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A scoping review of children's and parents' attitudes to and awareness of digital food marketing

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Abstract

Digital food marketing (DFM) of unhealthy foods and beverages (high in saturated fats, sugar and salt) to children and young people influences brand recall, recognition, purchase intentions and attitudes, and increases consumption of unhealthy foods and beverages. Understanding children's and parents' awareness of, and attitudes toward, such marketing is crucial for developing health-promoting advocacy and policy solutions. This registered systematic scoping review synthesized literature on children's, young people's and parents' attitudes and awareness of DFM. A structured search of Medline, PsycInfo, Academic Search Complete (Ebscohost), Scopus and CINAHL was conducted. Inclusion criteria were peer-reviewed studies focused on children (<18 years), young people (<24 years) or parents, published after 2000, examining attitudes or awareness of online marketing of food or non-alcoholic beverages. Data were extracted and charted in Excel. Forty studies were included for synthesis. Studies of children/young people (n = 31) show varying levels of awareness regarding DFM on social media and other digital media. While some understand social media marketing tactics, others struggle to recognize ads. Preferences lean towards influencer marketing and 'native' advertising styles. There is limited evidence on parents' views (n = 9 studies), but these suggest low parental awareness of digital marketing tactics targeting children, and unclear opinions on regulation. Overall, the findings suggest a need for a versatile, trans-disciplinary research and advocacy agenda to capture the complex and rapidly evolving digital marketing landscape, enhance critical digital literacies (including power inequalities) for both children and parents, increase knowledge-sharing and advocacy, and develop regulatory policies.

Keywords : advertising, children, digital food marketing, scoping review, parents, young people, commercial determinants of health

Contribution to Health Promotion

- This study synthesizes research findings on children and parents' awareness of, and attitudes to, digital marketing of unhealthy food.
- Children show varying levels of awareness of digital food marketing (DFM)—some understand social media marketing tactics, others struggle to recognize ads.
- Parents appear to have limited awareness of the strategies and formats used by marketers online and underestimate the effects of DFM on children.
- To increase awareness of DFM and its effects among children, health promoters and researchers should seek innovative ways to engage with children and parents in order to develop advocacy and policy solutions that promote health.

INTRODUCTION

Understanding children and young people's, and parents' awareness of, and attitudes to, marketing of unhealthy commodities is key to developing advocacy and policy solutions that promote health. It is essential to avoid shifting responsibility for managing harmful marketing to individuals, yet creating meaningful policy addressing unhealthy food marketing, and designing evidence-informed materials to increase children's, adolescents' and parents' critical digital health literacy requires engaging them in dialogue (Sykes *et al.*, 2018). To create such dialogue, researchers need to identify awareness of media marketing issues and techniques, as well as recall and attitudes. This is particularly important for digital marketing, given that digital advertising literacy has been found to only reach adult levels in later adolescence (Zarouali *et al.*, 2020).

Robust evidence points to the impact of digital marketing of unhealthy food and non-alcoholic beverages (*i.e. high in saturated fat, salt and sugar*) on children's health and well-being via the relationship between food marketing and dietary choices and behaviours (Boyland *et al.*, 2022). Digital food marketing is defined by the World Health Organization as, '*Promotional activity, delivered through a digital medium that seeks to*

maximize impact through creative and/or analytical methods' (WHO, 2019). Digital marketing for food and non-alcoholic beverages (henceforth digital food marketing, or DFM) seeks to leverage children's and adolescents' interests, preferences and developmental needs and vulnerabilities, with implications for rights to health, privacy, to participate in society, and to be free from economic exploitation (Tatlow-Golden and Garde, 2020).

Digital food marketing to children and adolescents affects responses to unhealthy food (Folkvord and van 't Riet, 2018; Granheim *et al*., 2022), with meta-analysis showing significant effects on preference, choice and eating (Boyland *et al*., 2022). A meta-analysis found that unhealthy food advertising increased dietary intake among children aged 2–14 years in five studies with experimental conditions for advergames (Russell *et al*., 2019), and that children exposed to advergames consumed an average of 53.2 kcal (95% CI: 31.5–74.9) more than children exposed to non-food advertising—enough to translate to weight gain over time if repeated regularly. This aligns with findings reporting a relationship between advergames and consumption of unhealthy food and drinks (Elliott and Truman, 2019; Coleman *et al*., 2022). This pattern is also seen in DFM on social media; exposure to social media marketing by influencers increased snacking on unhealthy foods and intake of unhealthy drinks (Sina *et al*., 2022), and promotion of unhealthy snacks by social media influencers mediated children's decisions about food and increased consumption of unhealthy foods (McCarthy *et al*., 2022). The more social media consumed by children and adolescents, the more likely they are to report consuming sugar-sweetened beverages (Kucharczuk *et al*., 2022). User- and peer-generated social media posts have a greater impact on adolescents' intention to purchase and consume sugary drinks, suggesting that viral marketing among/by peers may have a greater influence on behaviours than other marketing strategies (Harris *et al*., 2021).

The impact of some forms of DFM on children's and adolescents' dietary behaviours has been relatively well-documented to date, but the pace at which online marketing practices are evolving means that research frequently struggles to keep up with new developments. Digital food marketing can be paid/sponsored (the brand pays the platform and/or content creator to promote or make content, respectively), owned (the brand generates their own content for the brand-identified social media page) or earned (marketing material is shared organically by users). Any of these formats can include the use of: 'influencers', vloggers, celebrities and other popular personalities or personas; entertainment, humour and narrative approaches; games/advergames, or augmented reality and virtual environments; and techniques to target specific groups and tailor content to individuals based on data gathered through browsing history and other means.

Digital marketing practices and strategies, especially on social media, are becoming increasingly opaque and ambiguous as conventional analogue-era ad formats and styles have been replaced by newer formats that blur the lines still further. A key early shift to new DFM formats that obfuscate boundaries between content and marketing was so-called *native advertising*, where brands create paid-for content that mimics the look, sound and style of user-generated content 'native' to the platform, increasing attention and click rates compared to older 'banner' advertising styles (Einstein, 2015). Indeed, more recently, in advising on how best to increase engagement, the social media platform TikTok called on brands and advertisers to 'stop making ads', and instead engage with content-creators and influencers, and utilize the platforms creative and stylistic features and 'For You' algorithm to tailor-make marketing content that is 'authentic' and 'real' and blends into the feed seamlessly (TikTok, 2021). A further example current at the time of writing is *branded hashtag challenges*, where brands instigate, or capitalize on, viral challenges to encourage users to generate content that promotes their brand and/or product. Thus, the interactive character of social media marketing, and ensuing opportunities to engage with brands and their content (Montgomery and Chester, 2009), celebrities' (Calvo-Porral *et al*., 2021) and influencers' endorsements (Coates *et al*., 2019), and the personification of brands (Jeong *et al*., 2022) all contribute to a powerful tool with unparalleled reach that can be used to manipulate children's and adolescents' dietary preferences and behaviour with very little advertiser spend.

While systematic, scoping and rapid reviews have therefore evidenced the effects of DFM on child health behaviours and outcomes (Boyland *et al*., 2022; Granheim *et al*., 2022; Kucharczuk *et al*., 2022), and the power of DFM to children (Elliott and Truman, 2019), much less attention has been paid to synthesizing the evidence on attitudes to and awareness of DFM among both children and parents, how these are assessed, and how they relate to one another. Parents may assume that children can distinguish between commercial and general media content, however, this is an assumption that is usually predicated on an incomplete understanding of the newer tactics and strategies of advertisers online (Loose *et al*., 2022). Furthermore, parents are often more preoccupied with 'screen time' (time children spend on devices overall) rather than considerations of what content they are engaging with during that screen time, including exposure to commercial content and its effects (Loose *et al*., 2022). Yet mapping both children's and parents' views is crucial, as parent and child awareness is needed to form partnerships with one another, with civil society, and policymakers, and together engage in knowledge-sharing, awareness raising, and advocacy for policy change (WHO, 2019).

Thus the aim of this scoping review is to gather, summarize and critically explore the extant literature—both methods and findings—on children's, adolescents' and parents' awareness of and attitudes to the marketing of unhealthy food and beverages to children and adolescents.

The research questions underpinning the review are as follows:

> RQ1: What are the methods used to assess children's, adolescents', young people's and parents' attitudes towards and awareness of digital marketing of unhealthy foods and beverages?
>
> RQ2: What are children's, adolescents' and young people's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages?
>
> RQ3: What are parents' awareness of and attitudes towards the digital marketing of unhealthy foods and beverages to children and adolescents?

METHODS

Given the exploratory nature of this research, a scoping review method was selected. Scoping reviews are useful to identify the types of evidence available on a particular topic;

to identify methods addressing key questions on a particular topic; to clarify key concepts or definitions; and to identify and analyse knowledge gaps (Munn *et al*., 2018). As one of the key aims in this study was to investigate methods most commonly used to assess attitudes and awareness of DFM, and it was anticipated that a relatively heterogeneous sample of literature would be gathered, a scoping review was deemed most appropriate. Scoping reviews can provide a more expansive overview of a disparate body of literature, but similarly to other systematic-style review approaches, use structured systematic concept searches on trusted databases, pre-defined inclusion/exclusion criteria, a screening process and data extraction. A registered protocol for this review outlining eligibility criteria and search strategy was uploaded to the Open Science Foundation on 15 December 2022 (Muc *et al*., 2022). We drew on JBI guidance in drawing up the protocol and conducting the review (Peters *et al*., 2015).

Study context

This study was conducted as part of a larger mixed-methods, interdisciplinary project, *CLICKBITE*, exploring DFM and children's rights in Ireland, applying the WHO CLICK Framework (WHO, 2019) that recommends States carry out studies that map the digital marketing system, comprehend the marketing landscape, investigate children's actual exposure and engage in knowledge exchange with stakeholders. To realize this, CLICKBITE has investigated the food marketing landscape, carried out focus groups with children aged 7–17, as well as parents, to explore attitudes and awareness of DFM, captured children's screen activity to measure their actual exposure to DFM, carried out interviews with advertisers and completed a policy analysis with a child rights focus.

Eligibility criteria

We included studies that focused on children, adolescents or young people, or parents of children/young people. In Ireland, the national policy framework defines children and young people up to the age of 24 years, and the World Health Organization defines youth as aged 15 to 24; hence we similarly adopted these age limits for study inclusion. We also limited inclusion to studies published after 2000, given that the early to mid-2000s is when digital advertising moved towards more targeted models and social media was in its inception (Kelly-Holmes, 2015). Other inclusion criteria stated that studies should focus on the digital marketing of food or non-alcoholic beverages to children, and be published in English, German, Spanish, Portuguese or Polish (languages spoken by the research team). Studies were excluded if they focused on non-digital food marketing, focused on DFM to adults, focused exclusively on alcoholic beverages, were social marketing studies to improve children's nutrition, or did not describe attitudes and/or awareness. Grey literature and opinion pieces were excluded. Reviews were also excluded although their reference lists were examined for possible relevant studies. We set no limits on study design (see Muc *et al*., 2022, for further details).

