on food marketing to younger children through traditional media. Ideally, researchers from different scientific disciplines (e.g., behavioural science, communication science, political science, (social) marketing, nutrition, public health) should combine their knowledge to fill important research gaps, as also mentioned by one of the experts in the second chapter. This can offer many benefits as it makes the evidence base more robust and useful for theory development and policymakers. Moreover, applying consistent data collection methodologies to measure the nature, extent and impact of SMFM at different points in time and in different regions worldwide is essential. There are a few key research directions that require particular attention from researchers, as outlined below.

With most of the evidence on adolescent-targeted SMFM exposure being based on content analyses of specific social media pages and adolescents' self-reported or -collected data, more objective, quantitative research on adolescents' real-time SMFM exposure, as presented in this thesis, is warranted. Such research has only been done in one study so far (in Canada) [58]. Exposure data should continuously be monitored as SMFM is changing constantly [78]. Quantitative research seems particularly relevant for

the SMFM context, as adolescents may often not be aware of their exposure or its effects themselves and thus their answers in qualitative studies may not fully represent their actual exposure. Regarding exposure, obtaining insights into both branded and unbranded food promotions, product healthfulness, source, disclosure use, the brand promoted and type of content or strategy used (e.g., paid, owned, user- or influencer content) and product placement levels are recommended using universal or consistent coding schemes. Moreover, measuring adolescents' interaction with this content is also crucial. Engagement research was done previously [74, 143, 298], but these studies are based on qualitative and self-reported data that measured adolescents' willingness or likelihood to engage with SMFM content. Ideally, engagement should also be measured more objectively with screen recordings or artificial intelligence tools such as those developed at Deakin University [284]. Moreover, more eye-tracking research, as done by Murphy et al [74], should be conducted in the future, as well as biometric data such as heart rate or skin conductance, to be able to objectively measure adolescents' attention and reaction to different SMFM strategies.

Furthermore, while the current thesis significantly contributes to the qualitative evidence on adolescents' SMFM definitions, appreciation and awareness, the overall qualitative evidence base on adolescent-targeted SMFM is still scarce [63, 137]. So far, there is one existing study that examined adolescents' advertising literacy regarding sponsored influencer content and disclosures [142]. Qualitative research could focus on adolescents' general opinions on and experiences with SMFM, as done by one other study [141], or on the criteria for (not) having critical attitudes (i.e., persuasion knowledge) towards SMFM. Moreover, a qualitative approach could be used to involve adolescents in the development of interventions that help them resist appealing SMFM messages, for instance through co-design or participatory approaches and focus groups. Altogether, these qualitative research insights can help understand how well adolescents understand, recognise, or critically evaluate different SMFM tactics, and hence give different perspectives on existing theories on adolescent message processing and persuasion knowledge.

Importantly, the key to shifting governments' policy priorities towards increased support for adolescent-targeted EDNP food marketing restrictions on social media, is impact research. In the end, extensive evidence on the effects of SMFM on adolescents' food-related attitudes and behaviours is needed, as well as on potential mediating and moderating individual and external factors that are influential in this respect. Empirical

research can inform existing theoretical models such as the REFCAM or FMDM, by providing valuable insights into the circumstances under which SMFM cues are effectively influencing adolescents' attitudes and behaviours, but also under which circumstances adolescents are better capable of resisting SMFM. Eventually, once the evidence base and refined theoretical models can provide a more extensive understanding of how adolescents are being impacted by SMFM, this may help encourage policymakers to change food marketing regulations in a way that adolescents' health is more optimally protected.

While several experimental studies have been conducted on SMFM strategies targeted to younger children, even this has not yet led to rigorous changes in SMFM regulations and thus the evidence on SMFM needs to be expanded to a greater extent, among all age groups. Very little experimental research in this age group is available to date. In fact, impact research among adolescents has often been based on cross-sectional research on associations between adolescents' self-reported social media use and dietary intake. A major limitation of this type of research is that it does not prove that SMFM leads to certain dietary behaviours. In short, the effect of different types of SMFM content and strategies (e.g., product placements, paid content, influencer marketing) should be investigated experimentally. For instance, recent studies in younger children suggest that influencers who promote healthy foods or a healthy lifestyle may stimulate the intake of healthy foods [185, 299, 300]. Yet, research on the impact of influencers on adolescents is lacking. Moreover, the influence of peer-generated or earned food promotions should be studied more closely in the social media context, as these seem to increase with the food industry's changing SMFM tactics, and they are highly appreciated by and may be influential with regard to adolescents' dietary behaviours. Additionally, the impact of different sponsorship disclosure formats, in different types of influencer content, promoting different products, should be studied in adolescents, as the results in Chapter 5 show that disclosures in TikTok may increase transparency, but do not increase adolescents' critical attitudes. Furthermore, in addition to experimental research, conducting observational research to look into adolescents' social media behaviours and dietary intake in their natural environment is key, ideally over longer periods of time. Such observational research may be done through periodically distributed surveys on adolescents' social media use and food consumption, but preferably through more objective methods such as wearable cameras that measure exposure and behaviours over time, as done by Signal et al (2017) [301].

6.7. Conclusions

The research presented in this thesis is an early contribution to the emerging field of SMFM. During the writing of this thesis, more studies have been published showing the power and impact of SMFM in younger children, while insufficient attention has been given to its impact on adolescents. This thesis focuses specifically on the adolescent group and shows at first that there are many presumed individual and external factors and processes that may determine adolescents' vulnerability to SMFM. Adolescents' independence, constant access through personal smartphones and hence extensive social media activity make them important SMFM targets. Yet, their unique stage of cognitive development, with identity formation being an important aspect, makes them particularly vulnerable to the influence of influencers or peers on social media. Hence, as observed in this thesis, adolescents' high exposure to entertaining and unhealthy SMFM, largely posted by entertainment channels, peers or popular influencers may be concerning. Whereas adolescents generally seem to resist forms of marketing that are generated by brands and are more clearly separated from the entertainment they want to watch (i.e., through pop-up ads), they enjoy marketing content that is blurred by its entertaining context, i.e., in which products are highly integrated into the storyline of the content they are already watching. As they do not identify food content generated by entertainment channels, social media users or peers as marketing, they seem highly receptive to most of the SMFM they are exposed to, without being aware of or critical towards its commercial intent. Sponsorship disclosure helps adolescents recognise and understand marketing and persuasive intent of nano-influencer marketing posts on TikTok, but alternative disclosure formats may be needed to develop their critical beliefs and help them resist such marketing forms. This thesis has a multi-disciplinary nature, and may potentially inform disciplines such as communication, psychology, nutrition, public health, and (social) marketing, but also policymakers who aim to protect adolescents from unhealthy influences in their food environment. Yet, to be able to protect this age group against unhealthy food marketing, either by improving their ability and motivation to resist, or by implementing or strengthening effective policies that restrict their exposure, further advancing the evidence base is key. This should involve consistent, continuous monitoring of the nature, extent and impact of adolescent-targeted SMFM over time, on a worldwide scale.

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Appendices

Appendix A. Expert interview procedure and questions (Chapter 2).

Welcome, and thank you for participating in this interview. As I said in my email, this interview is part of my PhD studies, which aims to get more insight into food marketing on social media and its influences on dietary behaviours of adolescents, specifically 13 to 16 years old. So, when I refer to adolescents in this interview, I'm mostly talking about this specific age group.

So far, we don't know much about the content of food marketing on social media, and how this influences adolescents' attitudes and eating behaviours. The aim of this interview specifically is to get better insight into relevant factors that may be involved in this relationship, but also to develop a comprehensive research agenda for this type of research. So, what are the research gaps, priorities and challenges relevant to be addressed in future studies, and what are suitable strategies to tackle these?

We've selected you as an expert in the field of <….>, and I therefore would like to obtain input and/or feedback from the perspective of your field specifically.

This interview will take 45 minutes maximum and will be recorded and transcribed later on. The final results will be presented in my PhD thesis and used in an accompanied peer-reviewed publication. Please let me know if you have any questions at this moment.

Can you please confirm that you are happy to participate in this interview and that we record your answers for further data analysis and study?

Thank you, now I would like to start with the interview. First, I'll start with some questions on different types of food marketing on social media.

Part I – General discussion about types of social media food marketing (max. 5 min)

1. If you think about social media, what different types of food marketing or food advertisement can you think of?

2. <Send link to the file 'Branded content'>. I will give you some time to have a look at the document. <After 1 minute>. In the document you find some examples of social media posts. Would you consider all of these to be social media food marketing? Why or why not?
3. I will now give you some time to have a look at the document named *Unbranded content*. <After 1 minute>. In the document you find some other examples of social media posts. Would you consider all of these to be social media food marketing? Why or why not

Part II – Factors influencing the relationship between social media food marketing messages and food purchase and/or consumption (max. 20 minutes)

Process factors

1. Do you think social media food marketing influences adolescent's eating behaviours, so their food purchase and/or consumption? If yes, in what way? If no, why not?
2. Think back about the different examples of food marketing we saw and discussed earlier. When an adolescent aged 13 to 16 years comes across a food ad on social media, how do you think he or she reacts to this ad in the first instance? What happens in the adolescents' head?

Individual factors

1. Do you think that adolescents react to food marketing messages in a different way than adults or younger children? If yes, in what way do they react differently?
2. What characteristics of adolescents could make them sensitive to food marketing messages on social media? For example, are there certain psychological traits or demographic characteristics of adolescents that may make them more or less likely to respond to marketing messages?

Message factors

3. Does food marketing on social media have another effect on adolescents than food marketing on more traditional media such as print, television, etc. What is the difference?
4. What characteristics of food marketing messages on social media make these messages particularly powerful in targeting adolescents? For example, if they are presented in a specific manner, or they contain specific content.

Recap (only when enough time left!)

