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Nigerian adolescents' exposure to fast food marketing via Instagram

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Abstract

Objectives To explore the promotion of fast food to lower-income adolescents on Instagram with the specific aims of (i) identifying the marketing strategies used by fast food brands on Instagram to promote fast food to Nigerian adolescents and (ii) examining the influence of these strategies on user engagement.

Design A content analysis of posts from a 90-day period of the Instagram accounts of five fast-food brands in Nigeria was conducted. Overall, 576 posts were analysed, using a codebook developed based on the relevant literature, to identify adolescent-targeted strategies. User engagement was measured by number of likes each post received.

Results The observed brands frequently utilised adolescent-targeted marketing strategies, with the most popular strategies being emotional appeal, 'teen language' and product appeal. The results of Mann-Whitney U tests revealed significant associations between the use of these promotional strategies and user engagement. Adolescent-aimed strategies like product appeal and competitions resulted in higher user engagement with fast food promotional content.

Conclusion Fast food companies heavily target lower income adolescents through the use of Instagram. This raises health concerns related to the consumption of unhealthy food that arises from regular advertising in that demographic. Further, this exposure increases ad interactions that could cause adolescents to view fast foods more positively. Overall, findings indicate the need for actions aiming to limit and reduce the effect of adolescents' exposure to fast food marketing on social media, to target the features of social media platforms which affords users the ability to interact with fast food advertisements.

Keywords Obesity, Adolescents, Marketing, Fast food, Social media

Introduction

Fast food consumption rates are rising rapidly among adolescents in low- and middle income countries (LMICs) as highlighted by the recent finding that 55.5% of 12 to 15 year old adolescents across 54 LMICs consume fast food at least once a week [1, 2]. Such rates are largely attributable to the aggressive marketing practices used by fast food companies and the sharing of fast-food related content across multiple media platforms and settings [3, 4]. These marketing practices are largely unregulated despite the World Health Organization's (WHO, 2020) release of comprehensive recommendations for

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marketing restrictions for children [5]. In response, some governments (e.g. Chilean and Peruvian governments) have introduced strict regulations while food corporations have adopted self-regulation measures like the Children's Food and Beverage Advertising Initiative (CFBAI) - a voluntary pledge to reduce children's exposure to unhealthy food promotion. However, these actions have not been applicable to the new variety of promotional channels at play nor are they universally applied [6, 7, 8, 9].

Globally, young people have replaced time watching the television with smartphone use, forcing food companies to adopt a more digital approach to marketing to maximise advertisement reach, efficiency and impact [10, 11]. Consequently, with over 84 billion US dollars committed to social media advertising by global food companies in 2020 [6], unhealthy food marketing has become pervasive and prolific across digital channels including on social media platforms [12]. One study has revealed that 7 in 10 Canadian children were exposed to an unhealthy food advertisement within five minutes of using two of their favourite social media apps [13]. Another recent study [14], found that through using Instagram McDonald's reached millions of consumers in LMICs. These studies indicate that fast food brands prefer social media as it affords the ability to preferentially target population groups based on user demographics and preferences, increasing the companies' reach and capacity to deliver targeted advertisements. [15, 16, 17].

Although research has observed adolescents' exposure to the marketing strategies used by the fast-food industry, much of the literature is focused on high-income populations [18, 19, 20, 21] or on the use of traditional marketing mediums [22, 23, 24]. Hence, little is known about adolescent-directed marketing strategies used by fast food chains in LMICs. This is concerning because food is not only marketed as a commodity but as a cultural good [25], and what are otherwise normal marketing adaptations to local conditions might be encouraging levels of energy intake that are potentially excessive for the local consumer [26].

Fast food companies, like other food and beverage establishments, are known to adjust their marketing approach to appeal to the values of their 'host' population [27]. Key differences in the marketing strategies being used across socio-economic regions and contexts have been identified [27, 28, 29]. For example, Bragg and her colleagues [27] observed that healthier menu items were not promoted as much to children from low-income households in India while Seubsman and their colleagues [29] reported that, in developing countries, fast food chains marketed their brand as a symbol of wealth and high status. In western countries on the other hand, fast food brands target children majorly through sports-related marketing and video game product placement [27]. These contextual differences indicate that current evidence-based initiatives aiming to protect adolescents from junk food marketing online may be less effective in lower income settings, contributing to rising rates of fast food promotion in these settings [30, 31, 32].

To address this challenge, the primary aim of this study was to examine the marketing strategies used to promote fast food to adolescents on the widely used social media platform, Instagram. Little is also known about how social media influences adolescents beyond Western populations despite evidence suggesting greater use in lower income settings [33, 34]. Therefore, as a secondary objective, the study also aimed to explore the influence of these strategies on social media user engagement. By addressing both knowledge gaps, the findings of this study provide critical insights needed to inform the birth of policies and regulations that are applicable in these settings, and that can protect young people from the harmful effects of fast food marketing.