Search strategy and abstract screening

The search strategy was structured around three core concepts: population, digital marketing and food and beverages (see Table 1 below for concept grids). We worked with an expert research librarian to develop the search strategy in Medline, which was then translated across to PsycINFO, Academic Search Complete (Ebscohost), Scopus and CINAHL. We used a combination of free text terms and database-specific thesaurus terms, so each strategy varied slightly (see Supplementary File S1 for complete Medline search strategy).

Table 1: Concept grids

Concept 1: Population	Concept 2: Digital marketing	Concept 3: Food beverage
Child*	Marketing	Food
Adolescen*	Advert*	Beverage
'young people'	Brand	Drink
Parents	Commercial	Snack
Teenage*	Online	Soda
	Internet	
	Digital	
	Influencer	
	'Social media'	

After strategy refinement, we ran searches on 29 September 2022, identifying a total of 18,863 records; we updated this search on 22 March 2024, returning an additional 1,773 records. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram was used to keep track of records (see Figure 1 and Supplementary File S3 for PRISMA-ScR checklist). De-duplication was carried out in Endnote™ bibliographic software, resulting in samples of 11,953 (September 2022) and 1773 (March, 2024). These samples were exported to Rayyan™ for abstract screening. Two reviewers (M.M.D.E. and E.V. and M.M.D.E. and E.B.) independently screened abstracts in Rayyan to identify 128 and 25 records eligible for full-text screening in 2022 and 2024, respectively. Full-text screening against inclusion/exclusion criteria was carried out in Excel, with two reviewers (M.M.D.E. and E.V. and E.V. and E.B.) again independently assessing eligibility and a third (C.K. or M.T.-G.) resolving conflicts. This resulted in a total of 40 studies for data extraction.

Data charting, analysis and synthesis

Two researchers independently extracted data on 10% of the sample initially to pilot the extraction sheet and develop a consistent approach. The remaining data were extracted and charted in Excel by a single reviewer (E.V.); charted data comprised location of study, sample size and characteristics, aims/purpose, methods and key findings relevant to the research questions. During data extraction in March 2024, we also decided to extract further data on types of DFM focused on by studies, and replicated this with the studies previously identified in September 2022. Study methods were categorised and counted; these data are available in Supplementary File S2. Charted data were synthesized by tabulation, to map findings to the each of the research questions (see Tables 2–4). Key findings mapped to RQs 2 and 3 for each study were exported to a Word document for coding, and additional

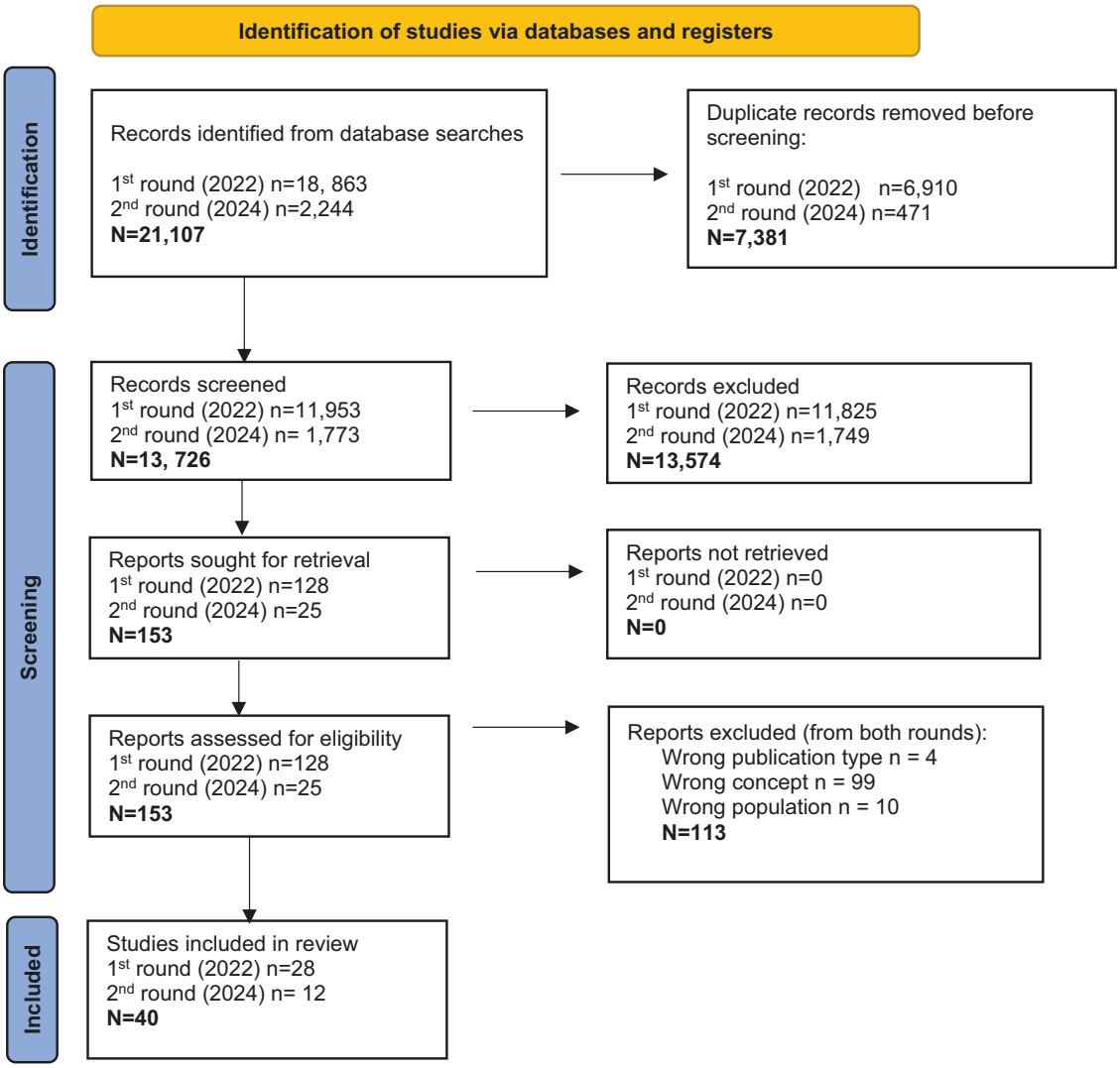

Fig. 1: PRISMA flowchart.

analysis of themes. This facilitated development of a descriptive and narrative synthesis.

RESULTS

Origin of studies

Forty studies were included in the final sample for review. All studies were conducted in middle- to high-income countries, with the majority originating in Australia (25%), EU countries (17.5%), Canada (15%) and the UK (15%) (see Figure 2).

> RQ1: What are the methods used to assess children's and parents' attitudes towards and awareness of digital marketing of unhealthy foods and beverages?

The majority of studies (55%) adopted a quantitative approach. The most commonly used data collection methods included cross-sectional survey (40%), and focus groups or group interviews (20%). A smaller proportion (17.5%) adopted experimental designs. The majority of studies were concerned with children/adolescents or young people (77.5%), with 12.5% on parents and children combined and 10% solely on parents. Most studies focused on DFM on social media (67.5%), and just over a fifth on influencer marketing. Just under a third did not specify a type of DFM strategy. (Supplementary File S2 contains a table that provides a quantified overview of basic study characteristics, including the proportion of study designs, population and type of DFM with which the study was concerned.)

For a detailed overview of study methods and types of DFM included see Table 2, which also includes details of study aims, sample size, cohort and basic demographic information (age group and gender breakdown, where provided). Further details of study methods mapped to the specific research questions and topics are outlined in the next sections detailing the findings of RQs 2 and 3.

> RQ2: What are children, adolescents and young people's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages?

Twenty-six studies were mapped on to the topic of awareness of DFM, including quantitative ($n = 15$), qualitative ($n = 8$) and mixed- or multi-method studies ($n = 3$). Data collection methods involved cross-sectional surveys ($n = 11$), focus groups ($n = 4$),

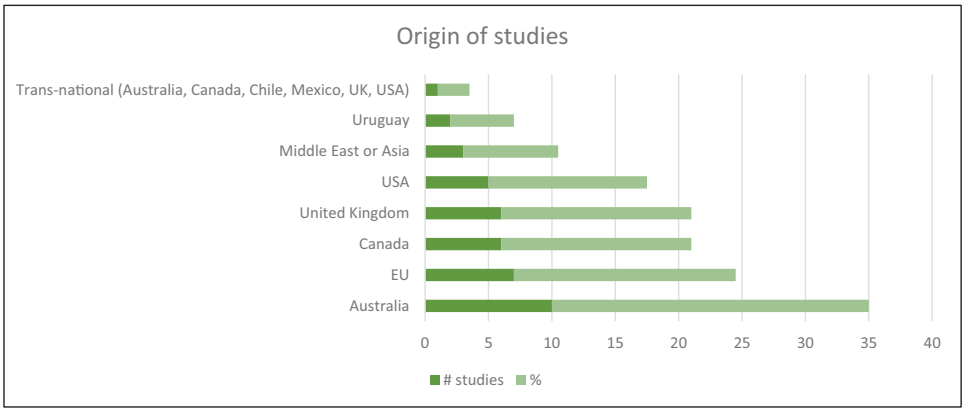

Fig. 2: Chart displaying origin of studies.

one-to-one interviews ($n = 2$), digital ethnographic approaches ($n = 2$), screen capture ($n = 1$), participatory approaches using specially designed apps ($n = 3$), go-along interview ($n = 1$), experimental design ($n = 1$) and a diary study ($n = 1$). Social media platforms most commonly mentioned or focused upon in studies included YouTube (Qutteina *et al.*, 2019; Coates *et al.*, 2020; Molenaar *et al.*, 2021; Pollack *et al.*, 2021; Ares *et al.*, 2022, 2023; Jonatan *et al.*, 2022; van der Bend *et al.*, 2022; Elliott *et al.*, 2023; Evans *et al.*, 2023; Elliott and Truman, 2024), Instagram (Qutteina *et al.*, 2019; Lutfeali *et al.*, 2020; Bragg *et al.*, 2021; Molenaar *et al.*, 2021; Ares *et al.*, 2022; Elliott *et al.*, 2023; Elliott and Truman, 2024) and TikTok (van der Bend *et al.*, 2022; Elliott *et al.*, 2023; Elliott and Truman, 2024).

