

Turning users into ‘unofficial brand ambassadors’: marketing of unhealthy food and non-alcoholic beverages on TikTok

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ABSTRACT

Introduction TikTok has over one billion monthly users and is particularly popular among children. We examined the (1) use of owned media by major unhealthy food and non-alcoholic beverage brands on TikTok and (2) nature of branded hashtag challenges instigated by such brands and the user-generated content created in response.

Methods We assessed the (1) content of all videos posted on the accounts of 16 top food and non-alcoholic beverage brands (based on global brand share) as at 30 June 2021, and (2) content and sentiment of a sample of brand-relevant user-generated content created in response to branded hashtag challenges instigated by these brands.

Results Of 539 videos posted by brands, 60% were posted in the first half of 2021. The most common marketing strategies were branding (87% of videos), product images (85%), engagement (31%) and celebrities/influencers (25%). Engagement included instigation of branded hashtag challenges that encouraged creation of user-generated content featuring brands’ products, brands’ videos and/or branded effects. The total collective views of user-generated content from single challenges ranged from 12.7 million to 107.9 billion. Of a sample of 626 brand-relevant videos generated in response to these challenges, 96% featured branding, 68% product images and 41% branded effects. Most portrayed a positive (73%) or neutral/unclear (25%) sentiment, with few negative (3%).

Conclusion Unhealthy food and non-alcoholic beverage brands are using TikTok to market brands and products via their own accounts and to encourage users to create and share their own content that features branding and product images. Given TikTok’s popularity among children, this study supports the need for policies that protect children from the harmful impact of food marketing on social networking platforms.

INTRODUCTION

The ubiquitous marketing of highly processed foods and non-alcoholic beverages high in fat, sugar and/or salt (herein ‘unhealthy food’) is a key challenge to achieving and maintaining healthy diets and body weight, especially

WHAT IS ALREADY KNOWN?

⇒ Children are exposed to high volumes of unhealthy food marketing online. TikTok is an increasingly popular social networking platform, including among children. No study to date has examined unhealthy food and non-alcoholic beverage marketing on TikTok, despite calls for urgent attention to be paid to the health implications of the platform.

WHAT ARE THE NEW FINDINGS?

⇒ This is the first study, to the best of our knowledge, to examine marketing of unhealthy food and non-alcoholic beverages on TikTok. Videos posted by top food brands frequently feature branding, product images, engagement and celebrities/influencers. Engagement includes instigation of branded hashtag challenges that encourage users to create content featuring brands’ products, brands’ videos and/or branded effects. User-generated content from these challenges collectively receives millions—and sometimes billions—of views, frequently features branding and product images and mostly portrays a positive sentiment.

WHAT DO THE NEW FINDINGS IMPLY?

⇒ Given evidence of the impact of food marketing on food preferences, purchasing, requests and consumption, our findings reinforce the urgent need for policies to protect children from the harmful impact of food marketing on social networking platforms.

among children.¹ Evidence demonstrates that food marketing influences food preferences, purchasing, requests and consumption.² In 2010, the World Health Assembly endorsed the WHO’s *Set of recommendations on the marketing of foods and non-alcoholic beverages to children* and urged countries to develop or strengthen policies to reduce the impact of unhealthy food marketing on children.¹ Despite this, few countries have enacted government-led policies, leaving children exposed to unhealthy food marketing across

multiple channels,² including digital media such as social networking platforms.³

TikTok is a social networking platform on which users create, post, watch and engage with short videos. Since its global release, TikTok's popularity has rapidly risen—its global monthly active users reportedly rose from 55 million in January 2018 to one billion in September 2021.⁴ TikTok is particularly popular among children, with over a third of its daily users in the USA reportedly aged 14 years or younger⁵ (an age gate at registration places 'additional privacy and safety protections' on users aged under 13 years).⁶ TikTok's features include tools, effects and sounds for creating videos, and feeds and pages for exploring videos. The algorithm-based 'for you' feed is based on a user's interests and engagements, while the 'discover' page features trending and sponsored content. Hashtag challenges, where users create and post videos with a shared theme (eg, a specific dance and/or sound) and tagged with a specific hashtag, are another key feature. Like other social networking platforms, TikTok's business model is based on the 'attention economy', in which platforms are free to use but users' attention is sold to brands and other organisations.⁷