Methodology

Setting

Nigeria is a key regional player in West Africa. Not only does Nigeria account for over half the population of the region with approximately 202 million residents but also has one of the largest youth populations in the world [35]. As of January 2022, Nigeria had 32.9 million active social media users and 1 in 2 Nigerian adolescents between the ages of 14 and 16 uses social media regularly [36]. Relatively high rates of fast food consumption among Nigeria adolescents coupled with a spike in the prevalence of overweight and obesity among adult Nigerians, [37, 38] indicates that from a population health perspective, there is significant cause for concern.

Selection of fast food companies

The Instagram accounts of five of Nigeria's most popular fast-food brands were included. The brands were first identified through review of 2020 global sales rankings and subsequently the companies' popularity was assessed based on Instagram presence and popularity [39]. The top five brand accounts, being the brand with the highest number of followers, were included in the study. Four of these brands were global brands namely Domino's Pizza, Krispy Kreme, Kentucky Fried Chicken (KFC) and Debonairs Pizza, while Chicken Republic was the only locally owned brand.

Codebook development

The Instagram account of each brand was accessed and three months of Instagram posts, including the image, caption, number of likes and comments, from 1 January 2021 to 1 March 2021 were extracted and saved

securely. Adolescent-directed marketing strategies were identified using a codebook. The initial set of coding categories were created based on strategies identified in relevant literature [40, 41, 42, 43]. To test its validity within the context of this study, the codebook was piloted on a subsample of 10 images from each Instagram account. Subsequently, two new categories (teen influencers and menu modification) were identified and added to ensure that the codebook was relevant for Instagram and responsive to the contextual nature of the study setting. The final codebook contained 15 mutually exclusive coding categories (Table 1).

Coding process

All authors independently coded a random subsample of 5 posts from each of the 5 Instagram accounts. Codes assigned for all 25 posts were checked for agreement, with an overall interrater reliability of 80% achieved on average. Discrepancies were discussed and agreed upon. All other posts were then coded by the main coder (EB), with the opinion of other coders sought when EB was unsure about the category a post belong to. The number of likes and comments gained by a post were recorded as measures of user engagement. This enabled the study to report on not only the frequency of exposure to adolescent-directed marketing strategies but also the relationship between the use of the marketing strategies and user engagement.

Analysis

Descriptive statistics were calculated and the total frequency of each marketing strategy was obtained. For the continuous variables mean and standard deviation values were obtained. Mann-Whitney U tests were conducted to examine the association between the marketing strategies and user engagement, while the Kruskal-Wallis H test was completed to test for associations between brand name and engagement. All quantitative analyses were done with SPSS version 25 (IBM).

Results

A total of 576 Instagram posts were analysed to examine fast food companies' use of adolescent-targeted marketing strategies. Descriptive results demonstrated that these strategies are commonly used, as all the Instagram posts observed contained one or more of these strategies. In terms of promotional activity through Instagram, Domino's Pizza (@dominospizzaNG) was the most active brand posting 179 times within the study period followed by the doughnut-brand Krispy Kreme ($n=163$). The Instagram accounts of the chicken-based restaurants, KFC and Chicken Republic made 89 and 86 posts respectively

Table 1 Definitions of Adolescent-targeted food marketing strategies

Categories	Definitions
Adolescent-directed marketing strategies	
Premium offers	Offers to consumers which are associated with the purchase of a product included. These could be in the form of a gift/s such as toys or cards, competitions, rebates and vouchers.
Promotional characters	Includes any brand identification characters (i.e. Ronald McDonald), licensed and unlicensed characters, and celebrities including Influencers.
Teen Influencers	A person who has the power to affect the purchasing decisions of teenagers because of his or her authority, knowledge, position or relationship with his or her teen audience.
Nutrition and health-related claims	Any general or specific claim that a food product is healthy or contains a specific nutrient.
Theme of taste	The presence of any word/s describing the taste or sensory appeal in the advertisement.
Emotional appeal	Non-verbal displays of fun and happiness (e.g., smiling or playing) or use of the words 'fun', 'love', 'happiness' or 'pleasure'.
Product appeal	Visual appeals or claims made about product characteristics such as product design, method/time of preparation, convenience etc.
Corporate social responsibility or philanthropy	Promotion of any ethical or sustainable initiatives or charitable work undertaken by the brand.
Competitions	Any contest involving participant entry (i.e. liking, commenting, tagging friends or sharing a post).
Event sponsorships	Any events the brand supports or brands/service partners, excluding charitable organisations (already coded as corporate social responsibility).
Engagement	Posts that prompt interaction or conversation.
Menu modification	The addition of new food products or meals to the menu such as the staple foods of host nations which are not sold by franchises located in other nations.
Scenery/Ambience	
Special price promotions	Limited time offers, discount menus, 2 for 1 deals, or other reduced-price advertisements including free delivery and discount vouchers.
Teen language	Any language or way of speaking characteristic of teenagers including acronym and slangs popular among teenagers.