5. We've just discussed how adolescents react to food marketing messages on social media, and the characteristics of either the food marketing messages or adolescents that may play an important role in this effect. Which of these do you think play the most important role in influencing dietary behaviours of adolescents?

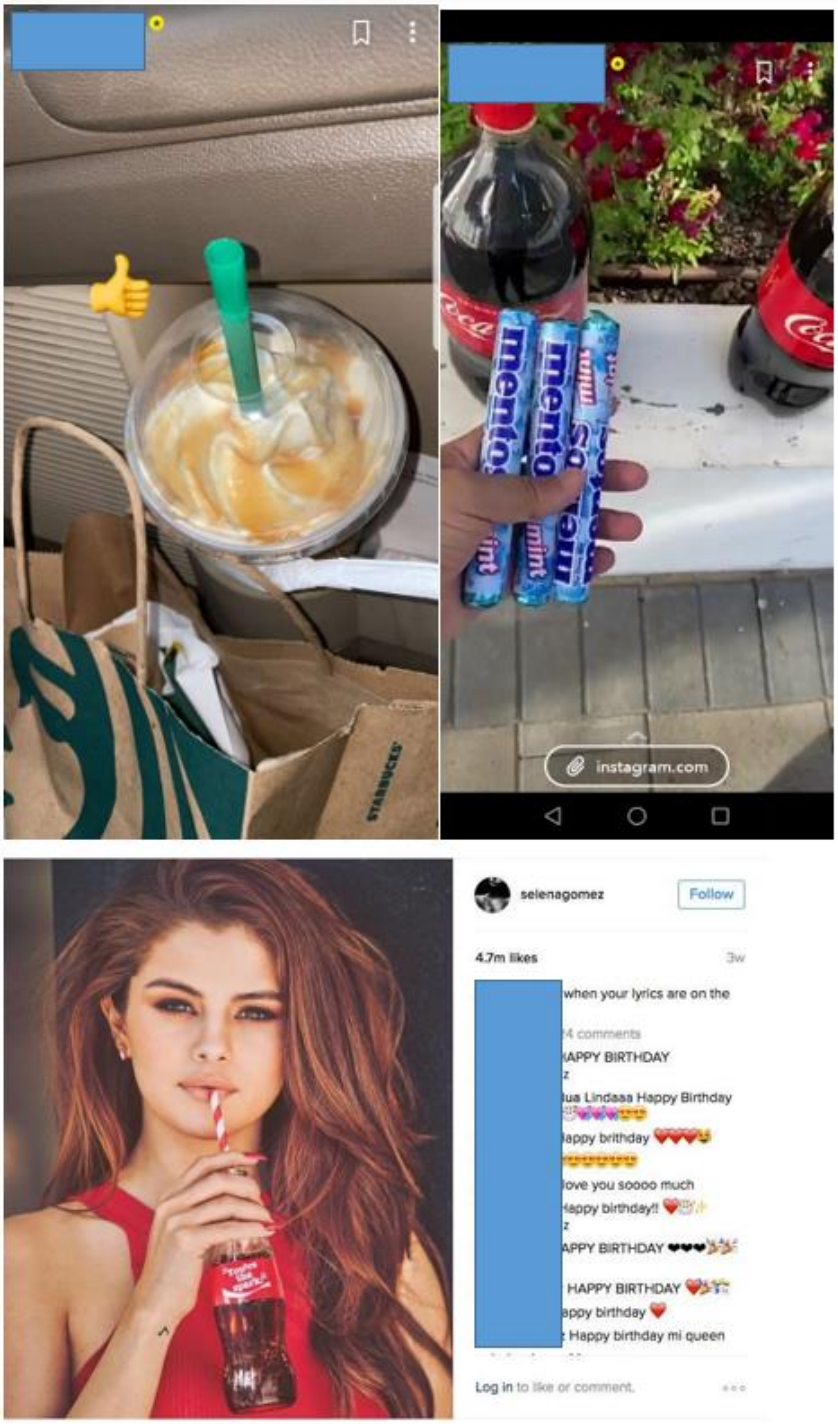
Part III – Research gaps, needs and challenges (max. 20 minutes)

1. In an "ideal world", what should food marketing on social media look like, for the sake of adolescent health?
2. How could this be accomplished most realistically in the "real world"? What would be the first step?
3. When aiming to improve eating behaviours in adolescents, what do we really want to know about social media food marketing at this point? What urgent

research questions should be on the agenda, when it comes to social media food marketing targeted to adolescents?
4. What type of studies need to be conducted? *(in case not mentioned)*
5. What do you think are the main challenges for this type of research? *(in case not mentioned)*
6. Could these challenges be tackled? If yes, how? *(in case not mentioned)*
7. I'm currently still recruiting participants for an expert interview. Are there stakeholders or experts from a particular field you think are essential to involve in this study? *(only if still applicable, i.e., more experts needed)*

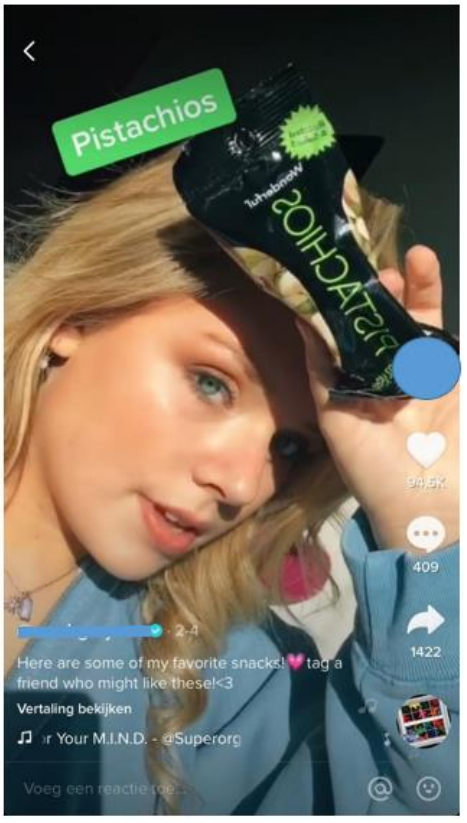
Thank you for participating in this interview, this has been very valuable for me.

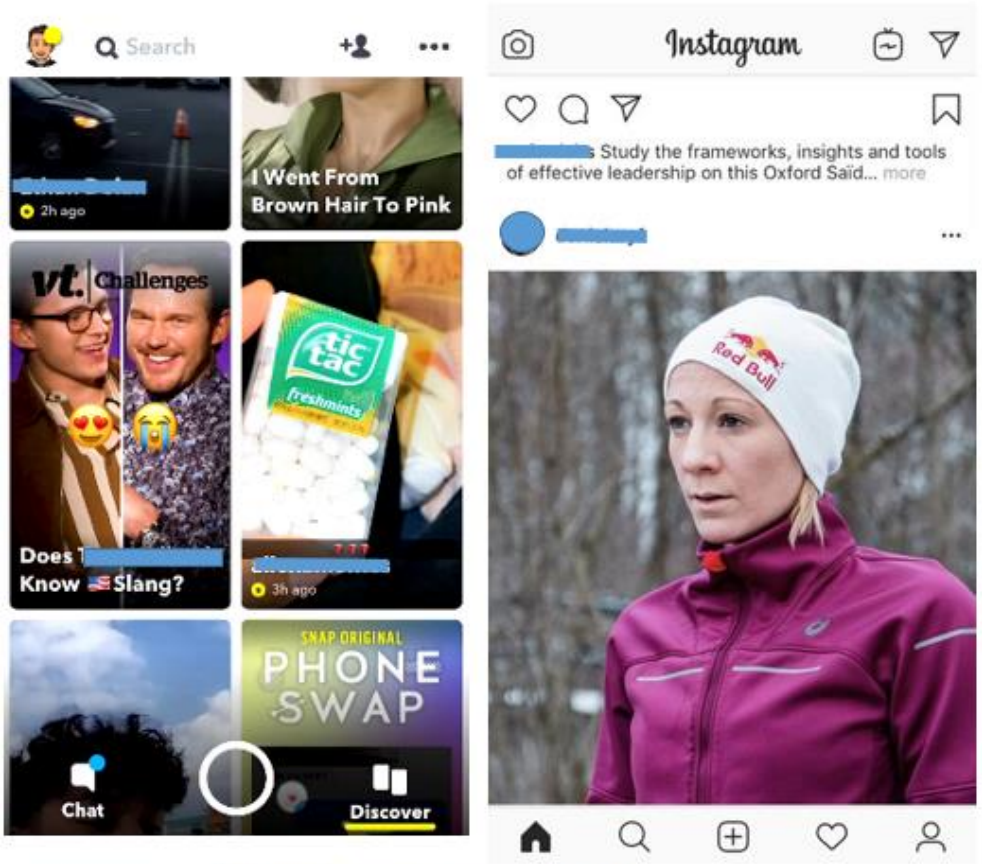
Appendix B. Branded social media food content shown to experts (Chapter 2).




14:16
I Bought Every Fast Food KIDS MEAL! (TASTE TEST EXPERIMEN
Who has the best kids meal?
392K views • 4 months ago
Which fast food chain has the best kids meal. No i dont have a kid yet but I thought this ta
be a fun one to do. I bought ...


