Social Media Influencer Marketing and Children's Food Intake: A Randomized Trial

Anna E. Coates, MPhil, Charlotte A. Hardman, PhD, Jason C.G. Halford, PhD, Paul Christiansen, PhD, Emma J. Boyland, PhD

abstract

OBJECTIVES: To examine the impact of social media influencer marketing of foods (healthy and unhealthy) on children's food intake.

METHODS: In a between-subjects design, 176 children (9–11 years, mean 10.5 ± 0.7 years) were randomly assigned to view mock Instagram profiles of 2 popular YouTube video bloggers (influencers). Profiles featured images of the influencers with unhealthy snacks (participants: $n = 58$), healthy snacks ($n = 59$), or nonfood products ($n = 59$). Subsequently, participants' ad libitum intake of unhealthy snacks, healthy snacks, and overall intake (combined intake of healthy and unhealthy snacks) were measured.

RESULTS: Children who viewed influencers with unhealthy snacks had significantly increased overall intake (448.3 kilocalories [kcals]; $P = .001$), and significantly increased intake of unhealthy snacks specifically (388.8 kcals; $P = .001$), compared with children who viewed influencers with nonfood products (357.1 and 292.2 kcals, respectively). Viewing influencers with healthy snacks did not significantly affect intake.

CONCLUSIONS: Popular social media influencer promotion of food affects children's food intake. Influencer marketing of unhealthy foods increased children's immediate food intake, whereas the equivalent marketing of healthy foods had no effect. Increasing the promotion of healthy foods on social media may not be an effective strategy to encourage healthy dietary behaviors in children. More research is needed to understand the impact of digital food marketing and inform appropriate policy action.

Institute of Psychology, Health, and Society, University of Liverpool, Liverpool, United Kingdom

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Address correspondence to Anna E. Coates, MPhil, Institute of Psychology, Health, and Society, University of Liverpool, Eleanor Rathbone Building, Bedford St South, Liverpool L69 7ZA, United Kingdom. E-mail: annacoa@liverpool.ac.uk

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WHAT'S KNOWN ON THIS SUBJECT: Studies have revealed that broadcast food advertising strongly influences children's eating behavior. The Internet is now well established as a food-marketing platform, and young people spend considerable time on social media, including engaging with the activity of influencers.

WHAT THIS STUDY ADDS: Acute experimental exposure to influencers promoting unhealthy foods on social media increases children's immediate intake of unhealthy foods, but the same influencers promoting healthy foods does not have a beneficial effect on children's choices or intake of those foods.

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Childhood obesity is a global health concern. Obesogenic food environments, in which high–saturated fat, high-salt, and/or high-sugar (HFSS) foods are increasingly available and extensively marketed, are a predominant food-system driver of population weight gain.[1–5] The World Health Organization has called on governments to implement policies that promote the intake of healthy foods and reduce the intake of unhealthy foods by children and adolescents.[6]

The detrimental effects of traditional broadcast marketing,[7–10] and HFSS product placement,[11–14] on children's eating behavior are well established. The Internet is now a major platform for food marketing,[15] and recent studies suggest that digital marketing may have similar effects to that of television.[15–19] Research has also demonstrated a "beyond-brand" effect of digital food marketing whereby irrespective of the healthfulness of a cue, children's subsequent overall food intake increases.[20,21]

Children's digital media (online content) consumption is growing rapidly.[19,22] When online, many children use social networking sites[23–25]; for example, 50% of 8- to 11-year-olds in the United Kingdom report using Instagram, and >80% of 5- to 15-year-olds use YouTube.[19] In social media, marketing is typically embedded into engaging and entertaining media content, which actively encourages children to share these experiences with peers.[26,27] Social media have also bred a new form of celebrity: online influencers with huge fanbases[28] and whose opinions can affect those of their subscribers.[29] Brands seek promotional relationships with influencers because of their reach and the trust that followers have in them.[30] Influencers often engage in food-marketing activity on social media by featuring brands and products in their content, and it is not yet clear if this affects eating behaviors in the young people exposed. Recent psychological models suggest that reactivity to food cues is moderated by message factors, including the level of integration of food cues.[31] Because of the embedded nature of food cues in influencer media content, children's awareness of the marketing may be low and the effects potentially more powerful than for television, on which even young children can discern what is marketing and what is content.[32]

In addition, social learning theory[33] purports that children's liking of a character increases the probability of imitating the character's action. Therefore, exposure to an admired media character, such as an influencer, holding a food product may encourage these behaviors in children.[34] Exposure to traditional celebrity endorsement of HFSS foods in television commercials has been shown to increase children's preference for and intake of these products,[35,36] with less robust findings seen for healthy foods.[37–39] Children report viewing influencers to be more trustworthy than traditional celebrities,[40] possibly because of increased feelings of familiarity.[41] To date, the impact of influencer marketing of food on children's eating behavior has not been researched.