Awareness of DFM

Awareness, recall and recognition

Given the design of the majority of studies, awareness of DFM was captured mostly using self-reported exposure measures (see Table 3). The study with the largest sample size ($n = 9171$) and reach (six countries: four higher income, USA, UK, Canada and Australia, and two middle income, Mexico and Chile) found that between 27% (UK) and 60% (Chile) of adolescents aged 10–17 years recalled being exposed to DFM, with smaller proportions reporting exposure to marketing via computer or video games (Demers-Potvin *et al.*, 2022). Whereas participants in Mexico and Chile reported the highest rates of exposure to sugary drinks, findings were more mixed for fast food DFM across higher- and middle-income countries (see also Moradi Latreyi *et al.*, 2020). A large Australian study had broadly comparable findings, reporting that 55% of adolescents ($n = 8708$) aged 12–17 remember seeing a food or drink advertisement on social media at least weekly in the past month, with 25% reporting exposure daily or almost daily (Gascoyne *et al.*, 2021). A Canadian study similarly found that 44% of respondents between the ages of 12 and 24 ($n = 2040$) reported seeing ads online/internet and 40% reported seeing ads on social media sites (Hammond and Reid, 2018). Van der Bend et al. interviewed Australian adolescents aged 13–16 after their screens had been recorded while they used their regular social media apps (Van der Bend *et al.*, 2022). Here, the screen capture method showed that a median of 6 non-core social media food posts were delivered to participants per 10 min (32% branded content; 23% paid-for ads) (see also Qutteina *et al.*, 2022), but 60% of these participants reported noticing the social media food posts just 'sometimes', 'rarely' or 'never'.

Adolescents showed higher recall for unhealthy food advertisements compared to healthier options or non-food ads (Baldwin *et al.*, 2018; Murphy *et al.*, 2020; Norman *et al.*, 2020; Molenaar *et al.*, 2021; van der Bend *et al.*, 2022; Ares *et al.*, 2023; Evans *et al.*, 2023). Ares et al. (Ares *et al.*, 2023) further reported exposure to a burger ad was associated with greater brand recognition compared to ads for salad or clothing, particularly among female participants, while van der Bend (van der Bend *et al.*, 2022) reported that recall for branded food products was higher than un-branded.

Digital critical literacy

Some children/adolescents appear to have a good understanding of the purpose, function and operationalization of food marketing on YouTube by influencers and YouTube personalities (Coates *et al.*, 2020), particularly in relation to the transactional nature of the relationship between brands and YouTube influencers (Folkvord *et al.*, 2019). At the same time, there is also evidence of difficulty recognizing some DFM formats, with participants ($n = 832$) aged 13–17 in one study performing worse than chance when asked to identify Instagram ads as compared to traditional ads (Bragg *et al.*, 2021). Two studies reported that children have variable awareness of product placement and advertising in advergames (Mehta *et al.*, 2014; Smith *et al.*, 2020). Qualitative findings (albeit from a decade ago) from the UK report that while children may be aware of online advertising practices such as advergames, they sometimes lack recognition of its function as a marketing exercise (Newman and Oates, 2014). There may also be a gendered aspect to digital critical literacy: one study reported that boys had more difficulty identifying persuasive marketing techniques than girls (Amson *et al.*, 2024), while another noted that boys were more willing to try an energy drink because of product placement in video games (Yang *et al.*, 2022).

Gender, age and ethnic differences in self-awareness of ad exposure

Some studies reported gender, age and ethnic differences in awareness of DFM. An age gradient is apparent, with older teens self-reporting exposure to a greater volume of DFM than younger adolescents (Hammond and Reid, 2018; Acton *et al.*, 2023). Ethnic minority youth in the US report greater exposure to and engagement with DFM than their White counterparts (Fleming-Milici and Harris, 2020; Acton *et al.*, 2023). Children from lower-income families are more likely to report being exposed to marketing of unhealthy foods than children

Table 2: Study details and mapping of methods

Authors	Country of study	Aim of study	Type of DFM and genre/strategy	Population/sample	Methodological approach
Acton *et al.* (2023)	Canada	To investigate how exposure to food and beverage marketing among children and adolescents varies by sociodemographic characteristics.	• Social media • Genre/strategy unspecified	• Adolescents • *N* = 3780 • Ages 10–12 and 13–17	• Quantitative • Cross-sectional web-based survey (International Food Policy Study) • Recruitment via parents/guardians enrolled in the Nielsen Consumer Insights Global Panel
Amson *et al.* (2024)	Canada	To understand how gender influences adolescents' interactions with digital food marketing (DFM) and their perceptions, responses, and behaviours in this context.	• Social media • Influencer marketing	• Adolescents • *N* = 16 • Ages 13–17 • Girls *n* = 8; boys *n* = 8	• Qualitative • Online ethnography • 'Go-along' interviews using a hybrid of participant observation and interviewing
Ares *et al.* (2022)	Uruguay	The study aimed to explore adolescents' experiences with DFM and its influence on their food choices in Uruguay.	• Social media • Influencer • YouTube ads	• Adolescents • *N* = 209 • Ages 12–15 (45%) • Ages 16–18 (55%)	• Qualitative • Group interviews/focus groups
Ares *et al.* (2023)	Uruguay	To evaluate the effects of exposure to unfamiliar food advertisements on YouTube on adolescents' advertisement and brand recall, brand recognition, attitudes, and food choice in a hypothetical scenario.	• YouTube advertisements	• Adolescents • *N* = 433 • Ages 12–18 • 51% female	• Quantitative • Experimental between subjects design with one control group, a non-food advertisement group, an unhealthy food (burger) advertisement group and a healthy food (salad) advertisement group • Stimuli video: Advertisements of international brands unfamiliar to Uruguayan adolescents, with no sound and a duration of 5 seconds. • Procedure: Participants watched videos with or without advertisements and answered questions to distract from the study's main objective, followed by questions related to advertisement recall, brand recognition and attitudes
Baldwin *et al.* (2018)	Australia	To investigate whether social media and online behaviours are associated with unhealthy food and beverage consumption in children	• Social media • Owned content • Competitions • YouTube ads	• Adolescents • *N* = 417 • Ages 10–16	• Quantitative • Cross-sectional online survey Measures: • Sociodemographic characteristics • Online behaviours, including internet and social media use and interactions with food and beverage content • Frequency of food and beverage consumption
Bragg *et al.* (2021)	USA	The aim of the study is to examine the impact of Instagram food advertisements versus traditional food ads on adolescents' preferences and their ability to identify such ads as marketing.	• Social media • Traditional ads vs native style ads	• Adolescents • *N* = 832 • Ages 13–17	• Quantitative Experimental online survey: • Researchers selected ads from the top advertised food and beverage brands on Instagram and traditional sources, ensuring they matched on brand name, demographics and ad theme. • Participants completed an online survey where they viewed pairs of ads and identified which they thought were from Instagram. They were also randomized to rate ads with or without Instagram features

Table 2. Continued

Authors	Country of study	Aim of study	Type of DFM and genre/strategy	Population/sample	Methodological approach
Carters-White *et al.* (2022)	UK	To explore children's, parents' and professional stakeholders' views on power concerning the regulation of online advertising of unhealthy food to young people in the UK.	• Not specified	• Adolescents aged 12–15 in the UK; • Parents of children aged 5–15; • Professional stakeholders • Young people *n* = 62 • Parents *n* = 30 • Professionals *n* = 11	• Qualitative • Focus groups
Coates *et al.* (2020)	UK	The aim of the study is to explore children's understanding of and attitudes towards influencer marketing of high-fat, sugar, and salt (HFSS) food and beverage products on YouTube.	• Social media • Influencer marketing (YouTubers)	• Children • *N* = 24 • Ages 10–11	• Qualitative • Focus groups: A YouTube video featuring influencer marketing of an HFSS product, and photographic stills were shown to inform discussions
Cornish (2014)	UK	The aim of the study is to examine parents' awareness and understanding of online advertising targeting their children, and how they perceive and respond to such advertising.	• Advergames • Banner adverts • Webisodes • Product placement	• Parents of children between 5 and 12 years of age • *N* = 42	• Qualitative • One-to-one interviews
Demers-Potvin *et al.* (2022)	Australia, Canada, Chile, Mexico, UK, USA	To examine adolescents' media viewing habits and the association with exposure to unhealthy food and beverage advertising across six countries.	• Social media • Unspecified	• Children and adolescents • *N* = 9171 • Ages 10–17	• Quantitative • Cross-sectional survey Measures: • Sociodemographic measures • Screen-time, including on social media, YouTube, gaming, TV • Exposure to advertisements on different social media platforms
Eaton *et al.* (2022)	USA	To explore perspectives among Black community members (USA) on marketing practices they may consider problematic, and elicit their ideas for taking action to change these practices.	• Social media • Celebrity endorsement • Sponsored posts • Owned marketing • Earned marketing	• Parents • *N* = 69	• Qualitative • Focus groups
Elliot *et al.* (2022)	Canada	To explore the 'power'of food marketing by identifying what they consider to be teen-targeted marketing techniques within various food marketing examples.	• Social media • Un-specified	• Adolescents • *N* = 54 • Ages 13–17 • Girls 54%	• Quantitative • Exploratory study • Participants asked to 'tag' 19 pre-selected food/beverage advertisements to identify features of the content that made it teen-targeted
Elliott *et al.*, (2023)	Canada	To document the persuasive 'power' and platforms of exposure of food marketing to teenagers in Canada.	• Social media • Un-specified (paid marketing most likely however)	• Adolescents • Ages 13–17 • *N* = 309 • 62% girls; 31% boys; 7% GNC	• Quantitative • Participatory approach • Data collected by participants using an app • Participants identified and tagged teen-targeted advertising in their environments over 7-day period
Elliot and Truman (2024)	Canada	To examine the nature of teen-targeted food marketing on digital platforms and its persuasive power, focusing on teenagers' real-life encounters with marketing messages and their assessment of persuasive content.	• Social media • Un-specified (paid marketing most likely however)	• Adolescents • *N* = 278 • Ages 13–17 • 63% girls; 30% boys; 7% GNC	• Quantitative • Exploratory study • Participatory approach • Data collected by participants using an app • Participants identified and tagged teen-targeted advertising in their environments over 7-day period