Users are exposed to marketing on TikTok via paid media (eg, paid advertisements from a brand), owned media (eg, marketing on brand-owned accounts) and user-generated content (eg, content created by other users that features brands). The latter describes content created by internet users that is published (eg, on a social networking platform or website), involves some creative effort (eg, upload of original photos or videos), and which often, but not always, does not have a commercial market context (eg, creators do not expect remuneration or profit but instead seek to express themselves, connect with peers or achieve fame).⁸ Some users (eg, influencers) are, however, remunerated for posting user-generated content,⁸ blurring the distinction between paid media and user-generated content.

Branded hashtag challenges are a form of marketing on TikTok that combine paid media, owned media and user-generated content to increase reach.⁹ They are instigated by brands and often call on users to feature products, brand-supplied videos or branded effects (eg, stickers, filters or special effects featuring branding) in user-generated content and/or feature the brand name in the hashtag.¹⁰ Users may be exposed to branded hashtag challenges via paid advertisements (eg, on the 'discover' page, when the platform is first opened, or in the 'for you' feed), via videos posted by brand accounts that users might seek out or that might appear in the 'for you' feed, and via user-generated content created and shared by other users (including influencers who have been paid to do so).^{9–11} Brands can now also pay to 'amplify' existing user-generated content's appearance in 'for you' feeds.¹² TikTok touts branded hashtag challenges as an 'opportunity that turns TikTok users into your unofficial brand ambassadors' and promotes several 'success stories' on its website.^{9 10}

Studies examining the portrayal of health-harming products such as alcohol and e-cigarettes on TikTok have shown that videos frequently portray a pro-alcohol or pro-e-cigarette sentiment.^{13 14} Despite its rising popularity and the marketing opportunities it provides, however, there has been no exploration of the extent and nature of unhealthy food marketing on TikTok. Understanding both of these will be valuable for advocates and policy-makers seeking to strengthen policies to counter the harmful impacts of pervasive unhealthy food marketing.

The aim of this study was therefore to examine the:

1. Use of owned media by major unhealthy food brands on TikTok.
2. Nature of branded hashtag challenges instigated by unhealthy food brands and the user-generated content created in response to these.

METHODS

Data collection

In line with previous content analyses of brand social media accounts that selected brands for inclusion based on brand share,^{15 16} we selected the top five brands in the confectionery, snacks, carbonates and chained consumer foodservice categories by global brand share.¹⁷ We then selected one verified account on TikTok for each brand (verification indicates TikTok has confirmed an account belongs to the user represented). If a brand had multiple verified accounts (eg, multiple country-specific accounts), we selected the account with the most followers with all posts in English (to allow analysis of text in captions). All data were manually collected directly from the TikTok app.

For each account, we recorded the numbers of followers, videos posted and likes at 30 June 2021. For each video posted on accounts up until this date, we recorded the date posted and the numbers of views, likes, comments and shares at 30 June 2021. We coded video content against a prespecified coding guide adapted from a study examining food marketing on Instagram (table 1).¹⁸ The guide from the prior study was selected for its inclusion of a comprehensive range of marketing strategies; 'branded effects' and 'branded hashtag challenges' were added to the guide to capture these features of TikTok. Where a branded hashtag challenge was featured in a video, the hashtag was recorded. Branded hashtag challenges were identified via the presence of branding and a disclaimer ('Sponsored by') on the hashtag page (the page on which all videos tagged with a specific hashtag are compiled). For each branded hashtag challenge, the brand, hashtag, challenge description and total number of views of videos tagged with the hashtag were recorded from the hashtag page.