Table 2 Instagram accounts of fast food brands in Nigeria

Brands	Instagram followers (*n*)	Posts during study period	Average likes per post (*n*)	Average comments per post (*n*)	No. of ADM Strategies used
KFC	36.2 K	89	124	14	132
Chicken Republic	51.6 K	86	147	11	123
Domino's Pizza	530 K	179	668	29	197
Debonairs Pizza	21.9 K	59	101	12	70
Krispy Kreme	49.5 K	163	294	11	189
Total	689.2 K	576	1334	77	711

Table 3 Frequency of adolescent-directed marketing strategies per brand

ADM Strategies	Fast food brands					
	Domino's Pizza	Kentucky Fried Chicken	Chicken Republic	Krispy Kreme	Debonairs Pizza	Total (% of observed posts)
Emotional appeal	7	18	40	51	10	126 (21.8)
Product appeal	64	1	2	23	14	103 (17.8)
Teen language	18	14	27	37	4	100 (17.3)
Premium offer	20	3	3	41	1	67 (11.6)
Special price promotion	15	8	1	2	26	51 (8.8)
Sponsorships/Partnership	-	28	-	-	1	29
Menu modification	3	16	-	-	-	19
Engagement	16	14	10	0	8	48
Competitions	15	11	15	5	0	46
CSR/Religious material	9	10	13	2	1	34
Theme of taste	18	8	8	-	4	38
Scenery/Ambience	-	1	2	14	-	17
Teen Influencers	-	-	-	16	1	17
Promotional characters	-	-	-	1	-	1
Health-related claims	-	-	-	-	-	-
Total ADM Strategies	**185**	**132**	**123**	**195**	**70**	**711**
Links	135	-	80	134	53	401
Videos	1	28	2	12	13	56
Hashtags	141	88	43	36	57	365
Branding element	177	85	85	114	45	506
Total	651	333	333	488	238	2024

while Debonairs Pizza was the least active posting 59 times within the 90 day period.

Table 2 shows that the observed brands received an average of 1,411 interactions per post with Domino's Pizza (who also employed the highest number of adolescent-targeted strategies, $n=197$) recording the highest number of likes per post ($n=688$) followed by Krispy Kreme ($n=294$). However, these engagement figures represent only a small percentage of followers (0.1 to 0.6% for *likes* and 0.005 to 0.05% for *comments*). In terms of the manner of engagement, it was apparent that users preferred to use the 'like' button as opposed to leaving a 'comment'.

Frequency and use of adolescent-Directed marketing (ADM) strategies

The use of *emotional appeal* was observed in 21.8% of all posts making it the most common strategy used by the fast food brands followed by *product appeal* (17.8%) and *teen language* (17.3%). *Premium offers* and *special price promotions* were also relatively common as seen in Table 3. Across the brands, Fig. 1 shows that Domino's Pizza accounted for the most ADM strategies (27.7%) and preferred to advertise using *product appeal* and *premium offers* including buy one-get -one free deal, while its pizza-based counterpart, Debonairs Pizza was more focused on utilising *special price promotions*. KFC's Instagram account (@officialKFCng) was more intent on showcasing their *sponsorships/partnerships* whereas the accounts of both Krispy Kreme and the local fast food