EXTREME DIPPER
499
179
veggie McNUGGETS! but which type are
you? #cnschallenge #sotiktok #mcdonalds
Vertaling bekijken
eat. Becky G) - @j-hope


Pistachios
409
1422
Here are some of my favorite snacks! tag a
friend who might like these!<3
Vertaling bekijken
r Your M.I.N.D. - @Superorg


Search
2h ago
I Went From
Brown Hair To Pink
vt. Challenges
Does
Know Slang?
tic tac
freshmints
3h ago
SNAP ORIGINAL
PHONE
SWAP
Chat
Discover
Instagram
Study the frameworks, insights and tools
of effective leadership on this Oxford Saïd... more
Red Bull

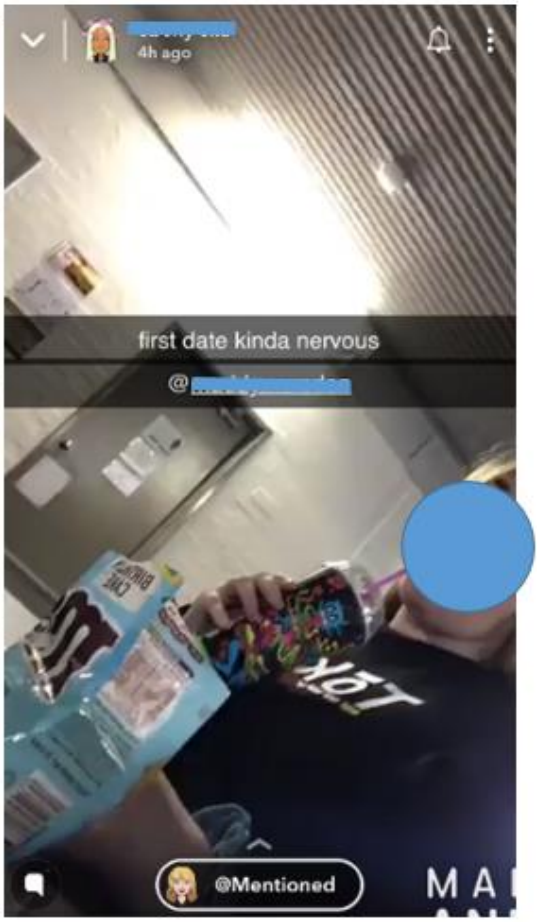

AT&T
10:00
88%
Instagram
benandjerrys
Sponsored
Limited
Batch
BEN & JERRY'S
Scotchy
Scotch
Scotch


Milky Lane
Gesponsord
Like NOTHING else ... get your stretchy pants out, the on speed dial and let's get this done
Delicious Burgers made for a proper cheat day, desserts to die for, cocktails for a serious party and local DJs keeping the funky beats alive until late.
Try NEWCASTLE's best burgers 13-15 Darby St, Newcastle NSW 2300
... Meer weergeven
Newcastle's BEST Burgers
Book Now milkylane.co
Nu boeken
Mouthwatering Desserts
Book Now milkylane.co
46
170 opmerkingen 9 keer gedeeld
Leuk
Opmerking plaatsen
Delen


Smith's Chips
New Smith's Poppables
NEW
ONE
POP
& YOU'RE
IN LOVE
SMITHS
POPPABLES
PERFECTLY POPPABLE CRISPY POTATO BITES
SWIPE UP TO UNLOCK THE LENS
Proberen
Reclame


Similar Posts
Sponsored
spriteaunz When the sun's more intense... more

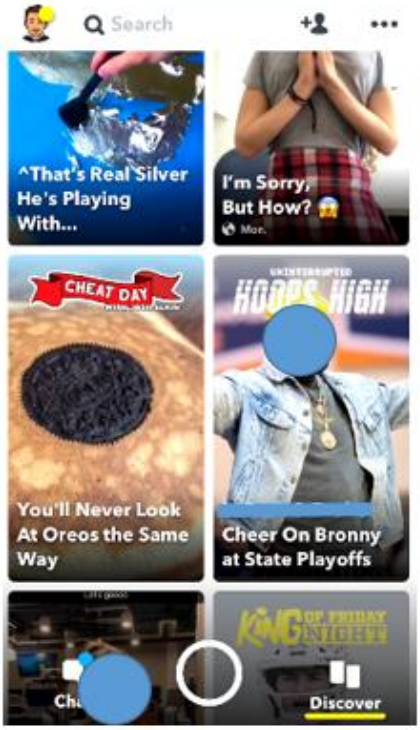

TiKTok
Mcdonald's secrets pt.1
196,4K
2123
Mcdonald's secret reveal #fyp #foryou #foryouppage #foryoupag #foryoupage #fy #shykids #diyproject #mcdonalds #mcdo #imlovinit
10,5K
Vertaling bekijken
Voeg een reactie toe...


4h ago
first date kinda nervous
@Mentioned


creme egg
creme egg
creme egg

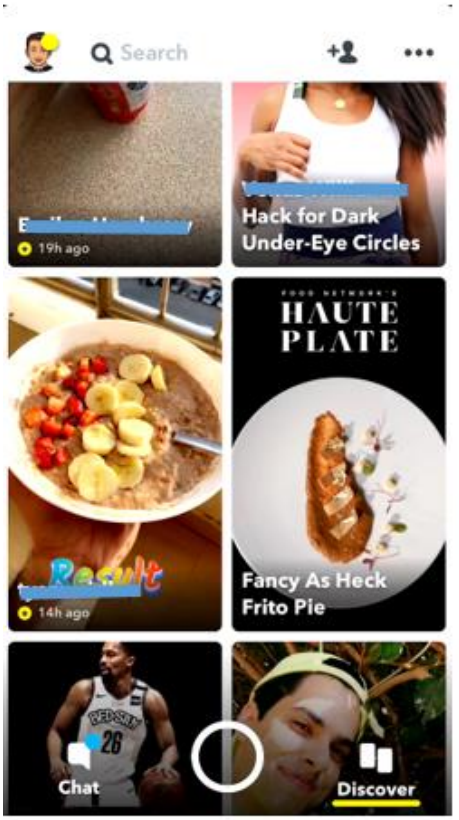

Finger lickin' good

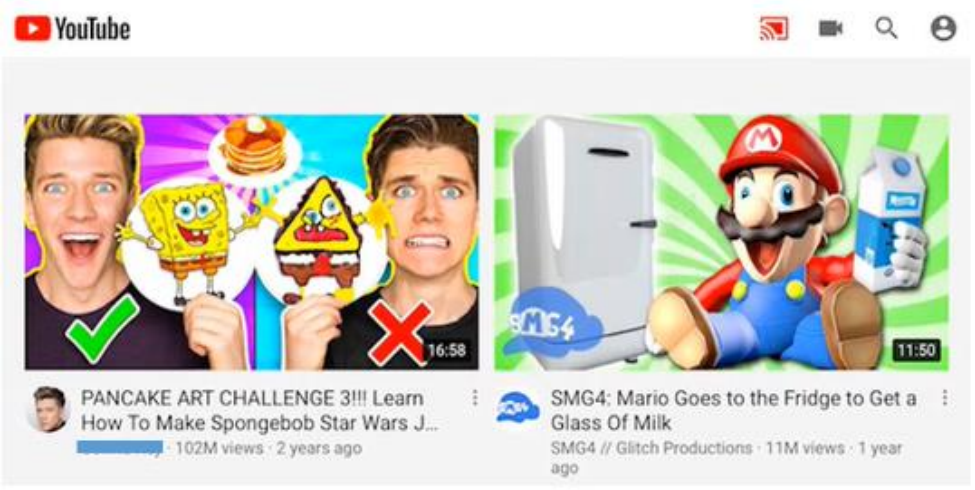

Instagram
Whoever you tag owes you this
McDonalds if they don't reply in 1 min
Liked by and others
View all 2,444 comments