We then sampled the first 100 videos appearing on the hashtag pages of each branded hashtag challenge, excluding any posted by brands' verified accounts as these were captured on, and included in analysis of, brand accounts. For each video, the numbers of likes,

Table 1 Coding guides for analysis of owned media and user-generated content on TikTok

Code	Description
Owned media	
Branding	Whether branding, such as logos, colours, fonts, trademarks or slogans is present, including branding in product images and branded effects (see below)
Product images	Whether product images are present, including packaged product images and unpackaged product images where the product is clearly identifiable as the brand's product
Branded effects	Whether a branded effect (eg, stickers, filters or special effects that feature the brand and appear within TikTok for users to add to videos) is present
Corporate social responsibility or philanthropy	Whether a statement of an ethical or sustainability standpoint or initiative or partnership with a charity is present
Celebrities/influencers	Whether anyone with a media profile or a verified badge (indicating that TikTok has confirmed the account belongs to the user it represents), excluding professional sportspeople, is present
Sportspeople	Whether a professional sportsperson is present
Children's characters	Whether a third-party cartoon or character is present
Branded characters	Whether a cartoon or character developed by the brand is present
Price promotions	Whether a price promotion (eg, promotion of regular prices or promotions of limited time offers, discount menus, 2 for 1 deals) is present
Competitions	Whether a competition is promoted
Engagement	Whether interaction or conversation is promoted, including promotion of hashtag challenges
Branded hashtag challenges	Whether a branded hashtag challenge is promoted
Sponsorships or partnerships	Whether a statement of sponsorship or partnership with an event, other brand or organisation is present, excluding any already captured by 'Corporate social responsibility or philanthropy'
User-generated content	
Branding	Whether branding, such as logos, colours, fonts, trademarks or slogans is present, including branding in product images and branded effects (see below)
Product images	Whether product images are present, including packaged product images and unpackaged product images where the product is clearly identifiable as the brand's product
Branded effects	Whether a branded effect (eg, stickers, filters or special effects that feature the brand and appear within TikTok for users to add to videos) is present
Positive sentiment	Whether the video portrays a positive sentiment (eg, through video content or positive text, emojis or hashtags in the caption)
Negative sentiment	Whether the video portrays a negative sentiment (eg, through video content or negative text, emojis or hashtags in the caption)
Neutral/unclear sentiment	Whether the video portrays a neutral or unclear sentiment
Adapted from Vassallo <i>et al</i> and Laestadius <i>et al</i> . ^{18 21}	

comments and shares, and whether the user who had posted the video appeared to have been paid to do so (indicated by inclusion of #Ad or similar in the caption) were recorded. TikTok's branded content policy requires users to enable the 'branded content toggle', which 'adds a disclosure (for example, #Ad)' to videos, when posting content that they have received 'something of value' in exchange for posting.¹⁹ The toggle's introduction was, however, staggered over time²⁰ and compliance with the policy is unknown. We coded video content and sentiment against a prespecified coding guide adapted from a study examining user-generated content on Instagram (table 1).²¹ Sampled videos were excluded from coding if the caption was in a language other than English and/or the video was not relevant to the brand (ie, did not feature the brand beyond the use of the hashtag of interest). Irrelevant videos may

arise when a hashtag is trending or promoted and users 'hijack' the hashtag to try to gain exposure. Data from user-generated content were collected between June and August 2021.

Two authors (RB and RC) independently coded all videos posted on one brand account for each category (n=114 at the time of cross-coding) and the first 100 videos appearing on the hashtag page for one branded hashtag challenge. The percentage agreement was calculated for each code and discrepancies in the cross-coded sample were discussed until resolution (eg, further refinement of the code description). Remaining videos (including videos posted on the cross-coded brand accounts between the time of cross-coding and 30 June 2021) were coded by one of the two authors.