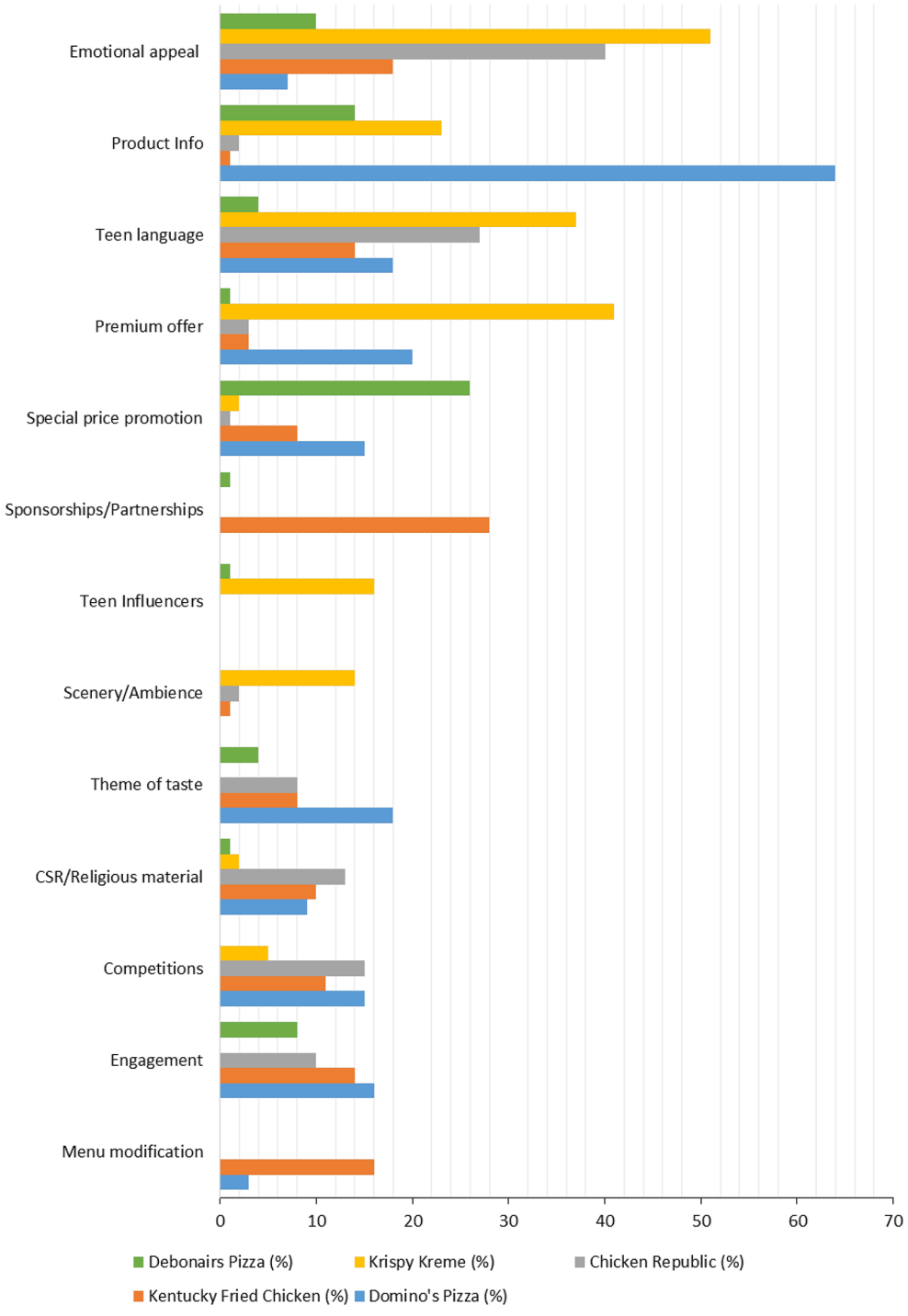

Fig. 1 Adolescent-directed strategies used by fast food brands in Nigeria

chain, Chicken Republic, utilised the *emotional appeal* strategy more frequently than the other brands.

As shown in Fig. 2, the use of *emotional appeal* usually involved images of young people expressing positive emotions such as fun or happiness while sharing fast food. On the other hand, Fig. 3 shows examples of *teen language* including the use of slang like "chairman", "street-wise", "gen-z" and acronyms like "TGIF" (Thank God It's Friday). Both textual and visual cues were commonly used to provide *product appeal*, with words like "hot", "delicious", "simple" used to describe the intrinsic qualities of fast food, while highly edited, high-definition

Fig. 2 Examples of the use of *emotional appeal* by fast food brands

images of fast food were used to showcase the attractive, external features of fast food items (Fig. 4).

User engagement and brand interactions

As presented in Table 4, the results of the Mann-Whitney U tests revealed that *product appeal*, *competitions* and *hashtags* were statistically associated with higher user engagement while *emotional appeal* and *special price promotion* were statistically associated with lower user engagement. User engagement was also examined across brands and a statistically significant difference in user engagement was found across the five brands, as indicated by the results of the Kruskal-Wallis H test (Gp1, $n=89$: KFC, Gp2, $n=163$: KK, Gp3, $n=179$: Domino's, Gp4, $n=59$: Debonairs, Gp5, $n=86$: CR), χ [2] (4, $n=576)=228.67$, $p=.001$). Domino's Pizza recorded the