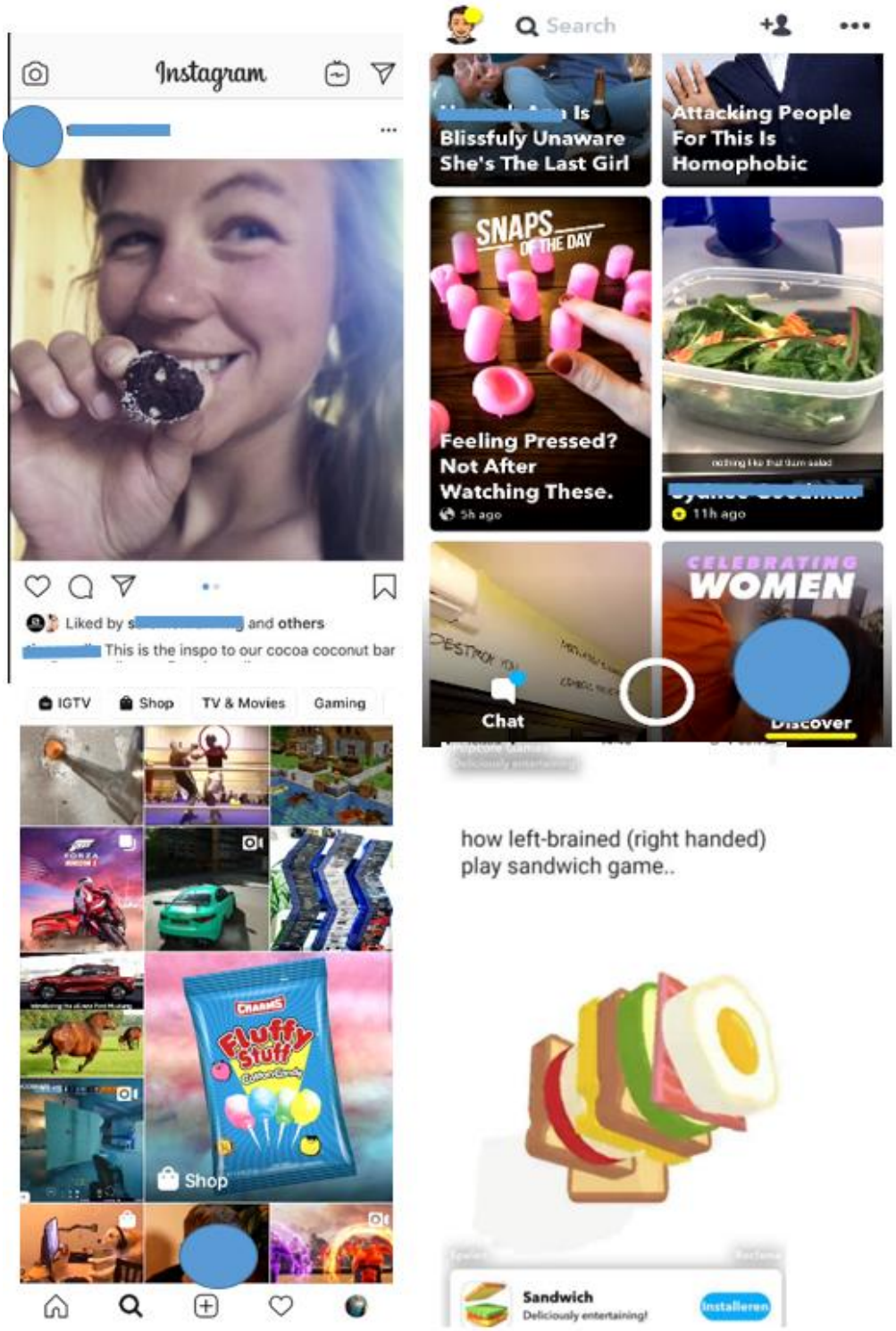

Search
^That's Real Silver He's Playing With...
I'm Sorry, But How?
CHEAT DAY
You'll Never Look At Oreos the Same Way
Cheer On Bronny at State Playoffs
Discover

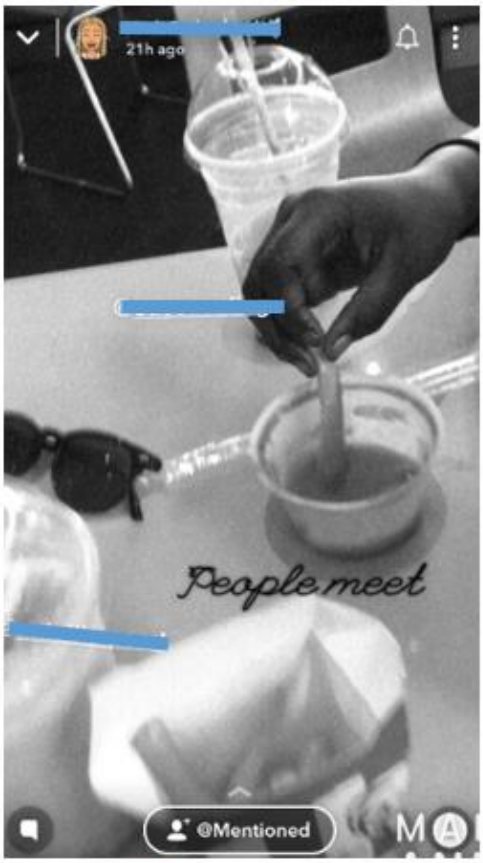

Explore
Follow
Chefclub
Reese's
REESE'S
Liked by and others
See Similar Posts

Appendix C. Unbranded social media food content shown to experts (Chapter 2).



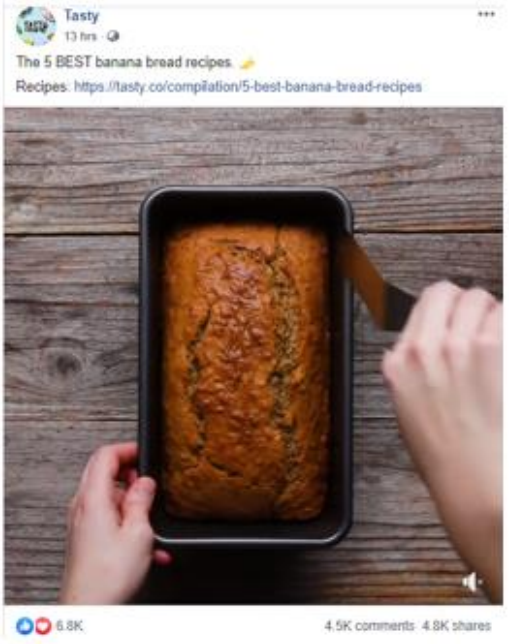



Instagram
Liked by s and others
This is the inspo to our cocoa coconut bar
IGTV
Shop
TV & Movies
Gaming
Shop
Search
Is Blissfuly Unaware She's The Last Girl
Attacking People For This Is Homophobic
SNAPS OF THE DAY
Feeling Pressed? Not After Watching These.
5h ago
11h ago
Chat
CELEBRATING WOMEN
Discover
how left-brained (right handed) play sandwich game..
Sandwich
Deliciously entertaining!
Installieren

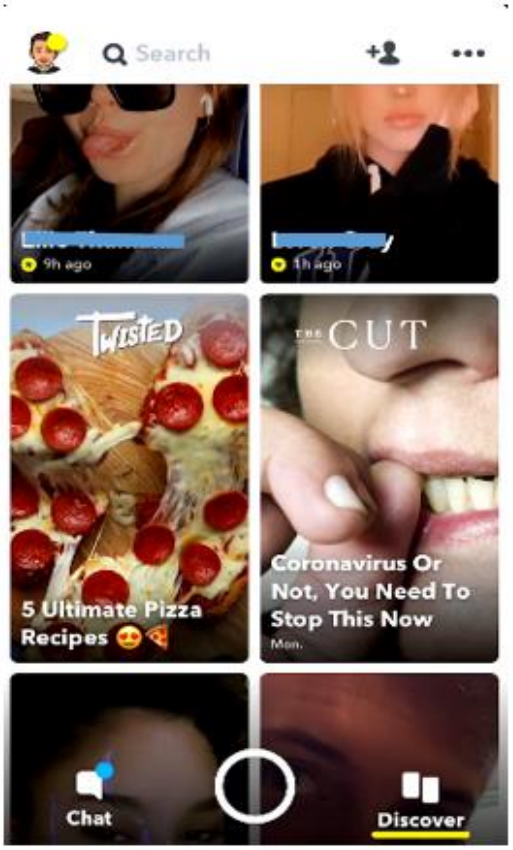

21h ago
People meet
@Mentioned


2h ago
Send a Chat


Clean apartment, clean linen, fridge restocked & freshly baked biscuits. I'm ready for you to visit
32
1 Comment
Like
Comment


Tasty
13 hrs
The 5 BEST banana bread recipes.
Recipes: https://tasty.co/compilation/5-best-banana-bread-recipes
6.8K
4.5K comments 4.8K shares


3h ago
Send a Chat


Search
9h ago
1h ago
TWISTED
5 Ultimate Pizza Recipes
THE CUT
Coronavirus Or Not, You Need To Stop This Now
Mon.
Chat
Discover

Appendix D. Pre-study questions on participants' socio-demographic characteristics and social media use (Chapter 3).

Demographic questions	**Answer**
1. Are you a boy or a girl?	0= Boy 1= Girl 2= Other
2. How old are you?	Options: 13, 14, 15, 16
3. What is your postcode?	Open-ended
Questions about social media use	**Answer**
4. In the past month, how often have you used the following social media platforms? *(Select one answer per row, by means of an 'X')*. If your social media platform(s) is/are not listed in the table, add to the empty rows	<see Appendix E>
5. What is your most favourite social media platform?	<choice from list of platforms picked in question 4>
6. Approximately what month of what year did you join this platform? (*You will be able to find this either on the platform itself or in your email inbox. If you cannot find it, please give us your closest estimation.*)	Date
7. How many other social media users are you connected to on this platform? (*For example, for Instagram and Twitter this is the number of users you follow, for Snapchat or Facebook this is the number of connections, and for YouTube the number of channels you are subscribed to*)	Number
8. How much time do you spend on this social media platform on a typical day?	0= not at all 1= 1-30 min 2= 31 min – 1 hour 3= 1-2 h 4= 3 h 5= 4-5 h 6= 6-8 h 7= more than 8 h

9. What device(s) do you use to access this social media platform? *(Several options possible)*	0= Computer (desktop or laptop) at home 1= Computer (desktop or laptop) at school 2= Computer (desktop or laptop) at work 3= Mobile phone 4= Tablet (e.g., iPad) 5= Other, please specify:.....
10. What do you primarily use this social media account for? *(Choose one option)*	1= messaging or talking with friends 2= creating or sharing photos/videos 3= viewing posts/updates of friends 4= connecting with (new) people 5= joining groups 6= following the news or latest trends 7= playing games 8= organizing parties/events 9= listening to music 10= other, please specify:.....
11. What is your 2nd favourite social media platform?	< choice from list of platforms picked in question 4>
12. Approximately what month of what year did you join this platform? (*You will be able to find this either on the platform itself or in your email inbox. If you cannot find it, please give us your closest estimation.*)	Date
13. How many other social media users are you connected to on this platform? (*For example, for Instagram and Twitter this is the number of users you follow, for Snapchat or Facebook this is the number of connections, and for YouTube the number of channels you are subscribed to*)	Number

14. How much time do you spend on this social media platform on a typical day?	0= not at all 1= 1-30 min 2= 31 min – 1 hour 3= 1-2 h 4= 3 h 5= 4-5 h 6= 6-8 h 7= more than 8 h
15. What device(s) do you use to access this social media platform?	0= Computer (desktop or laptop) at home 1= Computer (desktop or laptop) at school 2= Computer (desktop or laptop) at work 3= Mobile phone 4= Tablet (e.g., iPad) 5= Other, please specify:.....
16. What do you primarily use this social media account for? *(Choose one option)*	1= messaging or talking with friends 2= creating or sharing photos/videos 3= viewing posts/updates of friends 4= connecting with (new) people 5= joining groups 6= following the news or latest trends 7= playing games 8= organizing parties/events 9= listening to music 10= other, please specify:.....
17. What is your 3rd favourite social media platform?	< choice from list of platforms picked in question 4>
18. Approximately what month of what year did you join this platform? (*You will be able to find this either on the platform itself or in your email inbox. f you cannot find it, please give us your closest estimation.*)	Date
19. How many other social media users are you connected to on this platform? (*For example, for Instagram and Twitter this is the number of users you follow, for Snapchat or*	Number

Facebook this is the number of connections, and for YouTube the number of channels you are subscribed to)	
20. How much time do you spend on this social media platform on a typical day?	0= not at all 1= 1-30 min 2= 31 min – 1 hour 3= 1-2 h 4= 3 h 5= 4-5 h 6= 6-8 h 7= more than 8 h
21. What device(s) do you use to access this social media platform?	0= Computer (desktop or laptop) at home 1= Computer (desktop or laptop) at school 2= Computer (desktop or laptop) at work 3= Mobile phone 4= Tablet (e.g., iPad) 5= Other, please specify:.....
22. What do you primarily use this social media account for? *(Choose one option)*	1= messaging or talking with friends 2= creating or sharing photos/videos 3= viewing posts/updates of friends 4= connecting with (new) people 5= joining groups 6= following the news or latest trends 7= playing games 8= organizing parties/events 9= listening to music 10= other, please specify:.....