Our aim in this study was to examine the impact of social media marketing of snack foods, via influencers' Instagram profiles, on children's ad libitum snack intake. It was hypothesized that (1) children exposed to the social media marketing of snack foods (healthy or unhealthy) would consume more snacks compared with children exposed to marketing for a nonfood item, (2) children exposed to the social media marketing of unhealthy snacks would consume more unhealthy snacks compared with children exposed to marketing for a nonfood item, and (3) children exposed to the social media marketing of healthy snacks would consume more healthy snacks compared with children exposed to marketing for a nonfood item.

METHODS

Participants

A convenience sample of 178 participants aged 9 to 11 years were recruited via schools in the United Kingdom. Participants were offered no incentive for taking part. This age group is active on social media[19] despite platform terms and conditions setting age of participation at 13 years. The required sample size (n = 150) was calculated on the basis of a similar study with a medium effect size of celebrity endorsement on children's food intake.[35] The current study was approved by the University of Liverpool Institute of Psychology, Health and Society Research Ethics Committee, and data were collected between January 2017 and July 2017. Parents and children were informed of the study via school distribution of study information sheets, which required parents to return opt-in consent forms and children to assent before participation. Parents provided information on their children's demographics, food allergies, and media use on the consent form. Children with food allergies were excluded from participation. The number of children with food allergies and the number of eligible parents who did not provide consent were not recorded because of researcher time constraints.

Study Design

In a between-subjects design, participants were randomly assigned to 1 of 3 influencer-marketing conditions: healthy food marketing, unhealthy food marketing, and nonfood marketing (control). Within each condition, the mock Instagram profiles of 2 popular influencers (1 man, 1 woman) were viewed on a laptop computer. Counterbalancing of participants to condition, and influencer order (man first or woman first), was conducted by using randomizer.org. Although a "food-cues only" condition would begin to disentangle whether effects on food intake are attributable to the endorsement of the food cue or just the food cue itself, this is not representative of how foods are marketed by social media influencers; therefore, this condition was not included in the study.

Materials and Measures

Mock Instagram Profiles

Two social media influencers were selected: a 26-year-old female YouTube video blogger (vlogger) and a 23-year-old male YouTube vlogger (names are not provided for reasons of copyright). Both feature in the top 10 most popular vloggers with children in the United Kingdom[42] with ~12.1 million and 4.1 million subscribers on YouTube, respectively, at the time of testing and an equivalent number of followers on Instagram. Research suggests consumers respond differently to male and female celebrity endorsers,[43] and so children were exposed to mock Instagram profiles for both influencers (Supplemental Fig 2). Profiles consisted of the Instagram banner and 6 images (3 test and 3 filler) of the influencer holding a product. In test images, the products were snacks (unhealthy [eg, chocolate cookies] or healthy [eg, banana]) or branded nonfood items (control [eg, sneakers]). Snacks were used because they are frequently marketed to children[44] and are a major source of calories.[45] In filler images, the products were unbranded nonfood items. All images were obtained and edited (to create the healthy-condition stimuli) from influencers' YouTube channels (Corel PaintShop Pro 9).

BMI

BMI was calculated as weight (kg) divided by height (m).[2] Weight was measured to the nearest 0.1 kg with a calibrated weighing scale (Seca 770); height was measured to the nearest 0.5 cm by using a stadiometer (Leicester Portable Height Measure). Internationally recognized criteria for children were used to categorize children as being of healthy weight, being overweight, or being obese on the basis of age- and sex-specific BMI cutoff scores.[46] BMI *z* scores adjusted for age and sex were calculated by using World Health Organization AnthroPlus software (who.int/growthref/tools/en).