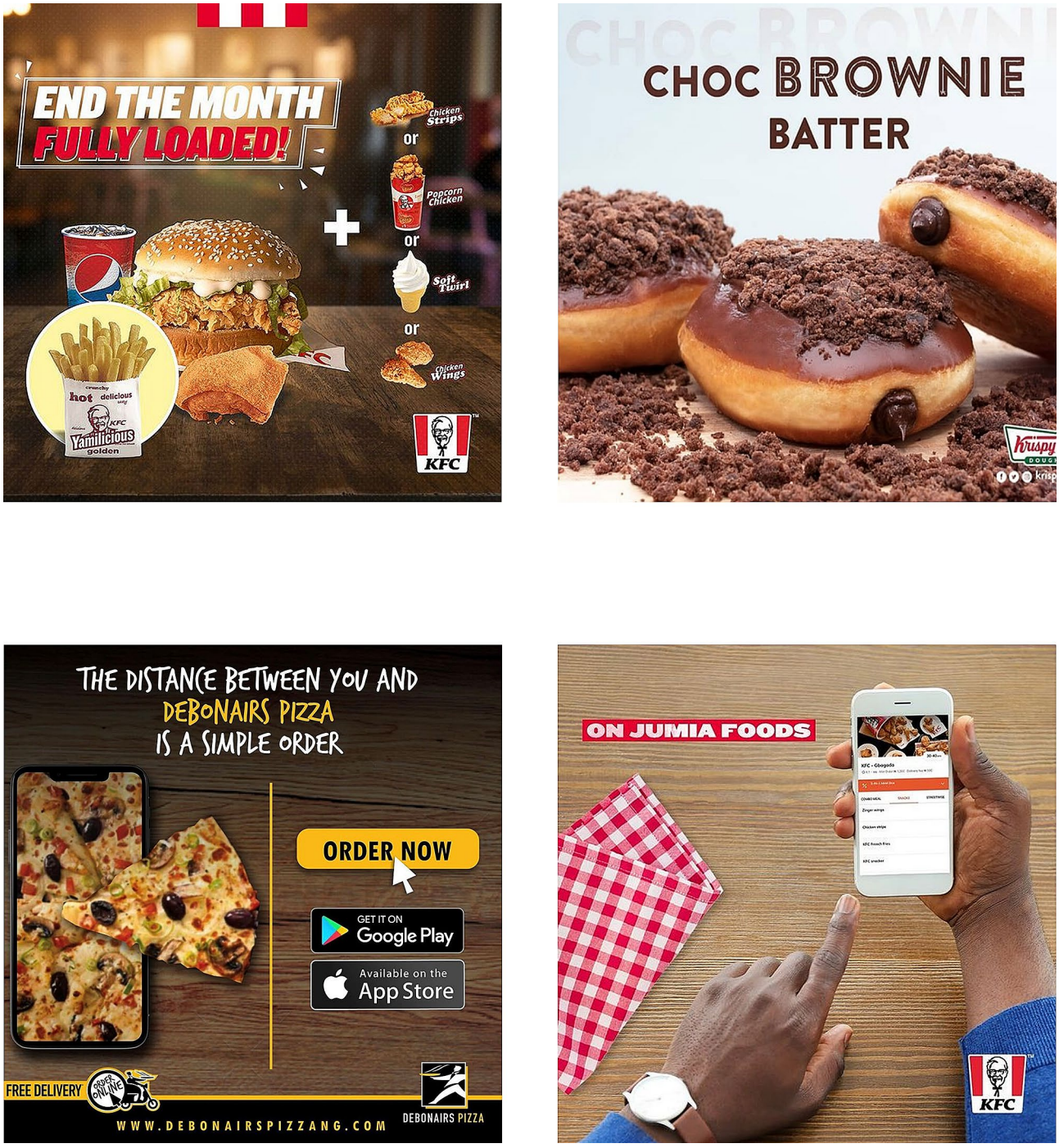

Fig. 3 Examples of the use of *product appeal* by fast food brands

highest median engagement (*Md*=352) while its pizza counterpart, Debonairs Pizza, had the smallest median engagement (*Md*=54).

General social media techniques

The use of common social media marketing techniques namely *hashtags, links* and *branding elements* such as logos and trademarked animations were also recorded and analysed. Over 87% of all posts included a unique element that identified the company, with global brands like Kentucky Fried Chicken (@officialkfcnigeria) and Domino's Pizza using their *logo* and/or *brand animation* on 100% of their posts. *Hashtags* were used in almost two-third (63.1%) of all posts while *links* which usually referred the user to the official website or the mobile app were attached in 67% of the posts. Krispy Kreme