Appendix E. List of most popular social media platforms in Australia (July 2020) and answer categories on how often they are used in the past month [1] (Chapter 3).

Social media platform	Never	Once a month	Several times a month	Once a week	Several times a week	Once a day	Several times a day	Once an hour	Several times an hour
1. Facebook									
2. YouTube									
3. Instagram									
4. Snapchat									
5. Twitter									
6. Tumblr									
7. TikTok									
8. Flickr									
9. Pinterest									
10. Reddit									
11. MySpace									
12. RenRen									
13. Weibo									
14. Foursquare/ Swarm									
15. Digg									
16. Periscope									
17. Delicious									
18. Other, please specify:.....									
19. Other, please specify:.....									
20. Other, please specify:.....									

1. Correll, D. *Social Media Statistics Australia – July 2020*. 2020 3 May 2020]; Available from: https://www.socialmedianews.com.au/social-media-statistics-australia-june-2019/.

Appendix F. Post-study questions on recognition and appreciation of social media food promotions (Chapter 3).

Questions	Answer options
1. Think back about the scrolling sessions. When I pointed out a food promotion or food ad to you, how often do you think you had you recognised this yourself?	1: Never 2: Rarely 3: Sometimes 4: Often 5: Always
2. Were you sometimes doubting whether you saw a food promotion or food ad?	Open-ended
3. Can you give an example of a food promotion or food ad you were not sure about?	Open-ended
4. Why do you think you doubted whether it was a food promotion or food ad?	Open-ended
5. To what extent do you think you have become more aware of food promotions or food ads on social media during this social media scrolling session?	1: Not at all aware 2: Slightly aware 3: Somewhat aware 4: Moderately aware 5: Extremely aware
6. Think about the food promotions and food ads we came across during this social media viewing activity. How much do you like social media posts that promote foods and beverages?	1: Dislike very much 2: Dislike moderately 3: Neither like nor dislike 4: Like moderately 5: Like very much
7. [In case several social media platforms have been viewed]: On what platform did you find the food promotions or food ads most appealing or attractive? - [If yes]: Why did you find the food promotions or food ads on <mentioned platform> the most appealing or attractive?	Open-ended
8. Are there any food promotions or food ads from the activity that you remember in particular? - [If yes]: Why do you think you remember those in particular?	Open-ended
9. In general, are there any types of food promotions or food ads you like more than others? - [If yes]: why do you like those more than others?	Open-ended
10. In general, are there any types of food promotions or food ads you like less than others? - [If yes]; why do you like those less than others?	Open-ended

Appendix G. Coding of composite food or beverages on social media into core or non-core classifications (Chapter 3).

Composite foods or dishes (coded as one entity)	Post coded as non-core	Post coded as miscellaneous
Composite foods/dishes/beverages where not all ingredients can be classified		X
Pizza (rolls) pepperoni	X	
Pizza with vegetables and/or other ingredients		X
Dish with fries / hot chips	X	
Hamburger or schnitzel dish	X	
Quesadilla		X
Salad		X
Sandwich wraps or burritos		X
Sandwiches or toast		X
Baked potato wedges		X
Noodle or pasta-based cooked dish (not instant)		X
Soup (not instant)		X
Mexican dish with nachos/tacos, cheese, tomato, guacamole, etc.		X
Curry or rice-based dish cooked (not instant)		X
Cheesy or creamy dishes (with excessive amounts of cheese or cream)	X	
Garlic bread	X	
Acai bowl or yoghurt with fruits		X
Overnight oats		X
Pancakes or French toast or waffles	X	
Smoothie (exact composition unknown)		X
Coffee or tea drink milk-based (exact composition unknown)		X
Quiche		X
Sushi		X
Fast food- type meal from fast food restaurant	X	

Appendix H. Participants' duration of use, device used to access, and main reasons for using their favourite social media platforms (Chapter 3).

Variable	n (%)
Active on platform at least 1-2 hours on a typical day, n (% of participants using the platform)	
YouTube (n=24) [a]	11 (46)
Snapchat (n=24) [a]	10 (42)
TikTok (n=15)	8 (53)
Instagram (n=26)	7 (27)
Pinterest (n=5)	1 (20)
Discord (n=2)	1 (50)
Facebook (n=2)	0 (0)
Twitter (n=1)	0 (0)
Reddit (n=1)	0 (0)
Devices used for at least one favourite social media platform, n (% of participants)*	
Mobile phone	35 (100)
Computer at home	23 (66)
Tablet or iPad	12 (34)
Smart TV	2 (6)
Computer at school	1 (3)
Main reasons to use favourite social media platforms, n (% of total number of platforms)	
Viewing posts/updates of friends	36 (35)
Messaging, talking with friends	34 (33)
Following the news or latest trends	11 (11)
Watching other videos or streamers content	8 (8)
Creating/sharing photos or videos	4 (4)
Watching videos: people playing games	3 (3)
Entertainment	2 (2)
For purchasing purposes	2 (2)
For ideas or inspiration	1 (1)
Listening to music	1 (1)

*Participants could select multiple responses

[a] N=1 data is missing

Appendix I. Selected examples of social media content, i.e., from Instagram, Snapchat, TikTok and YouTube (Chapter 4).

Figure D1. first example shown to participants active on Instagram.

Figure D2. second example shown to participants active on Instagram.

Figure D3. third example shown to participants active on Instagram.

Figure D4. fourth example shown participants active on Instagram.

Figure D5. fifth example shown to participants active on Instagram.

Figure D6. first example shown to participants active on Snapchat.

Figure D7. second example shown to participants active on Snapchat.

Figure D8. third example shown to participants active on Snapchat.

Figure D9. fourth example shown to participants active on Snapchat.

Figure D10. fifth example shown to participants active on Snapchat.

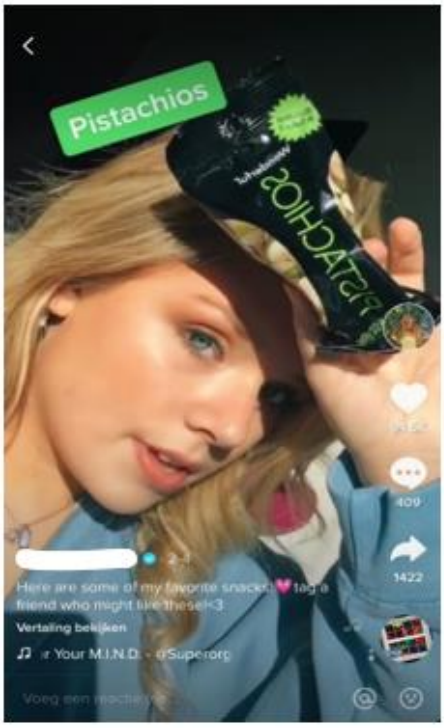


Figure D11. first example shown to participants active on TikTok.

Figure D12. second example shown to participants active on TikTok.

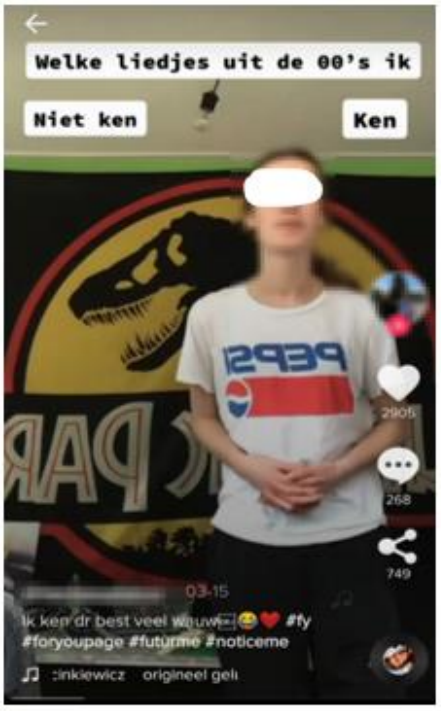


Figure D13. third example shown to participants active on TikTok.

Figure D14. fourth example shown to participants active on TikTok.

Figure D15. fifth example shown to participants active on TikTok.