Table 2. Continued

Authors	Country of study	Aim of study	Type of DFM and genre/strategy	Population/sample	Methodological approach
Evans *et al.* (2023)	UK	To investigate the associations between recall of unhealthy food marketing on videogame livestreaming platforms and adolescent eating behaviours, as well as the implications for DFM policies targeting young people.	• Video-game livestreaming platforms • Un-specified	• Adolescents • *N* = 490 • Ages 13–18 • 30.2% female	• Quantitative • Online cross-sectional questionnaire Measures: • Recall of unhealthy food marketing • Purchase and frequency of purchase • Diet quality • Attitudes towards and preference of branded and non-branded foods • Liking and social norms regarding foods
Fleming-Milici and Harris (2020)	USA	To measure adolescents' social media engagement with food/beverage brands, sociodemographic differences in level of engagement, and relationships between engagement and screen time.	• Social media • Owned marketing	• Adolescents • *N* = 1564 • Ages 13–17	• Quantitative • Exploratory • Cross-sectional survey Measures: • Sociodemographic characteristics • Screen time measures based on the Youth Risk Behaviour Surveillance System • Social media engagement: likes, shares or follows of different food brands
Folkvord *et al.* (2019)	Netherlands	To explore the impact of children's bonding with YouTube vloggers on their awareness of and attitudes towards brand and product endorsements in vlogs.	• Social media • Influencer marketing (vloggers)	• Children • *N* = 127 • Ages 10–13	• Quantitative • Cross-sectional survey Measures: • Frequency, viewing duration and evaluation of top five vloggers • attitudes towards vloggers • children's bonding with vloggers • awareness of brands and products in vlogs • self-perceived susceptibility to brand and products in vlogs • peers susceptibility to brand and products in vlogs • Awareness of vloggers' endorsement • Attitude toward advertising in vlogs • Understanding of sponsorship disclosure
Gascoyne *et al.* (2021)	Australia	To examine the association between adolescents' exposure to and engagement with food and drink advertisements on social media and their intake of unhealthy food and drinks in Australia.	• Social media • Unspecified	• Adolescents • *N* = 8708 • Ages 12–17	• Quantitative • Cross-sectional survey Measures: • Exposure to food marketing on social media and engagement with food or drink posts • Unhealthy food and drink intake
Gilmour *et al.* (2020)	Wales	To explore the socio-ecological factors contributing positively or negatively to young people's attitudes towards their food consumption.	• Social media • Unspecified	• Children • *N* = 42 • Ages 11–13	• Qualitative • Group interviews/focus groups

Table 2. Continued

Authors	Country of study	Aim of study	Type of DFM and genre/strategy	Population/sample	Methodological approach
Hammond and Reid (2018)	Canada	To examine exposure to energy drink marketing among youth and young adults, and test perceptions of energy drink advertisements (ads) regarding target audience age and promoting energy drink use during sports.	• Owned marketing	• Adolescents and young people • $N = 2040$ • Ages 12–24	• Quantitative • Cross-sectional survey (online) Experimental design: • A between-group experiment with respondents randomly assigned to view one of four energy drink ads Measures: • Brand awareness, exposure to marketing, and perceptions of ads
Holmberg *et al.*, (2019)	Sweden	To explore adolescents' experiences with online information regarding food, weight management, and health in the context of obesity treatment.	• Social media • Native advertising	• Adolescents • $N = 20$ • Ages 13–16	• Qualitative • Semi-structured interviews • Participants demonstrated their search procedures using a screen-recorded laptop • Examples of online food images were shown to participants as a prompt about food content that young people were exposed to online • Screen captured images were used as an aide in analysis of interview data
Jonatan *et al.* (2022)	Indonesia	To explore the impact of food and beverage marketing on the food choices of adolescents in Jakarta, Indonesia.	• Social media • Unspecified	• Children, parents, teachers and food sellers • Children ($n = 50$) • Ages 12–18 • All others ($n = 25$)	• Qualitative • Focus groups
Kelly *et al.* (2009)	Australia	To determine parents' attitudes and awareness of food marketing to children.	• Online competitions • Product placement in computer games • Kids only sections on websites • Mobile ring-tones and screensavers	• Parents • $N = 402$	• Quantitative • Cross-sectional survey (telephone) • Questions adapted from a previous survey on television food advertising to children, focusing on parental awareness and attitudes towards food marketing to children
Moradi Latreyi *et al.* (2020)	Iran	To examine the relationship between junk food consumption and exposure to food advertisements among high school students in Rasht, Iran.	• Unspecified	• High school students • $N = 341$ • Ages not reported	• Quantitative • Cross-sectional survey Measures: • Exposure to advertising online and frequency
Lutfeali *et al.* (2020)	USA	To investigate how adolescents' preferences for Instagram food advertisements are influenced by the number of 'likes' and comments, and how these preferences differ between heavy and light social media users.	• Social media • Owned marketing posts,	• Adolescents • $N = 832$ • Ages 13–17	• Quantitative Experimental cross-sectional online survey with randomization: • Participants completed an online survey, randomized to view Instagram food ads with or without comments and varying numbers of 'likes' • Ads from popular food brands were selected and modified to create different 'like' and comment conditions. Participants were automatically randomized into these conditions using Qualtrics software • Measures: Adolescents rated their preference for the ads, their likelihood to 'like' or comment on the ads, and reported their social media usage

Table 2. Continued

Authors	Country of study	Aim of study	Type of DFM and genre/strategy	Population/sample	Methodological approach
Mehta *et al.* (2014)	Australia	To investigate the perceptions of parents and children on ethical aspects of food marketing to which children are exposed online.	• Advergames • Viral marketing	• Parent/Child dyads • *N* = 13 • Ages (of children) 8–13	• Qualitative • Individual semi-structured interviews (i.e. with children and parents separately) • Follow-up focus groups with parents
Molenaar *et al.* (2021)	Australia	To understand the attitudes and experiences of young adults regarding food-related advertisements on social media and their impact on eating behaviours.	• Social media • Native advertising	• Young people • *N* = 166 • Ages 18–24	• Qualitative Digital ethnography:Data collected through an online platform, including 20 topic forums, challenges, polls and journal entries.
Murphy *et al.* (2020)	Ireland	To examine adolescents' responses to unhealthy, healthy and non-food advertising on social media and how these responses are influenced by the source of the ads.	• Social media (Facebook) • Advertising posts from a variety of sources (paid, owned and earned)	• Adolescents • *N* = 151 • Ages 13–14 and 13–17	• Experimental • Mixed methods Stimulus material: • Creation of Facebook 'News Feed' profiles with advertising posts varying by content (healthy/unhealthy/non-food) and source (peer/celebrity/company) Measures: • Social responses, memory for brands, and attention to advertising posts, likelihood to 'share', attitude to peer, brand recall, brand recognition and eye-tracking for attention
Newman and Oates (2014)	UK	To investigate how parents mediate their children's exposure to food marketing communications in the context of their family environment.	• Videogames (product placement) • Advergames	• Families (Parents and children) • Parents *n* = 16 • Children *n* = 29 • Ages (of children) 2–14	• Qualitative • Family interviews • Laminated cards used as a prompt to illustrate different forms of advertising
Norman *et al.* (2020)	Australia	To investigate how exposure to different marketing techniques from television and online food advertising affects children's brand recall, recognition, attitudinal responses, and desire to eat the advertised products.	• Advergames	• Children • *N* = 154 • Ages 7–12	• Quantitative • Experimental • Pre-/post-intervention (RCT) Intervention: • Children were exposed to 10 TV food advertisements embedded in cartoons and played online advergames featuring food brands Outcome measures: Children's brand recognition, attitudes towards brands and brand consumers, and their desire to eat the advertised products before and after the intervention
Nuss *et al.*, (2024)	Australia	To determine Australian adults' attitudes towards government actionsaimed at protecting children and adolescents from unhealthy food anddrink marketing within the current digital marketing landscape.	• Social media • Games and mobile apps • Paid advertising on social media • Influencers • Banner ads	• Adults in Australia • *N* = 2062 • 32% parents	• Quantitative • Cross-sectional online survey Measures: • Agreement with government protection from unhealthy food marketing • Support for policies on digital platforms restricting digital marketing techniques and children's personal information use

Table 2. Continued

Authors	Country of study	Aim of study	Type of DFM and genre/strategy	Population/sample	Methodological approach
Pollack *et al.* (2021)	USA	To evaluate Twitch users' experiences, attitudes and behaviours in relation to food and beverage marketing on Twitch and to compare these with YouTube.	• Video-game lives-treaming platforms • Influencer marketing (live-streamers)	• Twitch users (no age limits) • *N* = 620 • 90% male • 26% < 18 • 43% 18–24	• Quantitative • Cross-sectional online survey Measures: • Exposure to 9 product categories and 29 specific brands • Frequency of ad exposure, chat room discussions and product consumption while watching Twitch • Product craving and purchasing • Sentiment regarding Twitch advertising
Qutteina *et al.* (2019)	Belgium	To explore the food messages that adolescents encounter on social media and assess these messages for their sources, content, and the marketing strategies employed.	• Social media • Paid, owned and earned marketing • Influencer marketing	• Adolescents • *N* = 21 • Ages 12–18	• Mixed methods • Diary study design: Participants were instructed to capture any food-related images they came across on their social media platforms • Data collection tools: Custom applications were developed for Android and Apple users to facilitate the image-sharing process • Survey integration: Participants completed surveys before, during and after the diary study to provide additional context for images
Qutteina *et al.*, (2022)	Belgium	To assess the relationship between exposure to social media food messages and self-reported adolescent eating outcomes.	• Social media • All food posts, including paid, owned and earned marketing	• Adolescents • *N* = 1002 • Ages 11–19	• Quantitative • Cross-sectional survey Measures: • Exposure to core and non-core food messages on social media, food intake, perceived norms, food literacy, attitudes, self-regulation and other factors
Ragelienė and Grønhøj (2021)	Lithuania	The study aims to explore the significance of social influence from peers, siblings and social media on children's eating behaviour in the context of Lithuanian preadolescents.	• Social media • Unspecified	• Adolescents • *N* = 278 • Ages 8–13	• Mixed-methods • Semi-structured interviews • Cross-sectional survey • Children were interviewed in same-sex friend pairs Measures: • Relationships with siblings, eating frequency with siblings and friends, use of social media, social support for healthy diet scale of siblings and friends, fruit, veg and snack intake for day, food preferences for preadolescents
Smith *et al.* (2020)	Australia	To explore the influence of modern advertising on children's attitudes, choices, and consumption.	• Banner advertising • Advergame • Rewarded video advertisement	• Children • *N* = 156 • Ages 7–12	• Quantitative • A between-subjects randomized experimental study Intervention: • Participants played a 4-min online game with different advertising conditions: control, banner advertisement, advergame or rewarded video advertisement Outcome measures: Attitudes towards the advertised brand, game enjoyment, and awareness of advertising assessed via questionnaires. Snack choice post-game and food consumption were measured

