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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 summarized 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.

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 (Patton et al., 2014, 2016). The WHO indicated that globally more than one in six adolescents, i.e. individuals aged 10–19 years, was overweight in 2016 (World Health Organisation, 2018). 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 (Ogden et al., 2016; van Jaarsveld & Gulliford, 2015). 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 (Tucunduva Philippi et al., 2016; World

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Health Organisation, 2005). Adolescents' dietary patterns are generally characterized by frequent snacking, fast-food consumption, and meal skipping (Vaitkeviciute et al., 2015). 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 (Kaikkonen et al., 2013; Patton et al., 2011; Singh et al., 2008; Vaitkeviciute et al., 2015). One major factor influencing dietary behaviours is food marketing (Smith et al., 2019). Food marketing refers to "*any communication that is designed to increase the recognition, appeal, and/or consumption of particular food products, brands and services*" (Cairns et al., 2013). 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 (Folkvord et al., 2016; Story & French, 2004). 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 (Smith et al., 2019; Cairns et al., 2013; Scully et al., 2012; Giese et al., 2015; Harris et al., 2009a; Boyland & Halford, 2013; Boyland et al., 2016; Qutteina et al., 2019). 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 (Department of Health, 2019; Tatlow-Golden et al., 2016).

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 (Tatlow-Golden et al., 2016). 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 (Buijzen et al., 2010; Tatlow-Golden et al., 2016). It has been argued that adolescents are particularly vulnerable to this type of content as they are still in a phase of cognitive development (Cairns et al., 2013; Smith et al., 2019).

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 (Anderson & Jiang, 2018). YouTube, Instagram and Snapchat are the most popular social media platforms among American adolescents (Anderson & Jiang, 2018). In a Canadian study from 2019 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 (Potvin Kent et al., 2019).

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 (World Health Organisation, 2016). 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 (Tatlow-Golden et al., 2017; Townsend et al., 2017). 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 (Dunlop et al., 2016). 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 (Fleming-Milici et al., 2021). Recent studies demonstrate that adolescents are highly exposed to EDNP food marketing on social media, posing a large threat for adolescent health (Potvin Kent et al., 2019; Qutteina et al., 2019).

To date, food marketing restrictions have mostly focussed on reducing unhealthy television advertisements amongst children up to 12 years (Boyland & Tatlow-Golden, 2017; Freeman et al., 2016). 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 (Boyland & Tatlow-Golden, 2017).

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 policy makers.

2. Materials and methods

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 (Döringer, 2021). 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 (Bogner et al., 2009, pp. 1–13).

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 (Guest et al., 2006).

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-min 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. 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 think 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 and the other document unbranded examples (Appendix B). 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 (Buijzen et al., 2010). Focussing 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) (Folkvord et al., 2016). 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.

2.3. 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 (Saldaña, 2009, p. 223), 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 (Story et al., 2002; Townsend & Foster, 2013).

3. Results

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 May 7, 2020 and June 17, 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 1). A minority of participants provided rather practice-based perspectives (8, 9, 16, 17; Table 1) and some

Table 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

experts' perspectives could be considered a mix of both practice and research-evidence based (3, 4, 7, 11; Table 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 programs 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 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.

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. Fig. 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.

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)

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 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