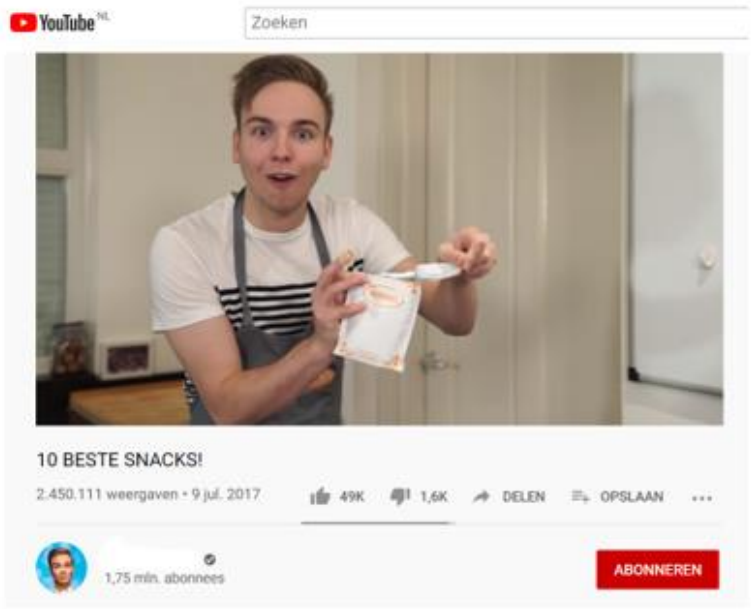


Figure D16. first example shown to participants active on YouTube.

Figure D17. second example shown to participants active on YouTube.

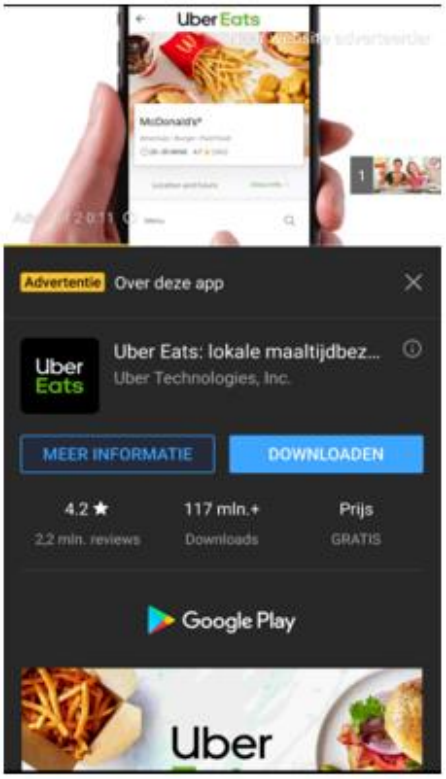


Figure D18. third example shown to participants active on YouTube.

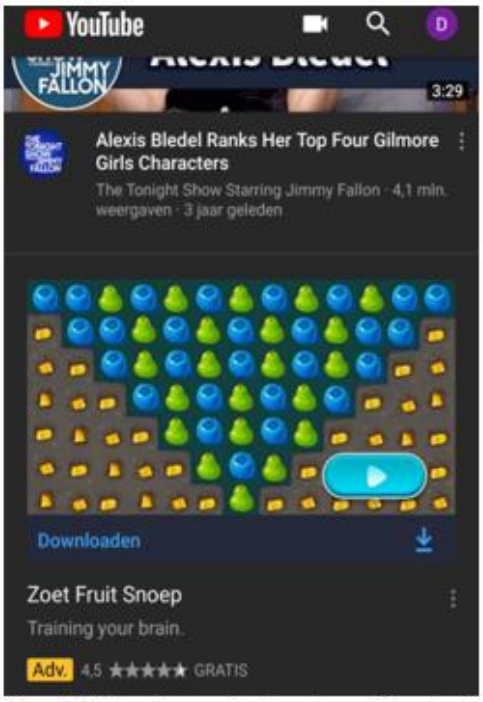


Figure D19. fourth example shown to participants active on YouTube.

Figure D20. fifth example shown to participants active on YouTube.

Appendix J. Experimental conditions TikTok influencer marketing, with no disclosure vs disclosure and low vs high product-plot integration levels (Chapter 5).

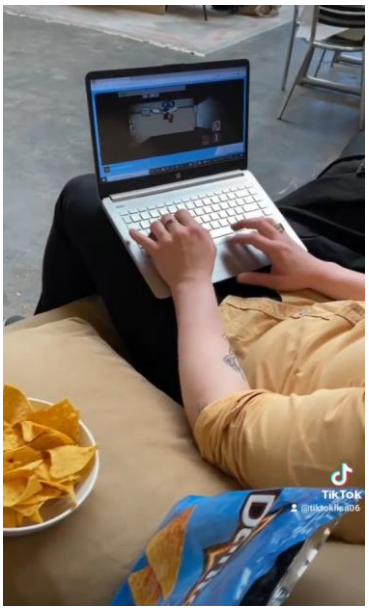


Figure 1: Video with low product-plot integration and no sponsorship disclosure

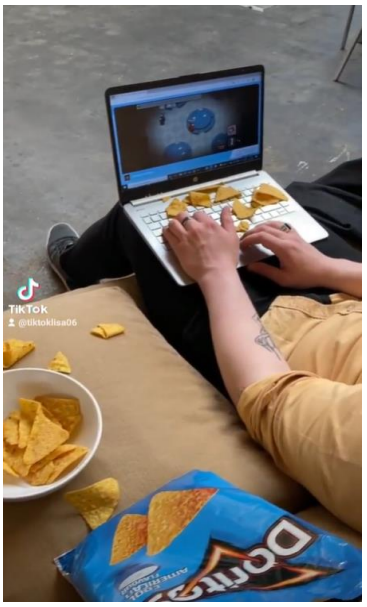


Figure 2: Video with high product-plot integration and no sponsorship disclosure

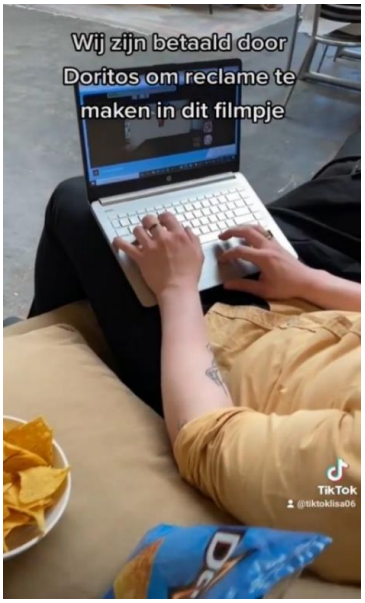


Figure 3: Video with low product-plot integration and a sponsorship disclosure

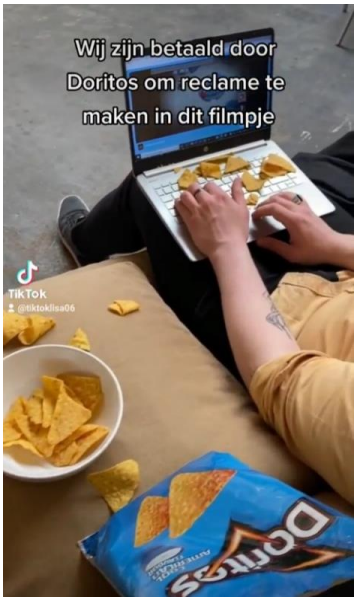


Figure 4: Video with high product-plot integration and a sponsorship disclosure

Summary

Over the past decades, food marketing communication strategies have changed as a result of digitalization. This has had implications for the food marketing tactics adolescents are exposed to, as this age group is among the most active users of digital and social media platforms. Besides that, adolescents are suggested to be cognitively vulnerable to palatable energy-dense, nutrient-poor (EDNP) food messages on social media, which may increase the intake of such foods. Yet, research on adolescent-targeted social media food marketing (SMFM) is still in its infancy, and more research is warranted to support stricter regulations that can protect adolescents against EDNP food marketing. The main aim of this thesis was to explore the nature, extent and impact of SMFM targeted to adolescents. The following research questions were addressed: (1) How is adolescent-targeted SMFM defined, what factors contribute to its effectiveness, and what future research- and policy directions do experts recommend regarding SMFM targeted to adolescents? (2) What quantity and type of unbranded and branded food promotions are adolescents exposed to on their favourite social media platforms? (3) What are adolescents' opinions and views about SMFM in terms of appreciation, awareness and recall? (4) How do adolescents define and identify food marketing on social media? (5) Can a sponsorship disclosure in SMFM with low versus high integration of a food brand in the plot increase adolescents' recognition of advertising, understanding of persuasive intent, critical beliefs, and change brand outcomes?

To address the first question, Chapter 2 provides the foundation and framework for the following Chapters 3, 4 and 5, and presents the results of a qualitative study for which 17 experts with multidisciplinary backgrounds (i.e., with clinical, research, policy or marketing expertise related to digital or social media and/or adolescent health or behaviour) were interviewed one-on-one. They were asked to provide a perspective from their field on how to define SMFM, on key factors involved in its effectiveness in targeting the adolescent group, and on future directions for empirical research and policies. The results illustrate that defining SMFM is challenging, as not only brands or commercial organizations but also social media users can now post and interact with branded content on social media. Transparency in the form of sponsorship disclosure would be key to recognise marketing intent better. Experts suggested that adolescents often do not consciously process food promotions on social media. A socio-ecological model is presented that shows the main factors influencing adolescents' processing of SMFM, which are related to their unique traits (e.g., identity formation, independence, impulsivity), social environment (e.g., peers, influencers), physical environment (e.g.,

buying power, online access), regulations and research at country level, and SMFM features (e.g., personalisation, entertainment, role models, interaction). Yet, according to experts more empirical research is needed to test SMFM effects in adolescents, as this can also guide the implementation of regulations that restrict adolescents' exposure to EDNP SMFM.