Table 2. Continued

Authors	Country of study	Aim of study	Type of DFM and genre/strategy	Population/sample	Methodological approach
Sutinen *et al.* (2024)	Finland	To examine adolescents' social media environment in relation to unhealthy food marketing, focusing on sociocultural representations and the influence of social media influencers on adolescents.	• Social media • Influencer marketing	• Adolescents • $N = 14$ • Ages 12–17 • Girls $n = 10$; boys $n = 4$	• Multi-method • Qualitative focus groups Netnographic approaches: • Data consisted of $n = 141$ social media posts of online food marketing by social media influencers and food companies in Finland
Thaichon and Quach (2016)	Australia	To investigate the child's perception of online advertising in social networking sites and the impact on his/her intention to consume unhealthy food.	• Social media • Unspecified	• Children and parents • Children $n = 30$ • Parents $n = 30$ • Ages (of children) 11–16	• Qualitative • Semi-structured interviews • Interviews held separately with parents/children
Van der Bend *et al.* (2022)	Australia	To investigate adolescents' exposure to and evaluation of social media food promotions (SMFPs).	• Social media • Paid content • Brand owned content • User-generated content • Celebrity/influencer generated content • Content embedded in entertainment	• Adolescents • $N = 35$ • Ages 13–16	• Multi-method approach using interview and screen capture • 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 their favourite social media platforms, during which the researcher pointed out examples of social media food posts (SMFPs) to participants. • Next, participants answered questions about their awareness and appreciation of SMFPs. Screenshots of SMFPs were de-identifed and analysed
Yang *et al.* (2022)	Taiwan	To examine the relationships between excessive gaming, online energy-drink marketing exposure, and energy-drink consumption among adolescents in Taiwan.	• Online gaming • Sponsored content	• Adolescents • $N = 2613$ • Ages 13–14 • Boys $n = 1228$; Girls $n = 1369$	• Quantitative • Cross-sectional survey Measures: • Energy-drink consumption • Online energy-drink marketing exposure • Advertising effects (attitudes and intentions towards advertised brand) • Marketing literacy, alcohol use and excessive gaming

Table 3: Findings of studies mapped to RQ2

Authors	Key findings relevant to RQ2: What are children's and young people's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages?
Acton *et al.* (2023)	Awareness of DFM: - Adolescents aged 13–17 were more likely than children aged 10–12 to report seeing unhealthy food marketing online ($p < 0.001$). - Girls were more likely to report seeing unhealthy food marketing online ($p = 0.009$), while boys were more likely to see it in video games ($p < 0.001$). - Minority ethnicities, including Indigenous youth, and respondents with lower-income adequacy reported more exposure than White and higher-income respondents, respectively. - Participants identified use of cartoon characters, free toys/products, and celebrity endorsements as marketing techniques that they were exposed to.
Amson *et al.* (2024)	Awareness of DFM: - Predatory Marketing Practices: Participants noticed targeted ads after searching or buying products. - Boys followed food companies based on product enjoyment; girls reported seeking information on new products and deals. - Both genders liked or commented on food posts to express positive experiences. - Girls identified a wider range of marketing techniques, such as colour and humour, and were more aware of the influence of social media influencers on their purchasing decisions; boys were less aware of these techniques.
Ares *et al.* (2023)	Recall/recognition of DFM: - Adolescents exposed to a burger advertisement (58%) on YouTube were more likely to recall the ad compared to those exposed to a salad (36%) or non-food ad (40%). - Brand recognition: The burger ad also led to marginally higher brand recognition, especially among female participants. Attitudes towards DFM: - The impact of food advertisements on brand attitudes and food choices was less clear, but male sex ($p = 0.063$) and frequency of burger consumption ($p = 0.099$) were marginally significant factors.
Ares *et al.* (2022)	Awareness of DFM: - All adolescents reported seeing advertisements on social media or websites 'all the time', however, many said they did not pay attention to it. - Food was one of the most prevalent categories: it was spontaneously mentioned in 29 interviews. - Fast food, junk food and food-ordering websites were advertised frequently (e.g. YaPedido). - Participants recalled frequently seeing influencers, celebrities and peers promoting food and beverages including energy drinks. Attitudes towards DFM: - Memorable and appealing aspects of food advertising online included: enticing images, use of colour, use of catchy music, big portions, novelty, emotive associations, price promos and celebrities. - Opinions on advertising varied and included: annoying, intrusive, informative, catchy, tempting, disgusting and deceitful. - Participants said ads could induce cravings, but that did not always mean they actually consumed what was advertised. - Views were mixed on whether or not choices were influenced by ads; some did acknowledge their food choices were sometimes influenced by the ads they saw online and by social media influencers. - DFM was regarded as effective advertising as adolescents felt social media is more relevant to their lives than TV. - Participants noted differences between platforms; Instagram was seen as more accessible to individuals and small business; YouTube was seen as accessible only to larger corporations. - Participants proposed strategies to reduce the effect of digital marketing on their food choices, including both regulatory approaches to reduce exposure to digital marketing of unhealthy foods and behaviour change communication.
Baldwin *et al.* (2018)	Awareness of DFM: - 23% watch food brand YouTube videos. - 12.5% have seen favourite food brands advertised on social media. - 2% have shared food brand videos on social media. - 6% have used food brand hashtags on any social media. - 30% liked a sugar-sweetened beverage brand on Facebook. - 26% liked a fast food brand on Facebook. - 23% liked a confectionery brand on Facebook. - 15% liked a salty snack brand. - 9% liked a juice brand on Facebook. - 13% entered a food brand competition on Facebook. Recall/recognition of DFM: - 189 food brands were named in free text field. - The most frequently named liked brands were Coca Cola (23%), McDonalds (17%), KFC (14%), Cadbury (11%) and Pringles (10%).
Bragg *et al.* (2021)	Recall/recognition of DFM: - Participants had difficulty identifying Instagram posts as ads. Attitudes towards DFM: - Instagram ads were rated more highly than traditional ads in terms of trendiness, artistic appeal and likeability.
Carters-White *et al.* (2022)	Attitudes towards DFM: - Young people were sceptical of the concept of self-regulation of online advertising and many had unfavourable views of the food industry.

Table 3. Continued

Authors	Key findings relevant to RQ2: What are children's and young people's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages?
Coates *et al.* (2020)	Attitudes towards DFM: - Participants preferred influencer marketing to pop-ups, which were perceived to interrupt media content. - Participants reported watching YouTubers with whom they identify, and share interests. - Participants believed that YouTubers would likely only promote products relevant to their interests. - Other perceived benefits of influencer marketing included learning new recipes or gaining ideas and opportunities things. - Attitudes towards influencer marketing were contingent on the child's familiarity and perceived (parasocial) relationship with the YouTuber (i.e. influencers known to and liked by children were deemed trustworthy and sincere). - Children reported feeling able to resist influencer marketing of high fat, sugar and salt products.
Demers-Potvin *et al.* (2022)	Awareness of DFM: - Self-reported exposure to DFM for unhealthy food/drinks on websites or social media ranged from 27% (UK) to 60% (Chile); and 10–17% reported exposure to DFM in video or computer games.
Elliot and Truman (2024)	Awareness of DFM: - Instagram, TikTok, Snapchat and YouTube were the platforms where teens encountered most food advertising. - Fast food (25%), beverages (29%) and candy/chocolate (19%) comprised the majority of the sample. Attitudes towards DFM: - Visual style was the most influential persuasive technique (power) across all platforms (24–27%), followed by special offers (10–15%), themes (11–14%) and humour (9–13%).
Elliott *et al.*, (2023)	Awareness of DFM: - Instagram, TikTok, Snapchat and YouTube were identified as the primary channels for teen-targeted food marketing; over three quarters of the ads were found on these platforms. - The majority of ads targeted at teens were for branded beverages, fast food and candy/chocolate, comprising 72% of the total advertisements. Attitudes towards DFM: - The most effective techniques (power) for attracting teens' attention were visual style, special offers and themes (e.g. trendy, sports, holidays/seasons, LGBTIQIA+). - Older teenagers (ages 15–17) were more likely to report multiple power indicators per ad ($p = 0.006$).
Elliot *et al.* (2022)	Attitudes towards DFM: - Visual style was the tag most frequently selected by participants, followed by animated character and theme. - Younger teens more likely to select animated character and less likely to select language. - Theme, humour, celebrity, special offer, music, language and teen actor are more likely to be identified in the marketing examples categorized as teen-targeted.
Evans *et al.* (2023)	Awareness of and attitudes towards DFM: - Adolescents reported recalling food marketing on popular livestreaming platforms such as Twitch, YouTube Gaming and Facebook Gaming. - Attitudes towards unhealthy foods mediate the relationship between the recall of unhealthy food marketing and the purchasing behaviour of adolescents (i.e. higher recall of marketed foods was associated with more positive attitudes to unhealthy foods. This in turn was associated with greater purchase of marketed foods).
Fleming-Milici and Harris (2020)	Awareness of DFM: - 70% of adolescents reported engaging with any food/beverage brands on social media. - Racial minority adolescents were more likely than White adolescents to engage with brands. - 54% reported engaging with brands of fast food, 50% with sugary drinks, 46% with candy and 45% with snacks (45%), 7% reported engaging with all other categories of food/beverage brands.
Folkvord *et al.* (2019)	Awareness of DFM: - Food and beverage products were the most common advertised products in vlogs; 112 food/beverage brands were recognized. - 75% of children reported they gained brand awareness. Attitudes towards DFM: - Over 60% of the children agree it is stupid and wrong to advertise; 30% and 40% agree it is okay or good for vloggers to advertise. - 80% of the children believed that other children would buy brands or products seen in the vlogs. - Half of the children believed that vloggers show brands and products to influence their viewers. - Over 70% of the children believed that vloggers get paid for using brands and products in their vlogs. - More than half of the children had bought or asked their parents to buy products shown in the vlogs.
Gascoyne *et al.* (2021)	Awareness of DFM: - Over half (55%) of students ($n = 8708$) reported seeing a food or drink advertisement on social media at least weekly in the past month, with a quarter (25%) exposed daily or almost daily. - A fifth of students reported liking or sharing food or drink posts. - Reported Exposure to a food or drink advertisement on social media at least once in the last week, and liking or sharing a food or drink post at least once in the last month was associated with a high intake of unhealthy drinks. - Frequency of engagement was associated with likelihood of a high intake of unhealthy food and drink.
Gilmour *et al.* (2020)	Awareness of and attitudes towards DFM: - Participants reported healthy foods were rarely advertised. - Advertising of fast foods/unhealthy foods was characterized as persuasive, effective and tempting. - Participants did not believe that social media influenced their attitudes towards or consumption of brands advertised.