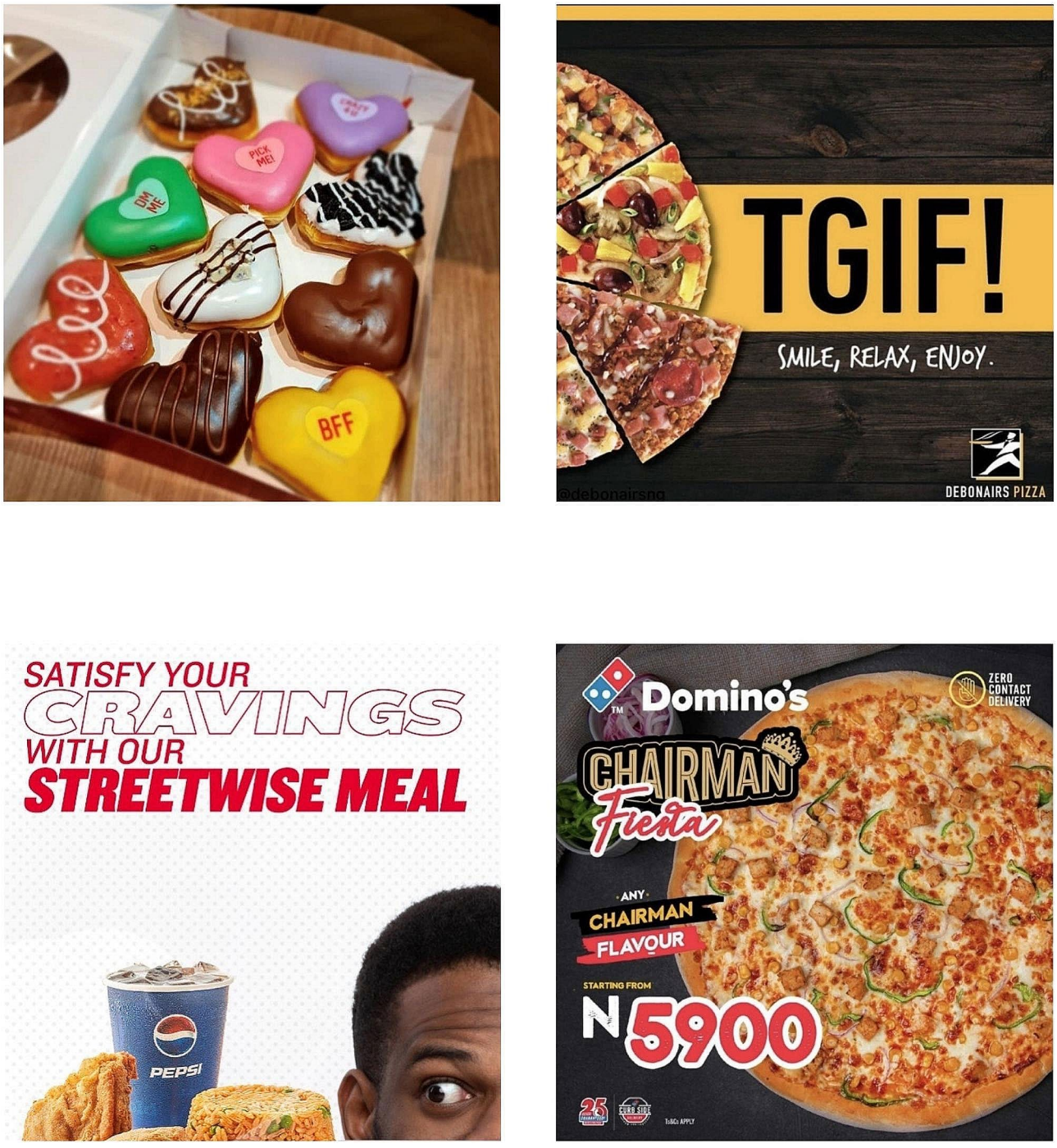

Fig. 4 Examples of the use of *teen language* by fast food brands

and Domino's Pizza were equally responsible for two-thirds of those 'linked' posts however Domino's alone accounted for nearly 40%, publishing 141 of the 365 posts that employed a unique *hashtag*. KFC on the other hand, did not once use *links* when promoting fast food to adolescents in Nigeria, although all their posts included one or more *hashtags*.

Discussion

Fast food is now a common feature of the social media marketing scene and as a result, adolescents who now spend hours on social media are heavily exposed to fast food advertisements [44, 45, 46]. With 140 million of its teenage users residing in LMICs, Instagram has proven to be an effective medium for food promotion to this demographic. Prior research indicates that its features alone

Table 4 Association between user engagement and adolescent-directed marketing strategies

Marketing Strategies	Mann-Whitney U	z (*p*-value)	r value (*N* = 576)	Median rank [a]	
				present	absent
Higher engagement					
Product appeal	14146.50	-6.57 (*< 0.001*)	0.27	323	150
Competitions	8948.50	-2.99 (*0.003*)	0.12	238	159.5
Hashtags*	33206.00	-2.76 (*0.006*)	0.12	209	157
Lower engagement					
Emotional appeal	22174.50	-3.74 (*< 0.001*)	0.16	123.5	179.5
Special price promotion	9206.00	-3.69 (*< 0.001*)	0.15	105	170

N = total number of cases; Cohen (1988) r value criteria of 0.1 = small effect, 0.3 = medium effect, 0.5 = large effect

[a] Median engagement when strategy is present vs. when strategy is absent

*General social media technique

increase the power of food advertisements [47]. Consequently, this research study examined the Instagram accounts of fast food brands in Nigeria and reported on their prolific use of adolescent-directed marketing strategies, as brands used at least one adolescent-marketing strategy per promotional post.

To attract adolescents, the observed fast food companies prominently employed *emotional appeal*, used *teen language*, and included *product appeal* within their posts. Two of these strategies significantly influenced user engagement, however while *emotional appeal* was linked to lower engagement the use of *product appeal* was associated with increased user engagement. The results strongly indicate that users were more likely to interact with a post which included *product appeal* namely textual and/or visual claims or appeals about special characteristics of a fast food product (i.e. its recipe, convenience etc.). Across brands, the promotional posts of both pizza brands received the most engagements. With hashtags well-known to increase the reach of social media posts, all fast food brands regularly employed this marketing tool which was seen to positively influence user engagement. Lastly, this study found that users preferred to engage with fast food related posts by "liking" the post rather than leaving comments.