Data analysis

We calculated descriptive statistics using Microsoft Excel. For owned media, the median and range of likes, comments and shares per video and the percentage of videos using each marketing strategy were calculated by category and in total. For user-generated content, the median and range of likes, comments and shares per video and the percentage of videos featuring branding, product images and branded effects and of positive, negative and neutral/unclear sentiment was calculated in total.

Patient and public involvement

Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our research.

RESULTS

Interrater reliability

The percentage agreement was greater than 80% for all codes other than 'positive sentiment' and 'neutral/unclear sentiment', for which it was 75%.

Use of owned media

Eighteen brands were selected for inclusion (two brands were among the top five brands in both the snacks and confectionery categories). Of the 18 selected brands, 16 had at least one verified account (table 2). The number of followers of included accounts ranged from 14 to 1.6 million; 539 videos had been posted on the 16 included accounts, with 3% (17) posted in 2019 (earliest year of posting), 37% (198) in 2020 and 60% (324) in the first 6 months of 2021. Four accounts had not posted any videos.

Videos received a median 63 400 views, 5829 likes, 157 comments and 36 shares per video (table 3). The most frequently used marketing strategies were branding (87% of videos) and product images (85%). Engagement featured in 31% of videos and included calls for users to comment on videos or tag a friend, hashtag challenges and/or more generic hashtags that promoted interaction (eg, #DuetWithMe, which refers to the 'duet' feature that allows users to record their own video alongside an existing video) and interactive polls. Ten percent of videos featured branded hashtag challenges.

Table 2 Details of major unhealthy food brand accounts included in analysis of owned media on TikTok (at 30 June 2021)

Brand	Brand account	Followers, no.*	Videos posted, no.	Date first video posted	Cumulative likes of videos, no.*
Confectionery					
Kinder	–	–	–	–	–
M&M's	@mmschocolate	19.3K	6	12 December 2020	699.2K
Lindt	–	–	–	–	–
Extra/Orbit	@extragum	146.2K	5	14 April 2020	507.6K
Reese's	@reesesukofficial	90.6K	36	23 May 2020	744.1K
Snacks†					
Lay's	@laysindiaofficial	49.6K	28	5 July 2019	374.9K
Doritos	@doritos	52.8K	11	16 March 2021	60.6K
Cheetos	@cheetos	49.1K	32	22 December 2020	223.8K
Carbonates					
Coca-Cola	@cocacola_us	69.9K	0	–	0
Pepsi	@pepsiglobal	385.9K	63	11 September 2020	1.4M
Sprite	@sprite_us	8466	0	–	0
Fanta	@fanta_us	725	0	–	0
Diet Coke	@dietcokeus	14	0	–	0
Chained consumer foodservice					
McDonald's	@mcdonalds	1.2M	35	6 October 2020	3.9M
Starbucks	@starbucks	1.6M	97	22 September 2020	7.9M
KFC	@kentuckyfriedchicken	594.4K	125	21 January 2021	2.6M
7-Eleven	@7eleven	11.2K	10	8 August 2020	5520
Burger King	@burgerking	599.8K	91	6 February 2021	2.9M

*Numbers of followers and likes are rounded by TikTok.

†Kinder and M&M's were among the top five brands in the snacks category by global brand share but were excluded from analysis in this category to avoid duplication (given their inclusion in the confectionery category).

Table 3 Analysis of major unhealthy food brands' owned media on TikTok (at 30 June 2021)