Table 3. Continued

Authors	Key findings relevant to RQ2: What are children's and young people's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages?
Hammond and Reid (2018)	Awareness of DFM: - 44% reported seeing ads for energy drinks online/internet. - 40% reported seeing such ads on social media. - Older respondents were more likely to report exposure to energy drink ads online and through social media, although exposure remained high among younger age groups (e.g. 52% of 18–19 year olds and 45% of 20–24 year olds reported seeing ads on social media compared with 28% of 12–14 year olds and 33% of 15–17 year olds).
Holmberg *et al.*, (2019)	Attitudes towards DFM: - Advertisements and posts of unhealthy food and drink (e.g. energy drinks) on social media were described as tempting.
Jonatan *et al.* (2022)	Awareness of DFM: - Children reported being frequently exposed to food advertising through social media such as YouTube, Facebook and Whatsapp.
Moradi Latreyi *et al.* (2020)	Awareness of DFM: - 14% reported being exposed to junk food advertising online. - 51% reported seeing advertising from more than one source. - 37%, 33% and 15% reported being exposed 'from time to time', 'quite often' and 'very often' respectively.
Lutfeali *et al.* (2020)	Attitudes towards DFM: - Participants preferred food ads on Instagram that featured many versus few likes. - Participants were more willing to engage with Instagram food ads when the ads had many likes. - The presence of positive comments did not affect participants ad preferences, suggesting 'likes' are a more powerful influence than comments.
Mehta *et al.* (2014)	Awareness of DFM: - Children had limited awareness of product placement in advergames. Attitudes towards DFM: - Children thought marketing had potential to contribute to family conflict by making children crave foods their parents would be reluctant to buy for them. - Children expressed some concern about implicit persuasion through marketing in advergames.
Molenaar *et al.* (2021)	Awareness of DFM: - Ads for unhealthy foods were recalled more frequently than ads for healthy foods. - Some participants said they used ad-blocking services, however they were still exposed to advertising online. - Ads were seen passively in social media feeds; Facebook and YouTube were the social media platforms most associated with seeing ads. Attitudes towards DFM: - Frequency and repetition were considered annoying, but effective in catching attention. - Promotions that were visually appealing, made the food look delicious, and used 'happy' or bright colours were mentioned commonly. - Promotional strategies that were effective included competitions or opportunities to win something; jokes, wit, slogans and jingles; promotion by celebrities and influencers. - Participants reported noticing discounts, affordable deals, special offers. budget/affordability were salient factors in purchasing behaviours - Some participants felt that constantly seeing ads for junk food hindered their ability to make healthful choices. - Ads on Instagram were described as more persuasive and covert, as they 'blend in with the feed nicely' and are accompanied with 'amazing shots of food'. - Ads were described as a temptation, however some believed they could 'tune' out the effects.
Murphy *et al.* (2020)	Attitudes towards DFM: - Participants rated peers with unhealthy food posts in their social media news feeds most positively and users with healthy food posts least positively. - Participants looked at unhealthy and non-food ads for longer than they did at healthy food ads. - Participants attitude to peers were significantly lower where social media profiles contained company-sponsored posts compared to peer or celebrity posts. - Participants reported they were significantly less likely to share healthy advertising posts than unhealthy and non-food posts. Recall/recognition of DFM: - The mean free recall rate for unhealthy brands (1.75) was nearly five times that for healthy brands (0.36). - The mean number of unhealthy brands recognized (7.53) was double that for healthy brands (3.87).
Newman and Oates (2014)	Awareness of DFM: - Children were aware of/had recognition of advertising online, but lacked understanding of it as a marketing practice.
Norman *et al.* (2020)	Recall/recognition of DFM: - Significant increase in brand recognition and recall by children (n = 154) in both experimental conditions (TV only and TV and advergame). Attitudes towards DFM: - Brands were perceived more favourably across all three attitude ratings (cool, exciting, fun). - A greater proportion of children who played the advergames and the TV advertisement perceived a person who would eat Brand A to be very or a little cool (36% vs 19%, $p < 0.001$). - Anti-adult themes, fun and humour, and parent pleasing were noted techniques in the most recognized and favoured advertisements.

Table 3. Continued

Authors	Key findings relevant to RQ2: What are children's and young people's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages?
Pollack *et al.* (2021)	Awareness of DFM: - Energy drinks were the product type most noticed on Twitch (62%). - 8 of the top 10 brands were for fast food or food delivery (e.g. McDonalds, Burger King, Chipotle). Attitudes towards DFM: - A greater proportion of respondents felt annoyed by advertisements on YouTube (65%) vs Twitch (40%). - More respondents agreed that advertisements served to support content creators on Twitch (79%) compared to YouTube (54%). - 60% of respondents felt there was too much advertising on YouTube (60%), while 68% of respondents felt there was just enough advertising on Twitch. - 14% of participants recalled craving a product after seeing it advertised on Twitch; a higher proportion (19%) of paying users reported craving a product compared to non-paying (12%). - There was a significant difference in the number of participants reporting consuming candy on Twitch to YouTube (75% vs 57%).
Qutteina *et al.* (2019)	Awareness of DFM: - Non-core foods made up the majority (67%) of the images (n = 607) shared by participants. - Female participants were significantly more likely to share images from Instagram and Snapchat; male participants were significantly more likely to share YouTube and FB images. - Almost half the images were of branded food products (n = 289; 47%).
Qutteina *et al.*, (2022)	Awareness of DFM: - Exposure to food messages was measured on a five point scale ranging from 'not at all' to 'very often'. - Median exposure to core foods was 2.58; to non-core foods was 4.08; and to branded non-core food posts was 5. - Participants reported significantly higher exposure to non-core food messages than core food messages ($H(70) = 315.94$, $p < 0.000$), and significantly higher exposure to branded non-core foods compared with overall core food messages ($H(18) = 131.00$, $p < 0.000$).
Ragelienė and Grønhøj (2021)	Awareness of DFM: - Children reported seeing ads for and photos of snack or junk food frequently on social media. - The frequency of food products seen on social media ads was positively linked with the willingness to consume these products ($r = 0.440$, $p < 0.01$). Attitudes towards DFM: - Children reported that food seen on social media was attractive and they were willing to try it.
Smith *et al.* (2020)	Awareness of DFM: - Participants were most aware of the advertising when it was embedded in the interface of the game. - Children were not significantly aware of the advertisement in the banner ad or advergame, but were significantly aware of the rewarded game ($p = 0.001$). Attitudes towards DFM: - Attitudes toward the perception of fun ($p = 0.06$) and taste ($p = 0.21$) of the test brand were not influenced by the type of advertising used. - Children who were exposed to the rewarded video advertising chose the test brand significantly more than children in the other three conditions ($p < 0.002$). - Attitudes to the game were mostly positive, scoring 4/5. - Choice of the test brand snack (not self-reported) was significantly influenced by the rewarded video advertising condition (compared with control, banner advertising, and advergame conditions).
Sutinen *et al.* (2024)	Attitudes towards DFM: - Young people expressed a preference for subtle marketing strategies that 'blends well in the content'. - Content that is light, fun, humorous and entertaining or games, challenges, humour and skits (playful content) were considered engaging. - Adolescents preferred to follow influencers and content creators with the same interests as themselves. - Participants were aware of the commercial nature of social media content, and have pragmatic views on influencer marketing; many expressed recognition of its necessity for content creation despite expressing some critical perspectives. - Young people acknowledged being influenced to buy products via social media influencers.
Thaichon and Quach (2016)	Awareness of DFM: - Participants reported that social media was effective in showing them things they liked and were interested in, including advertising. Attitudes towards DFM: - Some participants found ads annoying. - Food on social media was reported to be visually appealing. - Peer pressure: children liked and shared things their friends liked and shared. - Staying 'on trend' was important to young people and this included knowing about new food trends. - Participants reported that food ads influenced their food choices. - Fast food was associated with fun and socialization; ads that depicted this resonated with young people.

Table 3. Continued

Authors	Key findings relevant to RQ2: What are children's and young people's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages?
Van der Bend *et al.* (2022)	Awareness of DFM: - Of 35 participants, *n* = 4 noticed ads never or rarely; *n* = 17 noticed ads sometimes; *n* = 12 noticed ads often; *n* = 1 noticed ads always; thus, 60% adolescents missed ads sometimes, often or always. - *n* = 16 neither liked nor disliked social media posts promoting food; *n* = 17 liked them moderately or very much; *n* = 2 disliked them moderately or very much. Recall/recognition of DFM: - Participants were more likely to recall branded food products; recall of unbranded food products tended to be dominated by non-core foods high in fat or sugar. Attitudes towards DFM: - Food promotions on Instagram were considered the most appealing, followed by Youtube, Snapchat, Pinterest and TikTok. - Reasons for dis/liking posts based largely on visual appeal, entertainment and temptation. - Power of ads: high visual quality, appealing, aesthetic, vibrant, eye-catching, refreshing, satisfying, genuine (i.e. not fake) were popular; short video formats and funny content were preferred; traditional pop-up adverts were disliked.
Yang *et al.* (2022)	Awareness of DFM: - 75% reported seeing energy drink advertisements online in the past year. - Boys scored higher on the advertising effect scale compared to girls (1.58 vs 1.44) thus were more likely to express a willingness to try an energy drink because of product placement in an online game.

from higher-income backgrounds (Acton *et al.*, 2023). Acton *et al.* also reported that boys were more likely than girls to be exposed to marketing in video games ($p < 0.001$) (Acton *et al.*, 2023). A difference in self-reports of exposure by social media platform was found in one diary study, which showed that girls were more likely to share images from Instagram and Snapchat, while boys were more likely to share images from Facebook or YouTube (Qutteina *et al.*, 2019).

Attitudes towards DFM

Twenty-three studies were mapped to the topic of attitudes towards DFM (see Table 3 for details), including quantitative (*n* = 11), qualitative (*n* = 8) and mixed- or multi-method studies (*n* = 4). Data collection methods used involved experimental designs (*n* = 6), focus groups (*n* = 5), cross-sectional surveys (*n* = 4), one-to-one interviews (*n* = 4), participatory approaches using specially designed apps (*n* = 2), digital ethnographic approaches (*n* = 1) and a tagging exercise (*n* = 1).

Preference of advertising genre/strategy

Compared to traditional forms of advertising, children and adolescents preferred influencer marketing and the types of food advertisements featured on Instagram (Bragg *et al.*, 2021; Molenaar *et al.*, 2021; van der Bend *et al.*, 2022). At least one factor driving this preference includes 'native' style of advertising, in which food advertisements blend seamlessly into the feed or the content being delivered (Molenaar *et al.*, 2021; Sutinen *et al.*, 2024)—experienced as less intrusive and disruptive than pop-ups or distinct ads and thus more compatible to scrolling and viewing content (Coates *et al.*, 2020). Instagram-style advertising is also seen as more trendy, artistic and likeable (Bragg *et al.*, 2021). Despite stylistic preferences for influencer marketing, attitudes were somewhat ambivalent: a significant majority of children in one study thought it was stupid and wrong for vloggers to advertise (Folkvord *et al.*, 2019), while adolescents and young people in other studies felt it was a necessary support for content creators (Pollack *et al.*, 2021; Sutinen *et al.*, 2024). One UK study of 10–11 year olds found that trust was contingent on a parasocial relationship with the influencer; participants trusted the content creators they followed, but were more sceptical of those less familiar to them (Coates *et al.*, 2020).