Previous research

In accordance with one of this study's most significant findings, previous studies have reported frequent use of the *emotional appeal* strategy to promote unhealthy food to young people across both high and low-income contexts [14, 40]. While none of these studies examined its effect on online user engagement, the use of *emotional appeal* in food marketing has long been associated with increased consumption among adolescents [48]. In fact, the finding that promotional posts containing *emotional appeal* received lower user engagement than those that did not contain the strategy is, to our knowledge, the first time a detrimental effect has been observed from the use of *emotional appeal* to market food. This finding may be explained by the fact that older children and young adults have limited interest in persuasive cues that are pleasing, but irrelevant [49]. Such cues are more attractive to younger children who can only process a limited number of cues simultaneously due to their limited executive functions [50]. This presents a new worry that fast food companies are perhaps targeting younger children on social media, despite the age restrictions in place regarding social media membership.

Social networking age limits are fictitious, as younger children, including those below the age of 13, are able to circumvent the basic proof of age requirements of social media platforms, even as data analytics show that this demographic are markedly represented in active user populations [51, 52, 53]. As a result, the prominent use of the *emotional appeal* strategy observed in this study is hugely concerning. Social media apps like Instagram need to enforce tighter, foolproof systems which restrict younger children from owning accounts. Likewise, fast food companies cannot be allowed to exploit such flaws. Policy makers must ensure that legislations against child-directed junk food marketing extend to social media platforms, irrespective of the age limits supposedly in place.

Prior research indicates that young people from ethnic minority and lower socioeconomic groups are disproportionately exposed to and influenced by unhealthy food marketing [14, 54]. Price related strategies such as *price discounts* are used more frequently in low-income settings than in high-income settings as food companies view price as a key factor in consumer decisions within LMICs. [14, 19, 55, 56] In agreement with this evidence-base, strategies like *premium offers and special price promotions* were frequently found on the Instagram posts of fast food brands in this study. However, this study did not find any significant association between price-related strategies and user engagement and so could not suggest an influential relationship between fast food prices and positive attitudes or intentions towards fast food, despite the wealth of evidence from western countries suggesting a positive relationship between adolescents' food choices

and price discounts [57, 58, 59]. This discrepancy could be due to the current study being unable to account for other measures of social media engagement (e.g. post-sharing, accessing links etc.), using only publicly accessible metrics (likes and comments) to measure user engagement.

However, another explanation is that cultural perceptions of food in non-western countries have the potential to attenuate the 'normal' effects of marketing strategies [25]. Western food brands serve as symbols of social status in many LMICs including Nigeria [29, 60] and it has been observed that global fast food brands in these settings promote their products not as cheap, but as one of high quality, with price discounts marketed under the theme of value-for-money [23]. In line with Witkowski's theory, such 'normal' marketing adaptations to local conditions can encourage levels of energy intake that are potentially excessive for local consumers [26]. As a result, it remains possible that *special price promotions* and *premium offers* might not influence these adolescents' decision to consume fast food, but could be encouraging excessive consumption of fast food products, impacting consumption levels (amount) rather than consumption rates (frequency) in lower income nations.

Contextual differences in marketing techniques

In terms of contextual differences, the fast food companies appeared consistent in their marketing approach across borders. For example, Domino's Pizza in Nigeria focused on *product appeal*, in accordance with recent evidence revealing the prominent use of *product appeal* in the Instagram posts of their global account. Vassallo and colleagues noted that these appeals included claims relating to the healthy components of their products which was not observed in this study [19]. Instead, examples of product appeals provided by Domino's pizza and indeed the other brands included visual and textual claims regarding food components, recipes, information about taste, and convenience-related information such as 'time-till-delivery'. While the inclusion of such information may be explained by the fact that taste and convenience are established in the literature as important, independent predictors of food choice decisions among adolescents, [58, 61, 62] the absence of health-related claims is note-worthy.

The evidence suggests that adolescents make healthier food choices when provided with relevant nutritional information related to a food product [61, 63, 64]. In fact adolescents around the world have directly linked poor dietary behaviours to a lack of knowledge and ability to eat healthily [62]. The lack of product information relating to the nutritional status or healthy components of fast food (if any) is considered a missed opportunity to support adolescents in making informed food decisions. Global fast food companies in this setting should be mandated to not only promote healthy foods but also to include key nutritional information on their food products as part of product information, especially as this is standard practice when marketing through more traditional mediums like point of sale.

In addition to the absence of health-claims, the use of celebrities or promotional characters to advertise fast food on Instagram was rarely observed here even though such strategies have been noted in various settings [65, 66, 67]. Given the long-standing and effective nature of the relationship between celebrity endorsement and food marketing [65], it was unexpected that celebrities or at least sportspersons would not be incorporated into the Instagram posts of the brands in this setting. Prior research earmarks the important role of influencer marketing in the social media food marketing space, particularly in persuading adolescents [18, 68]. While it is possible that fast food chains in lower income settings, especially the multinationals, prioritise brand loyalty and are wary of compromising on brand image with recent reports indicating that only 4% of people trust influencers [69], further studies are needed to help us understand adolescents' brand perception and their perception of celebrity food endorsements and other common strategies in this setting.