Hunger

Subjective measures of hunger were obtained by using 100 mm visual analog scales (VASs). This measure followed the format of the question, "How hungry do you feel right now?" with the anchor points "not at all hungry" and "very hungry" to the left and right of the line, respectively. VASs are widely used, reliable, and valid rating scales for measuring children's subjective experiences related to food intake.[47]

Caloric Intake

To measure caloric intake, children were invited to eat ad libitum from a small selection of snack foods. The foods offered were unhealthy snacks (jelly candy [343 kilocalories (kcals) per 100 g] and chocolate buttons [510 kcals per 100 g]) and healthy snacks (carrot batons [42 kcals per 100 g] and seedless white grapes [66 kcals per 100 g]). Previous studies have successfully used similar foods to assess intake after exposure to advertisements.[20,21] Each food was preweighted to 100 g with the exception of the chocolate buttons, which were served as sold (70 g) to ensure that the quantities of all snacks appeared to be similar when served. Snacks were presented without any branding information on white paper plates and were weighed postintake to the nearest 0.1 g (Model BP8100; Sartorius, Epsom, United Kingdom), with data later being converted into kcals on the basis of the manufacturer's nutritional information.

Social Media Questionnaire

A questionnaire designed for this study asked children 18 closed-ended questions about Internet use and activities performed on social media. Questions were adapted from the European Union Kids Online Survey 2010.[48] To control for potential effects on kcal food intake, children were asked to report liking of the mock Instagram profiles with a yes-or-no response and previous familiarity with the influencers by indicating the number of social media sites they had previously viewed them on.

Procedure

Participants were tested in a quiet room in their school, seated at a desk with a laptop computer and questionnaire. Children firstly completed the hunger rating VAS and then viewed each influencer's Instagram profile on the laptop screen for 1 minute. Children were told to pay close attention to the profiles because they would later be asked about them in the questionnaire. Participants were then served 4 snacks (none of the foods served were visible on any of the test or filler images) and told they had 10 minutes to eat as much or as little as they liked. After 10 minutes, any remaining snacks were removed and weighed, and participants completed the questionnaire. Participants were debriefed, and height and weight measurements were recorded in private. Children were accompanied back to classrooms and were asked to refrain from discussing the experiment with classmates.

Statistical Analysis

Randomization checks were conducted for hunger, BMI, age, sex, ethnicity, liking of Instagram profiles, and previous exposure to the influencers by using a Welch 1-way analysis of variance. The conditions did not differ on the variables measured (all $P > .05$; Table 1).

To examine which factors should be used as covariates, Pearson's correlations were calculated. As shown in Table 2, hunger, previous influencer exposure, and liking of Instagram profiles were related to kcal intake and included as covariates in the analyses. Multivariate analysis of covariance measured the effect of the marketing-exposure condition (unhealthy snacks, healthy snacks, or nonfood control) on kcal intake. Post hoc tests examined the differences between conditions with Bonferroni adjustments for multiple comparisons. All analyses were conducted by using SPSS software (version 24 for Windows; IBM SPSS Statistics, IBM Corporation), and significance was assessed by using a 2-tailed test at $P < .05$. Effect sizes were calculated by using partial η squared, with 0.01 indicating a small effect, 0.09 indicating a medium effect, and 0.25 indicating a large effect.

TABLE 1 Participant Characteristics by Instagram Condition (n = 176)

	Control (n = 59)	Healthy (n = 59)	Unhealthy (n = 58)
Girls, %	61	63	55
Ethnicity white, British, %	88	83	85
Previous vlogger exposure, yes, %	54	46	54
Liking of Instagram profiles, yes, %	80	80	78
Hunger on VAS, mm, mean ± SD	61.27 ± 23.83	59.19 ± 26.06	55.84 ± 26.42
BMI z score, mean ± SD	0.72 ± 1.23	0.61 ± 1.63	0.46 ± 1.03
Age, y, mean ± SD	10.50 ± 0.57	10.38 ± 0.75	10.54 ± 0.73

RESULTS

The final sample consisted of 176 participants (105 girls) aged 9 to 11 years (mean = 10.5 ± 0.7 years). Two children were excluded from the analysis because they had not finished the session (n = 1) and had been observed to have concealed test foods (n = 1). Of the participants, 71% had a healthy weight, whereas 29% were of an unhealthy weight (18.2% with overweight; 10.8% with obesity). The percentage of children who had overweight or obesity was slightly lower than the national average[49] (34.3% of 10-11-year-olds in England had overweight or obesity at the most recent assessment). No differences were found in the BMI category distribution between sexes.