Metric	Confectionery (n=47)	Snacks (n=71)	Carbonates (n=63)	Chained consumer foodservice (n=358)	Total (n=539)
Reach and engagement					
Views per video, median (range)	69 500 (4849–76 200 000)	34 600 (5778–5 300 000)	62 800 (14 000–1 100 000)	72 850 (3697–83 400 000)	63 400 (3697–83 400 000)
Likes per video, median (range)	10 300 (343–396 700)	1594 (328–95 300)	5206 (774–263 200)	9092 (157–2 700 000)	5829 (157–2 700 000)
Comments per video, median (range)	60 (5–7409)	36 (9–1510)	60 (9–2190)	231 (20–64 100)	157 (5–64 100)
Shares per video, median (range)	21 (1–22 100)	18 (0–2116)	40 (3–1263)	47 (1–93 900)	36 (0–93 900)
Content					
Branding, no. (%)	39 (83)	68 (96)	61 (97)	299 (84)	467 (87)
Product images, no. (%)	47 (100)	55 (77)	60 (95)	294 (82)	456 (85)
Engagement, no. (%)	20 (43)	54 (76)	53 (84)	41 (11)	168 (31)
Celebrities/influencers, no. (%)	28 (60)	43 (61)	29 (46)	34 (9)	134 (25)
Branded hashtag challenges, no. (%)	0 (0)	41 (58)	1 (2)	13 (4)	55 (10)
Sportspeople, no. (%)	5 (11)	1 (1)	37 (59)	1 (0)	44 (8)
Branded characters, no. (%)	0 (0)	28 (39)	0 (0)	9 (3)	37 (7)
Branded effects, no. (%)	0 (0)	14 (20)	1 (2)	1 (0)	16 (3)
Price promotions, no. (%)	0 (0)	0 (0)	0 (0)	14 (4)	14 (3)
Sponsorships or partnerships, no. (%)	0 (0)	0 (0)	8 (13)	4 (1)	12 (2)
Competitions, no. (%)	1 (2)	0 (0)	0 (0)	7 (2)	8 (1)
Corporate social responsibility or philanthropy, no. (%)	1 (2)	0 (0)	0 (0)	6 (2)	7 (1)
Children's characters, no. (%)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Celebrities/influencers and sportspeople featured in 25% and 8% of videos, respectively, and included actors, musicians, and others with verified badges, and professional soccer and cricket players. Examples included @mcdonalds' use of the band BTS to promote the 'BTS Meal' (which included a sauce with packaging that could 'unlock' a branded effect featuring the band). Branded characters appeared in fewer videos (7%) and were mainly @cheetos featuring the Chester Cheetah character (predominantly on packaging) and @burgerking featuring the Burger King character.

Branded effects (3%), price promotions (3%), sponsorships or partnerships (2%), competitions (1%) and corporate social responsibility or philanthropy (1%) were less frequently featured. No videos featured children's characters.

Nature of branded hashtag challenges

In total, 10 unique branded hashtag challenges, related to seven included brands, were identified (table 4). The collective number of views of all videos tagged with the hashtag of a branded hashtag challenge ranged from 12.7 million to 107.9 billion per unique hashtag challenge

(this included views of videos that were tagged with the hashtag but otherwise irrelevant to the brand).

Branded hashtag challenges included calls for users to feature brands' products (#DoritosDuetRoulette, #ItWasntMe, #SlurpeeSummer, #SipIntoSummer), brands' videos through the 'duet' feature (#McDonaldsCCSing and #MadeReadyDuet) or branded effects (#SmileDekeDekho and #DoritosFlatLife). Only one offered a prize (#MadeReadyDuet).

Nature of user-generated content created in response to branded hashtag challenges

Nine hundred and sixty five videos were sampled from hashtag pages (rather than 1000 as intended, as only 65 videos were available on the #MadeReadyDuet hashtag page). Of these, 339 had a caption in a language other than English and/or were not relevant to the brand (other than the hashtag) and were excluded from further analysis, leaving a final sample of 626 brand-relevant videos.