Opinions on and attitudes towards DFM

Key attributes of online advertising that children and adolescents identified (across a range of study designs) as appealing to youth sensibilities included formal and cultural features such as colour, humour, visual style, music, celebrity and/or influencer involvement, positive emotions, and depictions of fun and youth culture (Norman *et al.*, 2020; Bragg *et al.*, 2021; Molenaar *et al.*, 2021; Ares *et al.*, 2022; Elliott *et al.*, 2022, 2023; van der Bend *et al.*, 2022; Elliott and Truman, 2024). Negative attributes included perceiving ads as annoying, intrusive, repetitive or deceitful (Thaichon and Quach, 2016; Coates *et al.*, 2020; Molenaar *et al.*, 2021; Ares *et al.*, 2022). Opinions on and attitudes towards DFM more broadly were similarly mixed and sometimes contradictory. Adolescents and young people characterized online advertising as tempting (Holmberg *et al.*, 2019; Gilmour *et al.*, 2020; Ragelienė and Grønhøj, 2021; Ares *et al.*, 2022), humorous or entertaining (van der Bend *et al.*, 2022; Sutinen *et al.*, 2024), effective and persuasive (Gilmour *et al.*, 2020), or alternatively irritating (Coates *et al.*, 2020). Even when they found it irritating, however, engaging with online advertising had an important social function, with participants in an Australian study valuing it for helping them stay 'on-trend' (Thaichon and Quach, 2016). There was evidence that DFM influences young people's perceptions of brands and individuals. After playing an advergame for a particular product, brands were rated favourably across three attitude ratings (cool, exciting and fun), while participants perceived people who use the brands associated with the advergames as being cool (36%) (Norman *et al.*, 2020). Similarly, in an experimental study in Ireland, where participants viewed fictitious social media profile feeds, they rated peers with unhealthy food ads in their social media news feeds more positively than those with non-food ads, and rated users with healthy food ads least positively (Murphy *et al.*, 2020).

Children, adolescents and young people's views on resistance to and regulation of DFM

A small number of studies explored perceived resistance to DFM (Coates *et al.*, 2020; Molenaar *et al.*, 2021) and adolescents' views on mitigation measures (Ares *et al.*, 2022). Participants reported strategies in which they 'tuned out' the effects

of DFM (Molenaar *et al*., 2021), or exercised self-control (Ares *et al*., 2022). Others engaged in concrete strategies to mitigate against DFM effects, such as using ad-blocking software (Molenaar *et al*., 2021), or eating healthy food while scrolling on social media or watching YouTube, to resist the hunger the ad might induce (Coates *et al*., 2020). Some perceived themselves to be unaffected, or less affected than others (Coates *et al*., 2020). For example, 80% of participants (n = 127; ages 10–13) in a Dutch study believed others would be influenced to buy, or ask parents to buy advertised products (Folkvord *et al*., 2019), while adolescents (ages 13–18) in Uruguay believed that younger children are more susceptible to advertising effects (Ares *et al*., 2022). Only two studies explored the concept of regulation of food marketing online with adolescents (Ares *et al*., 2022; Carters-White *et al*., 2022). Participants aged 12–15 in Carters-White et al.'s (Carters-White *et al*., 2022) study were disparaging of the idea that the industry would regulate themselves, whilst participants in Ares et al. aged 11–17 endorsed regulation to reduce DFM exposure and behaviour change communication (Ares *et al*., 2022).

> RQ3: What are parents' awareness of and attitudes towards the digital marketing of unhealthy foods and beverages to children and young people?

Compared to children, adolescents and young people, the evidence for parents' attitudes and awareness of DFM appears much less developed. Nine studies in total were mapped to RQ3, with seven studies mapping to the topic of attitudes and four to awareness. Most studies were qualitative (n = 7) and used interviews (n = 4), or focus groups (n = 3). Two studies were quantitative and used a cross-sectional survey design (n = 2) employing various measures (see Table 4 for a detailed overview).

Parents' awareness of DFM to children

Some parents may have limited awareness of the extent of children's exposure to DFM (Mehta *et al*., 2014; Jonatan *et al*., 2022). Notably, none of the identified studies appeared to discuss 'native' advertising or user-generated advertising strategies. In two older studies, parents were rather more concerned about advertising on TV than digital formats (Kelly *et al*., 2009; Newman and Oates, 2014). In some more recent studies, parents noted that advertising was pervasive (Thaichon and Quach, 2016; Eaton *et al*., 2022; Jonatan *et al*., 2022). Participants in one study were largely accepting that marketing was ubiquitous and an integral part of consumer society (Mehta *et al*., 2014). For some parents, then, there was a sense of inevitability and powerlessness against large corporations advertising these unhealthy commodities (Eaton *et al*., 2022).

Parents' attitudes towards DFM to children

Some parents were sceptical about advertising influencing children (Cornish, 2014; Thaichon and Quach, 2016), believing that children likely found ads repetitive, annoying and off-putting, leading to doubt that young people pay much heed to them (Cornish, 2014; Eaton *et al*., 2022). However, some expressed concern that DFM led to purchase requests for unhealthy foods (Thaichon and Quach, 2016; Eaton *et al*., 2022), which can contribute to familial conflict and parental stress (Mehta *et al*., 2014). Parents expressed concern at food advertisers' strategies, including the use of celebrity culture to leverage parasocial relationships (Eaton *et al*., 2022), and individualized marketing on children's personal devices, perceived to be 'under the radar' of parents' supervision (Mehta *et al*., 2014). Ultimately for some parents, such practices led to concern that DFM may wield sufficient influence that could negatively impact their children's health (Mehta *et al*., 2014). In an older study, only some parents reported that internet use was moderated/mediated but for 'unsuitable' or inappropriate content rather than advertising, however, others reported that their children were not allowed to use the internet unless a parent was present (Newman and Oates, 2014). Note that most of the studies cited here date from 2014 to 2016, when children's access to internet-connected devices was substantially less than it is now.

Parents' views on regulation and responsibility

Four parent studies focused (Carters-White *et al*., 2022; Nuss *et al*., 2024) or touched on (Mehta *et al*., 2014; Newman and Oates, 2014) regulation. A recent cross-sectional survey of adults, including parents, in Australia found over two-thirds (68%) supported governmental policies to regulate DFM to children online and significant disapproval (81%) of companies gathering children's personal data for marketing (Nuss *et al*., 2024). Parents in Mehta *et al*. were 'cynical' of the capacity of corporations to act ethically and thus favoured governmental regulations (Mehta *et al*., 2014). In three studies, participants emphasized parental responsibility for protecting their children from food companies' marketing, while expressing ambivalence and scepticism about the concept of corporate responsibility (Mehta *et al*., 2014; Newman and Oates, 2014; Carters-White, 2022). In those same studies, while there was acknowledgement and acceptance of the need for some regulation to protect children, advertising was also seen as a natural and inevitable necessity, businesses were seen as having a 'right' to market their products, and some viewed regulation as over-reach, which risked infringing on rights of individual autonomy (Mehta *et al*., 2014).

DISCUSSION

The aim of this review was to scope the literature on parents', and children, adolescents and young people's awareness of and attitudes towards DFM of unhealthy food and beverages, and to explore the methods used to carry out such studies. The findings provide a broad overview of the landscape, and highlight a number of key gaps. This section contextualizes and critically examines these findings, before discussing limitations of the study and concluding by outlining specific gaps, challenges and implications.

A need for child-centred participatory methods

Regarding methods, we found that quantitative cross-sectional designs dominate this space, although there is some indication that creative, participatory and digital ethnographic approaches are increasingly being employed. There are few qualitative studies seeking to understand children and young people's perspectives, and none of the studies reported the involvement of children or young people as advisors or in the design or co-creation of studies. This may point to missed opportunities, as children are better positioned to advise on the 'local context' of digital and online spaces, and can help

Table 4: Findings of studies mapped to RQ3

Authors	Key findings relevant to RQ3: What are parent's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages to children?
Carters-White *et al.* (2022)	Attitudes towards DFM: - Parents expressed scepticism about the potential for regulation due to the financial benefits that the government and companies gain from the current situation. - Parents felt the food industry's influence through lobbying could overpower public health interests. - Most parents supported stronger regulation by the State rather than self-regulation by the industry, to protect young people's diets, however, a minority were concerned that increased regulation might constitute over-reach and infringe on individual autonomy and parental responsibility.
Cornish (2014)	Attitudes towards DFM: - Parents were doubtful that online advertising strategies such as advergames were effective in influencing children, and also perceived their children to be less susceptible to the effects of online food advertising than others.
Eaton *et al.* (2022)	Attitudes towards DFM: - DFM and other promotional strategies were recognized as pervasive and influential on children and adolescents. - Repetition of ads on social media (e.g. YouTube) was perceived as annoying, repetitive and off-putting to young people. - DFM exposure was reported to lead to purchase requests for unhealthy food. - Participants expressed concern about the use of celebrities to target their communities through social media marketing.
Jonatan *et al.* (2022)	Awareness of DFM: - Parents noted children were interested in food or beverage posted by friends on social media.
Kelly *et al.* (2009)	Attitudes towards DFM: - 36% of parents reported being concerned about food marketing online, compared with 82% concerned about advertising on TV and 83% by food placement in supermarkets. - Of the 36% concerned about online food marketing to children, 84% were concerned about kids-only sections on websites, 83% about downloadable items, 81% about online competitions and 80% about online/computer games.
Mehta *et al.* (2014)	Awareness of DFM: - Parents had minimal awareness of children's exposure to product placement in advergames. Attitudes towards DFM: - Parents considered many aspects of marketing to be problematic and unethical. - There were concerns that marketing of energy-dense nutrient-poor (EDNP) put children's health at risk, and that marketing on the internet happened in children's private space and was thus 'under the radar' of parents supervision. - DFM was perceived to encourage purchase requests from children, and constant purchase requests contributed to family conflict/parental stress. - Some expressed concern about implicit persuasion through marketing in advergames and about the 'subliminal' effects of internet marketing, which was perceived to be ubiquitous. - Parents also accepted marketing as an integral part of consumer society and considered it parents' responsibility to mitigate effects. - There was some ambivalence about corporate responsibility; some restrictions on marketing of foods were accepted, but not necessarily at the expense of business success (i.e. businesses were seen as having a 'right' to market their products). - Parents were cynical of the capacity of corporations to act ethically and thus favoured governmental restrictions/regulations. - Children had a right to be protected from marketing, but parents were less sure about their right not to be undermined by marketers (i.e. parental responsibility to say no to children). - Parents conveyed a sense of powerlessness and inevitability towards marketing in the face of powerful corporations.
Newman and Oates (2014)	Awareness of DFM: - Parents showed limited awareness of the way that marketers attempt to use new and multiple communications to promote brands. - Internet use was moderated/mediated but for 'unsuitable' or inappropriate content rather than advertising; some children were not allowed to use the internet unless a parent was present; many parents were unaware of product placement in online games. Attitudes towards DFM: - Parents believed that they were primarily responsible for protecting their children from food companies' marketing. - They were most concerned about TV advertising and were largely ignorant about advertising practices online. - Despite views on parental responsibility, participants still thought the government should be involved in regulating marketing to children.
Nuss *et al.*, (2024)	Attitudes towards DFM: - Strong support for government actions to stop unhealthy food and drink marketing on digital platforms: 68% were in favour of stopping marketing on internet sites and mobile apps during times when children are likely to use them. - A large majority (81%) disagreed with the idea that companies should be able to collect children's personal information for marketing purposes. - Respondents using the internet several times a day were more likely to agree that the government should protect children from unhealthy food marketing (OR: 1.35, $p = 0.026$). - Older respondents (50–64 years) showed more support for government action to stop unhealthy food marketing on websites/apps (OR: 1.67, $p = 0.001$) and social media (OR: 1.54, $p = 0.007$). - Males were less likely to disagree with the collection of children's personal information for marketing purposes (OR: 0.61, $p = 0.002$). - Those with tertiary or vocational qualifications were more in favour of a ban on targeting unhealthy food marketing to children online (OR: 1.43, $p = 0.022$).