The results of the multivariate analysis of covariance are shown in Table 3 and Supplemental Table 4. There was a significant effect of marketing-exposure condition on total kcal intake (P = .001). Children in the unhealthy Instagram condition consumed 26% more kcals overall (mean = 448.3 ± 140.82 kcals) compared with those in the control condition (mean = 357.1 ± 146.5 kcals; P = .001) and 15% more than those in the healthy Instagram condition (mean = 388.96 ± 145.53 kcals; P = .05). There was no statistically significant difference in overall kcals consumed between the healthy Instagram condition and the control condition (P = .55). Together, these post hoc results provided partial support for hypothesis 1. See Fig 1 for results of the post hoc tests.

The effect of marketing-exposure condition on kcal intake from unhealthy food was also significant (P = .001). Children in the unhealthy Instagram condition consumed 32% more kcals from unhealthy snacks (mean = 384.83 ± 141.21 kcals) compared with children in the control condition (mean = 292.24 ± 146.85 kcals; P = .001) and 20% more than those in the healthy Instagram condition (mean = 319.51 ± 143.77 kcals; P = .03). There was no statistically significant difference in kcals consumed from unhealthy snacks between the healthy Instagram condition and the control condition (P = .76). These results supported hypothesis 2. However, there was no significant effect of Instagram condition on kcal intake from healthy snacks (P = .49), and so hypothesis 3 was not supported.

DISCUSSION

This study quantifies the impact of influencer food marketing on children's food intake. The results demonstrated that children exposed to marketing of unhealthy snacks increased their immediate overall kcal intake compared with children exposed to healthy food or nonfood marketing. Relative to the control condition, children exposed to marketing of unhealthy snacks also

TABLE 2 Pearson's Correlations Between Dependent Variables and Covariables (n = 176)

	Total Snack Intake, kcals	Healthy Snack Intake, kcals	Unhealthy Snack Intake, kcals
Hunger on VAS, mm	0.20[a]	0.12	0.18[b]
BMI	−0.01	0.30	0.02
Age, y	−0.04	−0.11	−0.02
Sex (female = 1; male = 2)	0.09	−0.02	0.09
Previous vlogger exposure, yes	0.15	−0.01	0.15[a]
Liking of Instagram profile, yes	0.16[a]	−0.19	0.16[a]

[a] $P < .05$.
[b] $P < .01$.

TABLE 3 Results From a Multivariate Analysis of Covariance to Predict Snack Foods Consumed by Hunger, Previous Vlogger Exposure, Liking of Instagram Profile, and Condition (n = 176)

	Total Snacks		Healthy Snacks		Unhealthy Snacks	
	Consumed kcals, Mean (± SD)	Main Effect, *P*	Consumed kcals, Mean (± SD)	Main Effect, *P*	Consumed kcals, Mean (± SD)	Main Effect, *P*
Hunger on VAS, mm		.003		.11		.007
High (n = 114)	412.06 (147.41)		67.25 (26.76)		344.81 (148.77)	
Low (n = 62)	371.64 (147.8)		63.5 (24.92)		308.14 (145.73)	
Previous vlogger exposure		.12		.84		.13
Yes (n = 90)	419.04 (157.32)		65.65 (26.33)		353.39 (155.43)	
No (n = 86)	375.62 (135.83)		66.22 (26.05)		309.4 (137.85)	
Liking of Instagram profiles		.20		.63		.17
Yes (n = 139)	409.94 (147.22)		65.67 (26.52)		344.27 (146)	
No (n = 37)	353.3 (145.84)		66.91 (24.9)		285.4 (149.78)	
Instagram condition		.001		.49		.001
Healthy (n = 59)	388.96 (145.53)		69.46 (25.36)		319.51 (143.77)	
Control (n = 59)	357.1 (146.5)		64.85 (21.36)		292.24 (146.85)	
Unhealthy (n = 58)	448.3 (140.82)		63.43 (30.91)		384.83 (141.21)	
Effect size[a]		.08		.01		.08

[a] Partial η squared.

consumed more kcals from unhealthy snacks specifically relative to the other 2 groups. However, children exposed to marketing of healthy snacks did not differ in their overall kcal intake or their kcal intake from healthy snacks specifically, compared with those in the control condition.