The median numbers of likes, comments and shares per video were 506, 16 and 8, respectively (table 5). Eight percent of videos were posted by users who appeared to have been paid to do so, 96% featured branding (the

Table 4 Details of branded hashtag challenges included in analysis of user-generated content on TikTok

Brand	Branded hashtag challenge	Description of branded hashtag challenge	Views of the hashtag, no.*
Pepsi	#SwagStepChallenge	Salaam namaste karne mein hi swag hai! To participate in the #SwagStepChallenge 1. Choose #SwagStepChallenge from the discover page 2. Synchronise your salaam, namaste and swag with the music beats 3. Post with #SwagStepChallenge and tag @pepsiindia	107.9B
Lay's	#SmileDekeDekho	Shake a leg with the Lay's #SmileDekeDekho Hook Step Challenge. Enjoy the joyful, flirty, naughty, calm, simple and whacky moments of Smile Deke Dekho musical. Just wait for the song to start, smile and do the hook step along with Ranbir and Alia. What are you waiting for? #SmileDekeDekho	49.0B
Doritos	#DoritosFlatLife	Get ready to live the flat life. The Doritos 3D Crunch Super Bowl commercial introduced you to Flat Matthew. Now it's time to experience it for yourself! Just use our Flat Branded Effect to transform into 2D-you and give us a peek into your #DoritosFlatLife.	17.6B
Cheetos	#ItWasntMe	Everyone has snuck some Cheetos from their loved ones. But now, you don't have to take the blame for it. Using the track 'It Wasn't Me', show us how you "steal" Cheetos Crunch Pop Mix in a fun way.	13.9B
Starbucks	#SipIntoSummer	Sunshine is just a sip away! Grab your fave Starbucks drink and show us what dreamy summer state of mind awaits you when you #SipIntoSummer	10.9B
Doritos	#DoritosDuetRoulette	If eating a bag of Doritos Roulette is a gamble, posting your reaction is betting it all on the house. We created a challenge for the spice-lovers, the risk-takers, and the lip-syncers: Doritos Duet Roulette. Grab a bag of Doritos Roulette, flip on selfie mode, and test your luck. Maybe you're brave enough to go chip for chip and post it using #DoritosDuetRoulette.	9.5B
McDonald's	#McDonaldsCCSing	Our Crispy Chicken Sandwich is so crispy, juicy, and tender, it deserves its own word: crispyjuicytender. It also deserves its own song. So Tay Keith produced the track, and when you join this challenge, you'll help give it vocals. Thank you for doing that.	8.6B
Cheetos	#DejaTuHuella	Film, fashion, art, dance, food? Whatever your thing is, we know you're puro fuego. So, we dare you to show the world how you rewrite the rules! So c'mon and #DejaTuHuella	4.8B
7-Eleven	#SlurpeeSummer	Slurp your way to Brainfreeze cool! Summer is heating up and 7-Eleven wants to see how you would use a Slurpee to cool off. #SlurpeeSummer #Sponsored	2.6B
Starbucks	#MadeReadyDuet	Duet with Chance the Rapper and show us how you're Made Ready with your best moves, or whatever feeling ready looks like for you. You could win a year supply of Starbucks bottled and canned coffees that are Made Ready just like you – and a personal moment with Chance. Check the rules for full prize and entry details. No purchase necessary. Follow @Starbucks (until 8/31/21) to qualify.	12.7M

*Number of views of the hashtag recorded as at 12 August 2021. Descriptions recorded in June 2021.

remaining 4% were still brand-relevant through verbal or written reference to the brand), 68% featured product images and 41% featured branded effects. Branding and product images appeared in branded effects (eg, #DoritosFlatLife videos used a branded effect that transformed users into a '2D' version of themselves), brand-supplied videos that users recorded themselves alongside using the 'duet' feature (eg, #McDonaldsCCSing videos used a McDonald's-supplied video of a Crispy Chicken Sandwich) and users' own recorded videos (eg, #DoritosDuetRoulette videos where users consumed Doritos products).

Most (73%) videos portrayed a positive sentiment. This was portrayed by, for example, seemingly genuine enthusiastic participation in challenges or praise for brands. Only 3% of videos portrayed a negative sentiment, which

included criticism of product taste, a featured celebrity, employment conditions at quick service restaurants, or product nutritional quality. In 25% of videos, the sentiment was neutral/unclear, such as when videos used branded effects but portrayed neither a positive or negative sentiment or when videos were crude or seemingly deliberately cringeworthy.