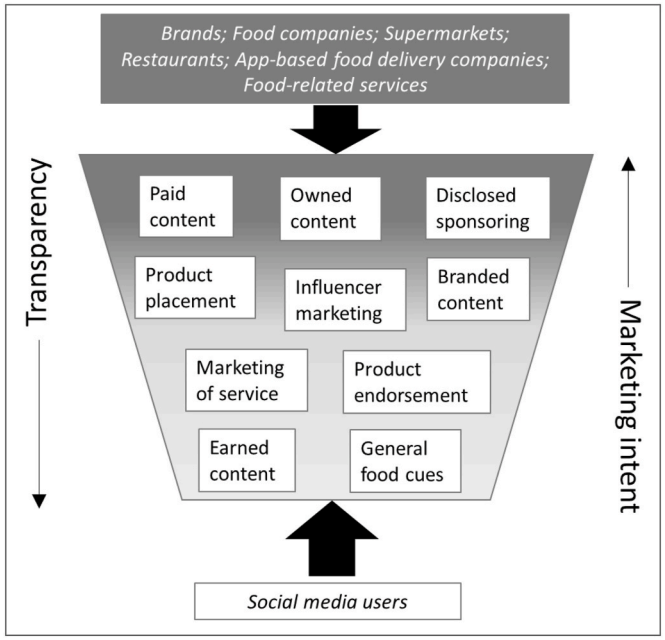

Fig. 1. Concept map showing different types of food content on social media that experts mentioned when defining SMFM, after having viewed examples of branded and unbranded social media food content. According to experts, for content to be considered SMFM, this would often depend on the underlying marketing source or intent of a social media message or post, and the transparency about this source or intent would increase their certainly 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.

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 sponsorship 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)*

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. 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.

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)

3.2.5. Effect on the receiver

In addition to the factors described in Fig. 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 recognize 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)*

Thus, one particular social media food-related message may have very different effects on different receivers, as some may find it more difficult to judge whether social media food content is SMFM than others.

3.2.6. Owned content, product placement, and product endorsement

Finally, five experts mentioned that social media food content created and shared by a food company or brand account, 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)*

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 in direct 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 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).

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 influencing the effect of SMFM on adolescents' consumption or purchasing behaviour. All key factors identified in the expert interviews are summarized in the SEM in Fig. 2 and indicated in *Italic* throughout the text.

3.3.1. Individual level - mediating factors

Adolescents' reaction to SMFM 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 feeling of guilt 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

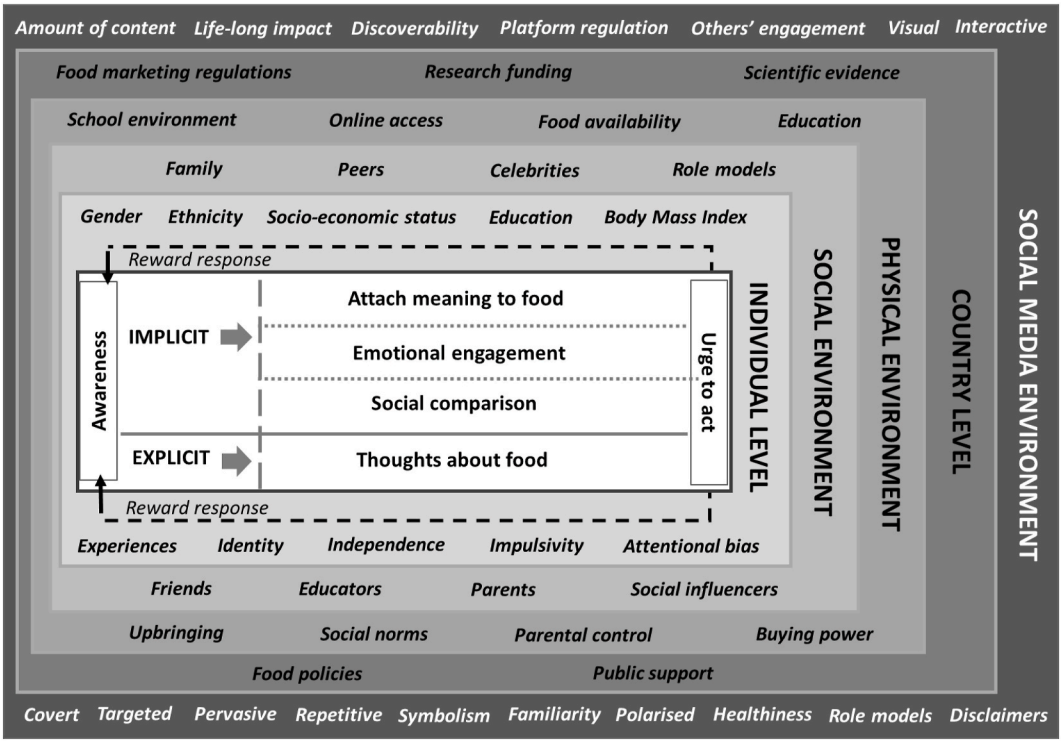

Fig. 2. Social Ecological model describing how social media food marketing (SMFM) may impact adolescents' dietary behaviours on different levels (i.e. on individual, social, physical environment, country and social media environment levels). Adolescents' processing of SMFM on an individual level may be mostly implicit, which involves attaching a symbolic meaning 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 thinking about the brand or product, 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 by experts during interviews.