Table 4. Continued

Authors	Key findings relevant to RQ3: What are parent's awareness of and attitudes towards the digital marketing of unhealthy foods and beverages to children?
Thaichon and Quach (2016)	Awareness of DFM: - Parents' awareness of online marketing was varied. Attitudes towards DFM: - Some parents were aware of and concerned about the effects of DFM on children, however, many were sceptical that online marketing was influential, citing that advertising was ubiquitous in the wider environment anyway.

researchers navigate and capture the complexity of the DFM landscape, and young people's exposure and engagement therein. For example, studies in health promotion that have adopted research methods that take as their starting point a citizen-child approach—in which children are viewed as agential subjects with rights to participate in decision-making about their lives—have yielded insightful findings into how children distinguish play/sport from physical activity/exercise, and shown how the natural and built environment can shape and constrain children's engagement in daily physical activity (MacDougall and Gibbs, 2022). Moreover, the inclusion of children in the development of studies can have a tangible impact at policy level. For instance, child-developed indicators of hobbies and well-being generated from participatory workshops in Ireland are now routinely included in the nationally representative Health Behaviours in School-Aged Children survey, and were selected by policy-makers to help monitor implementation of the national policy framework for children and young people (0–24 years) (Kelly *et al*., 2021).

Child-led methods that can better help researchers understand and navigate the digital worlds of children are needed, given that the findings indicate that while both children and parents are aware of DFM, the extent of their awareness may be somewhat constrained, and they might underestimate its effects. Importantly, a study in the review combining screen capture with post-capture interviews showed that a significant proportion of DFM went un-noticed (van der Bend *et al*., 2022), suggesting that self-reported exposure to DFM may be underestimated and underreported, and thus awareness may be limited. As exposure to advertising on social media increases brand consideration and choice even under low attention (Santoso *et al*., 2020), supported by dual-process models of advertising effects that indicate impact under low-attention conditions (Nairn and Fine, 2008), this suggests researchers interested in further building the evidence-base to advocate for regulation of DFM may want to focus their efforts on study designs that circumvent reliance on self-report measures. However, self-reported attitudes and awareness remain of interest as these generate insights into families' interpretive worlds and practices regarding food and food marketing.

Lack of focus on specific digital marketing tactics

A notable finding from the review is that while most studies focused on social media and influencer marketing, a significant proportion did not specify the precise genre or strategy of DFM. Moreover, few studies explored awareness or understanding of different marketing tactics, among either parents or children, adolescents and young people. While this highlights a gap, it is also a concern, given the apparent growth in covert and viral marketing strategies, including so-called 'native' marketing that mimics the look and feel of regular social media content. Industry publications regularly tout the value and effectiveness of native marketing as a means to circumvent 'banner blindness', and increase clicks and sales (Challinor, 2021), and it accounts for an increasing proportion of advertising spend. Native marketing approaches amounted to approximately $87.6 billion in 2022 (Yeun, 2022), and industry sources estimate projected growth to approximately $300 billion by 2031 (Business Research Insights, 2024). In a similar vein, deliberate instigation of branded hashtag challenges by unhealthy food brands is a strategy increasingly promoted to marketers by platforms as a cost-effective way to 'spark trends and cultural movements' (TikTok, 2024a). Reach of such strategies is extensive: one study reported the total collective views of user-generated content ranged from 12.7 million to 107.9 billion per challenge (Brooks *et al*., 2022). One specific such campaign on TikTok by Pepsi reportedly resulted in excess of half a million unique videos created by platform users, and over 3.1 billion video views (TikTok, 2024b). User-generated viral marketing approaches may be especially effective as adolescents trust their online peers more than companies (Harris *et al*., 2021). The industry shift towards native and user-generated viral marketing approaches should therefore be viewed with concern by health promoters and policy-makers alike, as the findings here suggest young people tend to favour the style and tactics used in these types of marketing strategies (Elliott and Truman, 2019), have difficulties identifying them as advertising (Harris *et al*., 2021), and thus may be more vulnerable to their effects.

Addressing manipulative tactics and health inequalities

The online environment has become a site of vital importance for the development of youth learning, information and identities. However, the ability of marketers to tap into platforms to exploit youth interests and desires means that DFM is becoming problematically intertwined with youth social and peer norms online (Thaichon and Quach, 2016). Lyons et al. have coined the term 'limbic platform capitalism' (the brain's limbic system processes basic and powerful emotions) to describe the way in which platforms leverage algorithmic data to manipulate emotions by targeting users' limbic pleasure centres to maximize engagement and market commodities more effectively (Lyons *et al*., 2023). Evidence from this review suggests that children and young people respond to DFM in precisely this way, with participants across multiple studies consistently describing food marketing as appealing to youth sensibilities through positive emotion. While acknowledging that children and young people have agency, it is also important to identify manipulative tactics that undermine their autonomy (Susser *et al*., 2019; Tatlow-Golden and Garde, 2020). Seeking ways

to counteract such tactics is, moreover, essential to address health inequalities, as findings here indicate that DFM likely does not affect all children and young people equally. Evidence suggests boys and girls are targeted differently, while minority ethnic and lower-income children may experience greater exposure. Although most studies in this review emanated from higher-income countries, exposure data from larger multi-country studies such as Demers-Potvin et al. (Demers-Potvin *et al*., 2022), which included four higher-income and two middle-income countries, indicate there may be additional disparities across country lines. While precise data on exposure are difficult to glean given the reliance on self-report and the challenges of securing actual data on children's exposure in digital media (Tatlow-Golden *et al*., 2021), it is nonetheless clear that DFM affects a large swathe of children and young people globally and is thus both a universal *and* an intersectional public health issue.

Third-person effect and implications for support for regulation and policy measures

A key and intersecting finding is that many young people and parents appear to underestimate children's susceptibility to the persuasive effects of advertising. Many children appear to believe they can resist the effects of advertising and assume that others are more susceptible. This indicates support for the 'third-person effect' in relation to DFM—which Driessen et al. (Driessen *et al*., 2022) similarly discuss in their review of parents' perspectives—by which individuals perceive themselves as more impervious than others to media and advertising messaging (Perloff, 1999). This has implications in terms of attitudes to regulatory regimes. While a number of studies here suggested that children and some parents are supportive of regulatory policy measures, at least some parents were ambiguous on this. Yet few studies investigated such views, so it is difficult to say with certainty what the level of support for regulation may be among parents, particularly in a context of limited awareness of the scope of and strategies employed by digital food marketers. Evidence elsewhere, however, suggests that young people support restrictions that curtail harmful commercial practices (Pitt *et al*., 2024). Encouragingly, there are also examples of resistance and youth advocacy. BiteBack, a youth-led UK organization, for instance, actively campaigns to end junk food advertising to young people online, and is a promising model for youth-led activism to counteract the insidious practices of food marketers online (BiteBack, 2024).

Limitations and strengths

There are several limitations as well as strengths to this review that should be noted. As we focused on peer-reviewed literature and excluded grey literature, it is possible we omitted relevant material. Most data extraction was carried out by a single reviewer, providing consistency, although dual extraction may be considered preferable. We did not carry out a risk of bias assessment on the gathered literature, as this is not a requirement of a scoping review, although it might be useful. Despite these limitations, our search strategy was robust and registered, and our methods are transparent and re-producible.

CONCLUSION: GAPS, CHALLENGES AND IMPLICATIONS

The findings of this review highlight several gaps, challenges and implications.

Self-reported exposure of children and young people to DFM is not a reliable indicator of actual exposure. Not only may children and young people have difficulty discerning commercial content and/or the intent and purpose of viral and native marketing to increase brand recognition, but also well-established theory of and evidence for dual-process models of cognitive processing demonstrate that material that is not consciously recognized and recalled also affects advertising responses (Harris *et al*., 2009). Screen capture measures of exposure are the only dependable method to capture the true extent of child and adolescent exposure to DFM (WHO, 2019; Tatlow-Golden *et al*., 2021). Additionally, creative and qualitative methods are underrepresented in the literature and would allow researchers to tease out awareness of and attitudes towards different forms of DFM, particularly native approaches, branded hashtag challenges and the many other less formal marketing methods currently being developed (Montgomery and Chester, 2009; Tatlow-Golden and Parker, 2020). Furthermore, as children and young people have insight into their lives that researchers and adults do not, it is essential that they are involved in the design and development of studies.

As industry consistently innovates advertising methods, further in-depth understanding of young people's real-time experiences online is vital to inform the development of policy and critical digital literacy resources. Thus, as we have articulated elsewhere (WHO, 2016) as have others subsequently (e.g. Lyons *et al*., 2023), we need to invest in a transdisciplinary research agenda grounded in an understanding of young people's vulnerabilities, agency and rights in this space. In a fast-paced digital environment, the slower nature of academic research and publishing can inhibit the timely sharing of knowledge compared to the pace of industry change. These elements mean that progress by researchers in this field is frequently being outpaced by the rapid shifts in the online digital environment. Researchers and research commissioners need to acknowledge this and endeavour to find innovative methods to access and assess the digital commercial environment and its encroachment on youth culture and health, and quicker, more efficient ways of disseminating and exchanging knowledge.

Digital food marketing represents a threat to children and young people's rights including right to health, privacy and freedom from economic exploitation (Tatlow-Golden and Garde, 2020), thus the knowledge gap on both parents and, children, adolescents and young people's views on regulation should be addressed urgently. Despite political and policy systems not always prioritizing children's views, children and young people have expertise in their digital worlds and they can and should play a role in decision-making, such that critical digital literacy efforts should extend to understanding the questions of structure and power that determine the marketing content served to them that seeks to influence their behaviours (Sykes *et al*., 2013; Crondahl and Eklund Karlsson, 2016; Paasche-Orlow *et al*., 2018; Pangrazio and Selwyn, 2018). Framing of the problem as a child rights issue may help to persuade States of the need, and indeed their obligation under the UN Convention on the Rights of the Child, to act decisively to protect the health and well-being of all children from the marketing of harmful products.

SUPPLEMENTARY MATERIAL

Supplementary material is available at *Health Promotion International* online.

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CONFLICT OF INTEREST

Prof. Tatlow-Golden receives consultancy fees from UNICEF and the World Health Organization for research into children, young people and food marketing. All other authors have no conflicts of interest to report.

DATA AVAILABILITY

No new data were generated or analysed in support of this research.

ETHICAL APPROVAL

No ethical approval was required for this study.

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