DISCUSSION

Our study is the first to analyse unhealthy food marketing by major food brands on TikTok. We found that brands are using their own accounts to post videos that frequently feature branding, product images, engagement and celebrities/influencers. Brand activity has rapidly increased—with most videos posted in the 6 months preceding data

Table 5 Analysis of user-generated content created in response to branded hashtag challenges on TikTok (collected between June and August 2021)

Metric	Total videos (n=626)
Engagement	
Likes per video, median (range)	506 (1–1 600 000)
Comments per video, median (range)	16 (0–43 900)
Shares per video, median (range)	8 (0–114 400)
Content	
Paid, no. (%)	48 (8)
Branding, no. (%)	603 (96)
Product images, no. (%)	427 (68)
Branded effects, no. (%)	257 (41)
Sentiment	
Positive sentiment, no. (%)	455 (73)
Negative sentiment, no. (%)	16 (3)
Neutral/unclear sentiment, no. (%)	155 (25)

collection—and includes instigation of branded hashtag challenges that encourage user-generated content featuring brand products, brand-supplied videos or branded effects. Analysis of a sample of brand-relevant user-generated content created in response to these showed that branded hashtag challenges are effectively turning users into, in TikTok's words, 'unofficial brand ambassadors';⁹ content frequently featured branding and product images and predominantly portrayed positive sentiment. For all but one branded hashtag challenge, videos tagged with the corresponding hashtag were collectively viewed billions of times. While this included videos that were tagged with the hashtag but otherwise irrelevant to the brand, our findings suggest that these may make up less than a third of videos (35% of our sample of user-generated content was excluded due to having a caption in a language other than English and/or not being relevant to the brand (other than the hashtag)).

The high level of marketing featuring branding and product images on brands' TikTok accounts is similar to brand accounts on other social networking platforms (eg, Instagram).¹⁸ Our finding that brand-relevant user-generated content heavily promoted brands also aligns with an analysis of brand-relevant user-generated content created in response to a corporate hashtag campaign (#HowDoYouKFC) on Instagram, which found that images frequently featured branding and product images and that most posts were explicitly pro-brand or neutral in sentiment.²¹ Compared with other social networking platforms, however, TikTok allows brands to encourage creation of highly orchestrated user-generated content. Several of TikTok's unique features encourage replication and imitation—its explicit display and linking of sounds and effects in videos encourages replication of sounds and effects in other users' videos and popular

hashtag challenges frequently centre around imitation.²² Our findings show brands capitalise on this by including branded effects and brand products in branded hashtag challenges, with branding and product images then propagated via user-generated content created in response.

The enormous reach of branded hashtag challenges is achieved by combining user-generated content with paid and owned media. Our analysis of brand-relevant user-generated content suggested almost all videos were posted by users who did not appear to have been paid to do so, adding to the evidence that digital technologies have facilitated the transformation of consumers into advertising producers and distributors, via user-generated content.²³ Such content blurs distinctions between commercial and peer activity,³ which is problematic as the mechanisms users would usually use to resist persuasive intent are not initiated when another user is the source of content.²⁴ Via hashtags, brands can also easily monitor user-generated content and find ways to market themselves and their products more effectively.²¹ Brands ability to pay to 'amplify' existing user-generated content's appearance in users' 'for you' feeds¹² extends this and muddies distinctions between paid and organic reach. While we found that fewer videos were posted by users who appeared to have been paid to do so (ie, influencers), these attracted nearly 10 times as many likes per video on average compared with apparently non-paid-for videos (data not shown) and are thus likely important in propagating branded hashtag challenges. The substantial reach of influencer marketing is concerning given exposure to influencer marketing of unhealthy foods has been shown to increase energy intake (from unhealthy foods and overall).²⁵