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 mayreinforce 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)

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 (Harris et al., 2019). 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 not 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 *unexperienced* 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)

3.4. Social and physical environment - moderating adolescent-related factors

The above quote directly relates to factors in the social level of Fig. 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 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. 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. Thus, being able to deal with something you don't like or being able to accept setbacks, being able to resist, being able to recover, and being 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 income, and where the parents have a higher educational level." (Senior Public health promotion researcher, The Netherlands)*

3.5. 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 mention 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 and 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.

3.6. 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 Socio-Ecological Model in Fig. 2 and indicated in *Italic* throughout the text below.

3.6.1. What should SMFM ideally look like – strategies

From the experts' responses several themes were identified (Table 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.

Table 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 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."*	Public health promotion 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

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.

3.6.2. 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.

3.6.3. 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 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

Table 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	*"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 policy makers care about."*	Public health (policy) researcher, Australia
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*	Social marketing researcher, Australia

(*continued on next page*)

Table 3 (*continued*)

Research focus area	No. of experts	Quotes	Expert mentioning quote
		influence around them."	
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 communication researcher, Belgium
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

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), i.e. 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.

3.6.4. 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.

4. Discussion

In this study, experts with both research- and practice-based perspectives on social media food marketing (SMFM) and/or adolescent health behaviours, were interviewed to gain better insights into potential factors influencing the association between SMFM and adolescent dietary behaviours, and to prioritize research and policy actions in this area. During the expert interviews, different definitions and types of social media food content that are considered relevant in the SMFM context were discussed, 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) (Competition & Markets Aut, 2019). Yet, the current rules rather seem to serve as guidelines instead of strict mandatory regulation, as influencers have still been found to breach them (Sweney, 2021). Possibly, the absence of any clear mandatory global 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 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. (Buijzen et al., 2010), which may typically be activated when consumers are exposed to highly embedded advertising messages, and this is 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 (Buijzen et al., 2010). Logically, if adolescents' processing of SMFM would be described by a typical marketing communication model such as a Hierarchy-Of-Effects (HOE) model (Rouse, 1991), 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 (Zimmermann & Iwanski, 2014). Therefore, affective responses to advertising, mostly measured by ad liking or attitude towards the ad, were found to be strong predictors of purchase (Harris et al., 2009b).

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 (Pechmann et al., 2005). 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 (Pechmann et al., 2005). 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 (Bryan et al., 2019).

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 (Lou & Yuan, 2019; Nouri, 2018). This relates to the concept of prototype perception which was introduced in the Prototype Willingness Model (PWM) (Gerrard et al., 2008), 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 (Gerrits et al., 2009). 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 (Branley & Covey, 2018). 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 (Coates et al., 2019; Folkvord & de Bruijne, 2020), or on online social networks, and the influence of influential peers in these networks (NWO, 2020).

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 as it provides 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 policy makers 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 (Smith et al., 2019; World Health Organisation, 2019). 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 (Potvin Kent et al., 2019; World Health Organisation, 2019). Yet, regulations around digital food marketing are largely non-existent (Boyland & Tatlow-Golden, 2017). Besides this, current food marketing regulations focussing 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 (Boyland & Tatlow-Golden, 2017; World Health Organisation, 2019). 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 (Sweney, 2020).

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 (World Health Organisation, 2019; Cancer Council Victoria, 2020), 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 (World Health Organisation, 2019). Although it has been argued that increased advertising literacy may not fully enable children to defend themselves effectively against affective, entertaining and embedded advertising tactics (Rozendaal et al., 2011), focussing 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.

Ethical statement

This study was approved by The University of Newcastle's Human Ethics Committee, approval number Approval No. H-2019-0309. Oral informed consent was obtained from all participants prior to participating in this research.

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Authors' contributions

DB, TB, VS and EK contributed to the design of the study. DB oversaw acquisition of the data. DB and TJ coded and analysed the data independently, discussed their outcomes and decided on a final coding structure and themes. DB drafted the manuscript based on these final outcomes. All other authors provided feedback on the following drafts of the manuscript. All authors have approved the submitted version, and have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

Declaration of competing interest

The authors declare that they have no competing interests.

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Appendix A. Supplementary data

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