Chapter 3 of this thesis presents the results of an observational study that addresses one of the key gaps indicated by experts in Chapter 2 and other authors. This multi-method study provides quantitative insights into the nature and extent of 13–16-year-old Australian adolescents' (n = 35) exposure to unbranded and branded food promotions on their favourite social media platforms, and qualitative insights into the appreciation and perceived awareness of social media food marketing targeted to them. This was done through one-on-one interviews on Zoom that were screen recorded and during which adolescents were instructed to share their screen and visit a maximum of three of their favourite social media platforms. After the social media activity, adolescents were interviewed. A total of 1801 unbranded (n = 1221) and branded (n = 580) social media food promotions were identified, with a majority coming from Instagram, Pinterest and Snapchat. Adolescents saw a median of 12.0 (6.3 to 20.0) food posts per 10 minutes, of which the majority were considered EDNP and embedded in engaging content posted by entertaining channels or popular influencers. At the same time, many of these influencer posts did not contain any sponsorship labels, suggesting that influencers may not often disclose commercial intent. Adolescents disliked traditional, pop-up ads that interrupt what they are watching. They enjoyed entertaining short videos, and preferred high-quality, aesthetic posts that promote palatable EDNP foods. They recalled EDNP foods most often. The results imply that adolescents' exposure and enjoyment of entertaining, influencer-generated EDNP food marketing on social media is alarmingly high, and restrictions should protect their health.

The chapter thereafter, Chapter 4, describes the results of a qualitative study on adolescents' opinions on and evaluation of social media food marketing messages. Specifically, Dutch adolescents aged 13-16 years (n = 16) were shown examples of SMFM from Instagram, Snapchat, TikTok, and YouTube, and were interviewed about their appreciation and awareness of this content, and how they determined whether social media food content is marketing. The results show that adolescents generally like food promotions on social media, with those on Instagram being the most appealing. They appreciated short videos, influencer content, EDNP-type foods, and high-quality,

attention-grabbing, humorous and palatable-looking posts most. They disliked ads that were interruptive and popped up on their screen. Adolescents' criteria to define SMFM were generally related to the level of integration of products into posts, i.e., prominent focus on the product was seen as marketing. Subtle product placements were not seen as marketing, even if there was a 'Paid partnership' label shown. Posts with 'Sponsored' or 'Ad' disclosures were often recognised as marketing, likely because there was a clearer focus on the product in these posts. According to adolescents, influencers with many followers were more likely to be advertising products, while peers or less popular influencers were called to be 'indirect' or 'unofficial' promoting foods, as their posts looked less professional. This study fills an important gap in literature, as it shows that while being exposed to highly entertaining, integrated influencer- and peer-generated food posts on social media, adolescents do not seem to identify this as marketing, and they use rather traditional definitions to describe SMFM.

Next, Chapter 5 presents the results of an experimental study in Dutch adolescents 12-17 years old, which investigated to what extent a protective sponsorship disclosure in an influencer TikTok video with low versus high integration of a food brand into the plot mitigated persuasion in adolescents. This study took place in secondary schools, and students were instructed to watch a TikTok video on their phone and fill in a questionnaire on their recognition of advertising, understanding of persuasive intent, critical beliefs, brand attitude and product choice. The findings demonstrate that a sponsorship disclosure made TikTok influencer marketing intent more transparent, as it increased adolescents' recognition of advertising and their understanding of persuasive intent. These effects were found regardless of the level of product-plot integration. Yet, the disclosure did not help them to develop critical beliefs towards influencer marketing and also did not mitigate persuasion by impacting brand attitude or product choice. This study is the first to investigate the effectiveness of disclosure on brand placements in influencer short-form TikTok videos, showing that even in this particular fast-paced, immersive and entertaining environment, and regardless of the product-plot integration shown, sponsorship disclosure can be a promising tool to increase the transparency of influencer marketing intent among adolescents.

Altogether, from the empirical evidence provided by the studies in this thesis, it can be concluded that the contemporary social media environment has a large impact on the nature and extent of adolescents' exposure to, and their appreciation and awareness of food marketing. Since most adolescents' exposure to food promotions includes highly

engaging, palatable EDNP foods, which are embedded in posts' storylines and disseminated by social networks, adolescents see SMFM messages largely as something that is entertaining to watch, and they have no critical attitude towards. This is concerning, as it may enhance their unhealthy eating behaviours and compromise their health on the long term, especially given the extent of their SMFM exposure, and how much this adds to their food cue exposure on a daily basis. Adolescents are still in a cognitive developmental phase in which they are attracted to palatable, rewarding food cues and are sensitive to food-related behaviours of peers or role models, being in the midst of their identity development. While they do seem capable of activating consumer defences to some extent, e.g., with regard to pop-up advertisements that interrupt what they are watching and which they skip, they do not use this defence mechanism when watching entertaining influencer- or peer posts, which is the content they are most frequently exposed to. Yet, this thesis has shown that a sponsorship disclosure in a TikTok influencer marketing video helps adolescents recognise advertising and understand its persuasive intent, and thus can provide more transparency in a social media short-form video context. However, the tested disclosure did not trigger any critical beliefs or mitigate persuasion among adolescents, suggesting that other disclosure formats (e.g., that provide additional information about sponsorship) may be needed for them to actually resist SMFM. This indicates not only that more research is needed on potential ways to help adolescents defend themselves against SMFM, but also that consistent, continuous monitoring of the extent, nature and impact of different SMFM tactics is needed to inform more effective SMFM regulations.

Acknowledgements

There was a time I told everyone that I would never do a PhD. I guess working on the same topic for 4 years seemed unappealing and daunting to me. Frankly, I did end up doing a PhD after all, and there is no way I regret it. Yes, it was unappealing and daunting at times, but I have learned so much, and there were many awesome people that believed in me and made these moments seem doable and even appealing to me. I am very grateful for their support and would like to thank them.

First of all, I would like to thank my supervisors *Tamara*, *Ellen* and *Vanessa,* for their support during my PhD journey. I could not have had any better supervisors, as you all have so much expertise and contributed to supervising me in your own way, while forming one cooperative team. I have learned a great deal about conducting research from all of you, and you have guided me in a way that I did not feel restricted and could come up with my own ideas. Because much was possible within my project, I sometimes felt lost, but there was always one of you who could help me out. During our Dutch-Australian Monthly meetings I always appreciated the relative laidback atmosphere and the small talk about Dutch versus Australian weather or time differences before diving into the main topics. But most of all, I felt supported to express myself freely and say anything that came to my mind.

Tamara, wow, I realize I have known you for almost 9 years now! I vividly remember that period we met at UON; you just started there as Postdoc, and I was an intern from Wageningen University who was completing the last part of my Master's. I am really grateful to have worked with you since then, as you have not only provided me with invaluable guidance and encouragement throughout my research journey, but also became a dear friend over the years. Clearly, our paths were meant to cross again, since you were the one to manage getting funding for my Dual Award Doctoral Degree PhD - so I can actually blame you for making me do a PhD after all… Yet, I am grateful you did, as I cannot imagine having done anything else. Your expertise and dedication to the consumer behaviour field have taught me much about how successful research is conducted and I respect the large amount of work you are doing while still staying on top of it. The combination of mentorship and friendship have been invaluable; our conversations always felt like we were on the same wavelength, and I never hesitated to run any idea past you. Your personal approach made our PhD group 'Team Tamara' to a great success, and I am glad to have been part of it. Thanks for always believing in me, being positive, and challenging me to do things that seemed impossible, like getting ethical approval for the exposure study. I think I could not have had any better supervisor.

The funny thing is, *Ellen*, that before I started my PhD, you were already on the list of people I was eager to work with. Back when I worked for the Dutch Choices Foundation secretary and took notes at the Scientific Committee meetings, I remember this one time they discussed to invite established researchers from other fields, including you. Their discussions made me really look up to you and think: this person must have a lot of expertise! Much later, when I was looking for a research job, I applied for a PhD for which you turned out to be the main contact person. However, I was not invited for an interview, which was disappointing as I thought I had a good chance. I found the courage to call you and ask why I was not invited. I remember you were so friendly and easy to talk to, and I did not feel nervous at all for asking. This is exactly how I would describe you as my supervisor; because you are really easy going, positive, curious, and open to discuss anything anytime, I always felt like I could be myself when brainstorming about my research. Your high level of expertise and views have taught me a great deal about the consumer research field, and I would like to thank you for your inspiration, encouragement, and all the pleasant brainstorm sessions we have had. Also, I really appreciated the dinner at your house, it was so great meeting your lovely family!

Vanessa, I only got to know you right at the start of my PhD, and I remember Tamara introducing you to me beforehand, telling me many positive things about you, and that you would be a valuable asset to the supervisory team. Indeed, she could not have been any more correct; you greatly contributed to the team. When I sent you work I had written, I knew I would always get detailed feedback from you, which was very helpful and it also made me look at my work from a different angle. Also, your insights and advice during meetings were helpful; at times you brought things to the table that no one else had thought of and that was refreshing. You inspired me to stay on top of my work and I really value and respect your research expertise and meticulousness. Besides that, I also greatly appreciate you as a person. You are kind, positive, interested, and always ready to help. You tried to make as many (online) meetings as possible, even though some were at impossible times and you had to take care of your kids and/or they were distracting you in the background. It was lovely to meet them by the way, also during the coffee we had before I left to the Netherlands. Personally, I really appreciated that moment!