Our findings demonstrate the engaging nature and substantial reach of unhealthy food marketing on social networking platforms. Considered alongside evidence that children are exposed to high volumes of unhealthy food marketing online (approximately 10 unhealthy food promotions per hour on the internet among Australian children)²⁶ and that food marketing influences food preferences, purchasing, requests and consumption,² our study supports calls for policies that protect children from the harmful impact of food marketing, including on social networking platforms. According to a 2019 review, few countries have statutory regulations to protect children from unhealthy food marketing and restrictions on unhealthy food marketing on the internet are uncommon.²⁷ The UK's Health and Care Bill proposes that all 'paid-for' online marketing of 'less healthy food and drink' be banned from 1 January 2023²⁸ and would effectively prohibit in-app advertising and paid-for advertisements, including use of influencers, if foods or non-alcoholic beverages that are high in fat, sugar and/or salt are present in the advertisement.²⁹ However, a proposed exemption for brand-only advertising (ie, advertising of a brand with no identifiable unhealthy foods in the advertisement) risks limiting the extent to which children are protected. Nearly half the branded hashtag challenges

in our study promoted brands, rather than foods per se and thus appear to be out-of-scope of the proposed law. The proposed law also exempts marketing originating outside the UK, which is problematic—particularly for marketing that is shared or created by users (eg, influencer marketing)—as social networking platforms frequently operate across international borders. More broadly, regulating marketing of unhealthy commodities on social networking platforms faces issues as to who is legally responsible (ie, the brand or the social networking platform), particularly where transnational corporations are involved.³⁰

There are some limitations to our study. We could not determine the extent of activity due to social bots (accounts that are run by programmes and complete automated tasks like viewing or liking specific videos), which may exaggerate reach and engagement. The sampled user-generated content may not have been representative of all user-generated content for a branded hashtag challenge—we could not sample videos posted on private accounts and excluded videos with a caption in a language other than English, and what determines the order videos appear in on hashtag pages is not apparent (there is some indication that brands/advertising agencies select which videos appear first).³¹ Other users may also see a different selection of videos, if the order is algorithm-based; during data collection, we used a new TikTok account that had not engaged with any videos. Using the presence of hashtags like #Ad as an indication of whether users had been paid to post videos is likely to have been imperfect and may have underestimated the proportion of videos posted by users paid to do so. Our analysis of sentiment of videos was, to some extent, subjective, although similar methods have been used in other studies.^{14 21} While we described the nature of owned media and user-generated content, we did not measure children's exposure to these, which is an important area for future research.

CONCLUSION

Our study has shown that TikTok is an emerging source of unhealthy food marketing, including that created by users at the instigation of brands. Given TikTok's popularity among children, our findings support the need for policies that protect children from the harmful impact of food marketing, including that on social networking platforms. TikTok's rising popularity also calls for further research into its potential impact on public health and its role as a corporate political actor.³²

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Contributors RB and KB conceptualised the study. RB and RC analysed, had access to and verified the underlying data. RB wrote the original draft. All authors contributed to review and editing and were responsible for the decision to submit the manuscript. RB is the guarantor.

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Ethics approval This study involves human participants and was approved by Deakin University's Faculty of Health Human Ethics Advisory Group (HEAG-H 70_2021). Deakin University's Faculty of Health Human Ethics Advisory Group (HEAG-H 70_2021) provided a waiver of consent in relation to accessing collections of potentially identifiable data that are neither health nor sensitive data. The expected risks of the project were negligible given the data were neither health nor sensitive data and the results were to be reported in aggregate. It was also considered impracticable to obtain consent given the quantity of videos included and difficulties in contacting the users who posted the videos.

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Data availability statement Data are available upon reasonable request. The videos analysed were publicly accessible at the time of coding. No videos were locally downloaded or copied. Access to the coded video content and sentiment will require a request for modification of the ethics approval.

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