Celebrity endorsement of healthy foods has previously been shown to encourage children to eat more of these foods,[38,39] although this effect, when found, is typically less robust than for HFSS foods.[37] Studies have also revealed that playing a fruit advergame increases children's intake of fruit, but again, this effect is smaller than seen for HFSS foods.[17] Therefore, it was reasonable to predict that exposure to social media food marketing for healthier items would produce similar effects in the current study. The results did not support these findings. A possible explanation for this, and for the smaller effects found in previous studies, is that the hedonic value (ie, tastiness) of HFSS foods is much stronger than for healthier foods.[50] In addition, HFSS foods are often designed to appeal more to children because of colorful packaging[51] and brand logos.[52] These explanations are supported by recent eye-tracking data, which demonstrate that HFSS food cues embedded in media content capture children's visual attention more than healthy cues.[53,54] It is therefore likely that substantially more exposure than what typically occurs in short-term experimental studies is needed to drive children's intake of healthier items.

Food cues within an advergame, irrespective of whether they are HFSS foods or fruit, have been shown to lead children to increase kcal intake in general.[20,21] Therefore, it was predicted that exposure to influencer food marketing that featured a food cue would produce similar effects in the current study. This effect was found for unhealthy cues but not healthy cues. As previously discussed, children may have attended more to the unhealthy cues. Alternatively, only fruits were offered as healthy snacks in the advergame study, whereas a fruit and a vegetable were offered in the current study. Children have been found to prefer fruits to vegetables because of their sweet taste and so may have consumed more kcals overall in the advergame study because of a greater preference for the test foods.[55]

In the current study, as predicted, children exposed to unhealthy food marketing consumed more unhealthy foods compared with children in the other conditions. These findings are consistent with previous studies assessing the impact of digital marketing on intake of HFSS foods[17,56] and those demonstrating the effect of celebrity endorsement on intake of HFSS foods.[35,36] The medium effect size found in the current study is consistent with that of a meta-analysis of the effect of broadcast and digital food advertising on children's intake.[7] Cohort studies indicate that an energy gap of 69 to 77 kcals per day is all that is required for a child to become overweight.[57] In the current study, children in the unhealthy-food–marketing condition consumed 91 kcals more compared with those in the control condition. This is larger than the proposed energy gap and is the effect after acute exposure to social media influencer marketing only. Children's additional kcal intake in response to acute food-marketing exposure is not compensated for at later eating occasions, and so marketing-driven overconsumption would, in time, lead to weight gain.[18]

This study had some limitations. First, all children were exposed to the same 2 influencers, and individual differences that may have moderated endorser effects, such as perceived