Next, I would like to thank my fellow PhD mates who were all part of '*Team Tamara*' or the '*Nutrition Education group*' in Australia at some point in time. We are not only colleagues, but also have become friends. I liked the low-key and positive atmosphere during our bi-weekly meetings, and the respect and interest we had towards each other´s

projects. We encouraged each other, advised each other, and celebrated every win. It has helped me a lot that this group of supportive friends was always there. Besides that, I really enjoyed the fun things we did, such as the cooking classes on Zoom (even though I had to cook dinner in the early morning due to the time difference) and other outings such as going out for drinks and picnics. *Angeliek*, thank you for your positivity, encouraging talks, walks around Callaghan campus, and teaching the best RPM classes ever! Also, sharing your DADD experiences has helped me understand better how it all worked, I would have been lost without your knowledge. *Berit*, I am sad you are not living in Australia anymore, but I cherish the things we did together, such as parkrun, going for coffee, on hikes, and most importantly: getting free food at the Callaghan campus (remember the crocodile sausages?!). *Eva*, you have become a good friend. As you were also doing a DADD, we were both in the same situation of having to move country, so we understand each other well. I do not know where life will take you after your PhD, but I know at some point we will both be in Wageningen and go for coffee again! *Tammie*, thank you for being a loyal and supportive friend, who even sent me postcards to the Netherlands! I will always remember our versatile discussions on Zoom, about the strangest social media food content we viewed; we had difficulty but also a lot of fun coding it, and your perspective was always refreshing. *Irma*, I only got to know you later in my PhD, and I am glad I did. You are positive, open, curious, willing to help others, and it was interesting to hear about your project as it is so different from mine. With your talent and dedication you will get really far!

I would also like to thank all of my colleagues at MCB. You are one big family and I felt welcome from the minute I entered the department. When I was at the office, I liked that everyone always went for lunch together, and I enjoyed the outings and conversations in the corridors. *Theresa*, you started working at MCB not long after me, and we soon became friends. Thanks for your attentiveness, openness, inviting me to your house for work and/or dinner, and for the many good conversations we have had. *Roselinde*, I am glad we became office buddies for a while. I enjoyed our conversations and sharing our frustrations about students in the Applied course we were teaching. It was nice to organize the ISBNPA symposium together! *Monique*, I enjoyed the dinners we had at your house. It was fun talking about the cycling trips we were both doing with our dads. *Jurriaan*, it was always fun to run into you at the office. Your positive energy and ideas are so refreshing. I enjoyed following the EDEN seminar together. *Ellen Vossen*, thanks for being a great secretary and helping me out with whatever question I had. I enjoyed

our conversations about our mutually beloved Amsterdam. *Erica*, thanks for sharing your office with me during COVID restrictions, including your amazing plant that (surprisingly) survived. *Ellen van Loo*, thanks for giving me the opportunity to give a guest lecture in your course on Digital food marketing, it was a great experience for me. *Alain,* thanks for organizing great pub quizzes, it was always so much fun! *Xin, Cas, Giulia, Paul, Milly, Yi, Serdar, Jacco, Arnout, Ivo, Caspar, Haoran, Betina*, thanks for the nice conversations during lunch or in the corridors. Finally, I would like to thank you, *Hans*, for your constructive feedback. Your questions were often challenging and I feared them a bit, but they helped me to stay critical about my own work. I also appreciate you as a person, you are always interested in others and enthusiastic to participate in MCB outings, which is nice - except for that time you shot me at laser tag…

I would like to address special thanks to my three paranymphs, *Nienke, Laura* and *Eva*. *Nienke*, I am lucky I got to know you during my Master's, and to be in this great 'Aussie adventure' with you since our internship in 2014. Who would have thought we would both still be living the Aussie life right now?! You are a loyal friend, who is always there to help me out, and I am happy we got to share so many good memories. I know there will be many more to come! *Laura*, I only got to know you since I started working at MCB in 2021, which is not long at all, but we got along instantly during the MCB day out. I remember someone asking whether we already knew each other. I feel like we are just on a very similar wavelength, and I hope we can continue our highly appreciated and endless Teams conversations in some way! *Eva*, you were my Utrecht buddy. It also feels like I have known you forever, while I only met you at the MCB office. I always really enjoyed our cycling trips and dinners together – with or without sunglasses on of course. You are always so considerate and care about others. I miss hanging out with you in Utrecht.

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I would like to thank my *Mum* and *Dad* for always being there; loving, encouraging, positive, but also critical sometimes when I need it. Thanks for letting me crash at your new house in 'Wagie' for a while before I moved back to 'Aussie'. I am glad you have found such an amazing place. I know it must have been hard for you to see me move Down Under, yet, be prepared I will be crashing at your house every summer from now on…

Although my PhD has physically separated us for a while, in a way it has also brought us together, *Ross*. Thanks for always listening to me, also from the other end of the line when we were apart. I love our life in our new home, and going out to take photos and explore new places with you. Your caring, supportive, laidback character helps me worry less and live in the moment. *Audrey,* I always look forward to your 'Good night, Welterusten, Bonne nuit' texts. It has made the distance seem smaller when I was gone. We always have so much fun together. I am excited for what will come for you, Eli, Daddy, and me.

Daphne

About the author

Daphne van der Bend was born in Amsterdam, the Netherlands, on the 16th of March 1990. In 2011 she completed the Bachelor Health & Life Sciences at the Free University in Amsterdam. Daphne developed a particular interest in nutrition, front-of-pack (FOP) nutrition labelling and consumer behaviour during the Master Nutrition & Health (specialization: Epidemiology & Public Health) at Wageningen University. She completed her Master thesis at the University of Newcastle (UoN), for which she analysed trends in Australian children's portion sizes and published the results in a scientific journal under the supervision of Prof. Clare Collins. Meanwhile, she was also involved in Dr. Tamara Bucher's consumer behaviour research.

In the 1.5 years following her Master, Daphne was Trainee at the Dutch consultancy Schuttelaar & Partners, where she studied the influence of the Dutch Healthy Choices FOP logo on product reformulation - the outcomes of this study were published in a scientific journal. Besides this, Daphne was involved in multiple projects advising food industry in the area of nutrition, health and sustainability. Yet, she realized that doing research is more her thing, and became research assistant and junior researcher at the Longitudinal Aging Study Amsterdam (Vrije Universiteit, Amsterdam). She worked with large datasets containing medical and health-related data of the elderly population. She continued working for the International Choices programme and published an article on European FOP labels.

In February 2019, Daphne started a Dual Award Doctoral Degree PhD at UoN, with Dr. Tamara Bucher and Dr. Vanessa Shrewsbury at the College of Health Medicine and Wellbeing, and Dr. Ellen van Kleef at the Marketing & Consumer Behaviour Group, Wageningen University & Research (WUR) as her main supervisors. For her thesis project, of which the results are presented in this book, she conducted research in both Australia and the Netherlands. Daphne hopes to continue working in research after her PhD, potentially on a similar topic, or otherwise on topics related to public health, nutrition and consumer behaviour.

List of scientific publications

Van der Bend DLM, Gijsman N, Shrewsbury VA, Bucher T, van Trijp H, van Kleef, E. *Can I @handle it? The effects of sponsorship disclosure in TikTok influencer marketing videos with different product integration levels on adolescents' persuasion knowledge and brand outcomes*. Computers in Human Behavior 2023; 144(5):107723.

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Training and Supervision Plan

Daphne van der Bend
Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Wageningen School of Social Sciences

Name of the learning activity	Department/ Institute	Year	ECTS*
A) Project related competences			
A1 Managing a research project			
Reviewing paper for Nutrients	Nutrients	2019	1
Reviewing paper for JNEB	JNEB	2020	1
Reviewing paper for Appetite	Appetite	2022	1
'Differences and Similarities between Front-of-Pack Nutrition Labels in Europe: A Comparison of Functional and Visual Aspects'	26th European Congress on Obesity, Glasgow (Scotland)	2019	1
'Social media food marketing and dietary behaviours in adolescence: experts' perspectives on key priorities, challenges and strategies'	Nutrition & Cooking Education Symposium, UON	2020	1
WASS Introduction Course	WASS	2021	1
'Adolescents' awareness and appreciation of social media food marketing'	ISBNPA Annual Meeting, virtual	2021	1
'The nature and impact of adolescent-targeted food marketing on social media'	ISBNPA Annual Meeting, Phoenix (US)	2022	1
A2 Integrating research in the corresponding discipline			
Introduction to programming with R	UON	2019	0.5
Digital and Social Media Marketing (MKTG3002), without examination	UON	2019	1
Workshop/training on delivering the SALSA (Students As Lifestyle Activists) program, and subsequent delivery to high school students in Gosford	Westmead Hospital (Sydney) & Henry Kendall High School (Gosford)	2019	1
Master class WASS: Habits	WASS	2021	0.5
Cyberpsychology Section Virtual Seminar	The British Psychological Society	2021	0.5

EDEN Doctoral Seminar on Consumer Research	EIASM	2022	4
Artificial Intelligence for Food and Health (INF36803)	WUR	2022	3
B) General research related competences			
B1 Placing research in a broader scientific context			
Public Health Research in practice: Evaluation and adaptation of public health interventions: the role of context	VLAG, in cooperation with the Social Sciences group	2018	1
Chair at the Sustainable Food Future Conference	UON	2021	1
Philosophy of Social Science	WASS	2022	3
Symposium organisation	ISBNPA Annual Meeting, Phoenix	2022	1
B2 Placing research in a societal context			
Writing article 'Voedselkeuzelogo's onder de loep genomen (longread)'	VMT	2019	1
Interview for blog	TMI Academy	2020	0.5
Interviews for local radio stations and newspaper	ABC News, 2NURFM, Newcastle Herald	2020, 2021	0.5
C) Career related competences/personal development			
C1 Employing transferable skills in different domains/careers			
Assertive Communication	University of Sydney	2019	0.5
Lecturing, grading and tutoring 3rd year students in the course Functional Foods & Health Claims	UON	2019, 2020	1
Supervising MSc. Thesis student Tjamke Beunke	WUR	2020	1
Supervising MSc. Thesis student Nerine Gijsman	WUR	2022	1
(Co-) supervising group of students in the course Applied Consumer Studies	WUR	2022	1
Career Orientation	WASS	2022	1.5
Total			**32.5**

*One credit according to ECTS is on average equivalent to 28 hours of study load

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