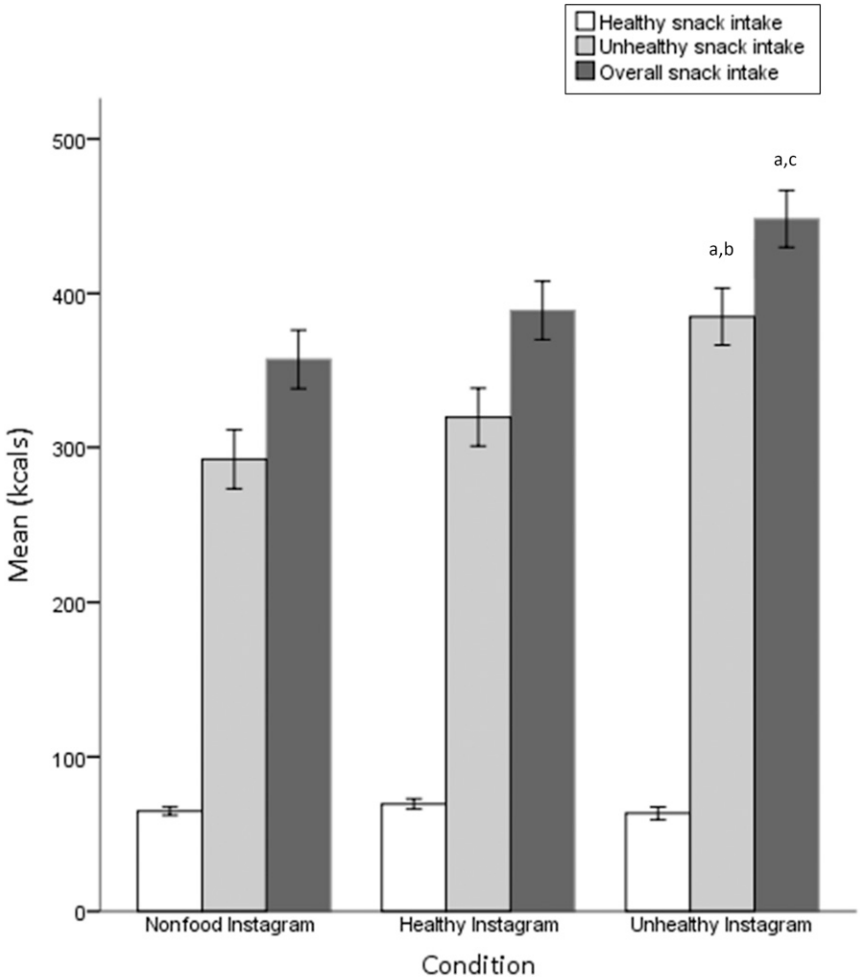

FIGURE 1
Mean (± SEM) snack intake (kcals) as a function of Instagram condition. [a] P = .001 indicates increased intake of unhealthy and overall snacks in unhealthy Instagram condition compared with nonfood. [b] P = .027 indicates increased intake of unhealthy snacks. [c] P = .047 indicates overall snacks in unhealthy Instagram condition compared with healthy.

similarity, familiarity, and likeability,[58] could not be considered. Just more than 40% of the sample had no previous exposure of the 2 influencers used in the current study but were included in the analysis. Including these children may have underestimated the impact of influencer food marketing. However, children are likely to spend much longer on social media sites[19] than occurred here and, as a result, be exposed to greater volumes of influencer food marketing.[59] In addition, Instagram encourages engagement with advertising by prompting users to "like" and share images.[30] This engagement allows direct communication between influencers and followers, heightening feelings of familiarity and likeability[41] and enabling influencer marketing to reach not only followers but also followers' wider social networks.[60] For this reason, it would be interesting to explore effects of influencer marketing on those who do not follow the influencers' online activity but may be recipients of their content via peers. Second, although children were asked to refrain from discussing the study with their classmates, we cannot be sure that this "contamination" did not occur. Thirdly, the study was cross-sectional, so conclusions about causality cannot be drawn from these data, and future studies should be designed to explore this and the potential for longer-term effects. It would also be interesting to compare the potential influence of peers versus media influencers on children's behavior.

The findings of the current study may be used to inform the debates ongoing in many countries surrounding food-marketing policies for digital media.[15] In 2017, the United Kingdom's Committee of Advertising Practice introduced a new self-regulatory code for nonbroadcast media that required advertisements for HFSS products to not be shown where >25% of the audience is <16 years old.[61] In a recent ruling, the Advertising Standards Authority, the United Kingdom's independent advertising regulator, responded to complainants who viewed that 2 YouTube vloggers (those featured in the current study) were popular with children and had featured in HFSS marketing on Instagram. Both influencers have been nominated for the award for UK favorite vlogger at the 2015 Nickelodeon Kids' Choice Awards, demonstrating their popularity with children.[62] The Advertising Standards Authority noted that <25% of both influencers' Instagram followers were registered as <18 years old; therefore, the advertisement was deemed to not target children. At the time of writing, collectively, these influencers have just more than 15 million Instagram followers.[63] Using Instagram's user demographics data, 3.75 million young people (13–17 years old) may have been exposed to this influencer HFSS food marketing. In addition, Instagram's data do not include children <13 years old who use fake dates of birth[64]; thus, this figure is likely to be a conservative estimate. The data presented here should inform regulations of online food marketing to enable children to participate in the digital world without their dietary health being adversely affected.

CONCLUSIONS

This study demonstrates that influencer marketing of unhealthy foods increased children's immediate food intake of these foods, whereas influencer promotion of healthy foods had no such effect. These findings are consistent with the literature on the impact of celebrity endorsement, which shows that the effects of HFSS food promotion are more robust than for healthy foods.[37] Childhood obesity remains a major health concern across the globe, and digital marketing offers food companies myriad new ways to reach children, many of which are difficult to monitor and the effects challenging to quantify.[15] Children have a right to participate in digital media and a right to protection of health.[65] Food-marketing restrictions should be applied to new forms of digital marketing, particularly social media, on which vulnerable young people spend a lot of their online time.

ABBREVIATIONS

HFSS: high–saturated fat, high-salt, and/or high-sugar
kcal: kilocalorie
VAS: visual analog scale
vlogger: video blogger

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