Implications for policy and practice

Exposure to unhealthy food marketing encourages adolescents around the world to choose, purchase and consume unhealthy foods [7, 18, 70, 71]. The literature also notes that dietary behaviours established during adolescence usually last a lifetime [72, 73]. For LMICs, these implications pose a more devastating effect on population health, as many of these countries are currently facing a double burden of diseases related to malnutrition and obesity, with rising trends of non-communicable diseases [74, 75]. Given that over three quarters of the 15 million annual NCD-related deaths occur in LMICs, a situation whereby risk-factors for obesity become epidemic is bound to add great pressure to the already fragile health systems and pose significant challenges to development [76].

Therefore, the ubiquitous presence of adolescent-related promotional strategies noted in this study is cause for great concern and calls on global and local policy makers to prioritise the introduction and enforcement of regulations that extend to social media, restricting adolescents' exposure to fast food marketing in LMICs. Social media platforms appear to have similar policies in place restricting the advertising of alcohol, tobacco and gambling to children. However, the evidence indicates that such voluntarily measures to restrict the exposure of

children to the marketing of unhealthy commodities are not effective policy actions [6].

One of the most note-worthy findings of this study was the lack of health claims within the promotional content of fast food marketing in a LMIC context. In HICs, food companies frequently promote certain components of their food products as healthy or advertise healthier alternatives, as western governments enforce standards around nutritional information and adolescents in these settings increasingly demanding healthier food products [77, 78, 79]. However, it remains to be seen whether increased demand for healthier products in LMICs would foster a similar change in how fast food is marketed to adolescents in these countries.

Nevertheless, fast food products in themselves are not healthier whether in HICs or LMICs, regardless of the laws of demand and supply. In fact, robust studies demonstrate detrimental changes in the nutritional quality of fast food within the past 30 years including increased energy and sodium content [80]. Thus, health claims would only serve to promote the perception of healthfulness which might increase the effect of the fast food advertisement among adolescents in LMICs. This suggests proactive action be taken to prevent fast food companies from utilising this tactic (making health claims) in the future. Regulations can be put in place to ensure the information is accurate and food labels are effectively introduced, especially since nutrition workers in LMICs are now focused on building food literacy which reportedly has the tendency to increase demand for healthier foods [81, 82].

Crucially, the evidence base strongly indicates a positive relationship between engagement with unhealthy food messages on social media and adolescents' self-reported intake of such foods [83, 84, 85]. As a result, one of the most important findings of this study was that the use of popular adolescent-targeted marketing strategies was positively associated with general user engagement, particularly as users preferred to engage with the posts by using the 'like' button which is seen to be a digital cue for validation and acceptance [86].

Adolescents are known to interact with food brands to enhance social image, [18, 87] and as Instagram highlights followers who liked a particular post, its teen users were afforded the ability to assess online behaviour and attitudes which shape one's social image. In line with previous evidence that adolescents who 'share' unhealthy food on their social media feeds perceived more positively than those who do not [88], there is a strong possibility that adolescents also have higher regard for peers who 'like' or positively engage with a fast food post.

Research also indicates that adolescents rate advertisements with medium or high numbers of "likes" higher than those with few "likes" [89, 90]. Adolescents in this setting are likely to perceive the fast food posts with high engagement numbers more positively than those with low levels of engagement. This connotes importance as peer influence, which is often more predominant during adolescence, combined with the subtle merging of social media marketing and entertainment, has been shown to hinder youths from disengaging from promotional strategies aiming to control their dietary choices and consumption patterns [91, 92].

Taken together, the observed effect of adolescent-targeted strategies on user engagement draws attention to the contributory role of the special features of social media networks in the promotion of unhealthy food among adolescents. According to the literature, "likes" function as a social norms indicator that capitalises on young people's sensitivity to peer behaviour [90]. In line with the social norms' theory, peer behaviours perceived as the norm are often matched or mimicked by individuals [92], and indeed, the significant influence of normative peer behaviour on adolescents' food choices has been extensively documented on [93]. Recently, adolescents were reported to adjust their food intake to model social eating behaviours and peers' approval and attitudes towards food choices has been shown to significantly predict eating behaviour [94, 95, 96]. Therefore, this study's findings strongly indicate the need to limit the engagement affordances of social media networks when fast food advertisements are involved.

Instagram affords users the ability to view those who have engaged with a post. However, of greater relevance to policy is the fact that the social network also allows account owners to restrict engagement with their posts by disabling the 'like' and 'comment' features. This implies that the potential exists for Instagram, in their role as administrators, to restrict unhealthy food brands from engaging with vulnerable populations by disabling the engagement features for posts generated by these brands, taking on some burden of responsibility to reduce adolescents' exposure to the promotion of such foods rather than being passive vehicles of obesity risk. Taken together, this study suggests that policy makers encourage social media networks to put in place engagement restrictions to reduce the effect of unhealthy food marketing on adolescents. Recent evidence also suggests that other features of Instagram increase the 'power' of advertisements [47]. Future researchers should focus on other affordances of social media which may be positively influencing unhealthy food promotion.

In terms of opportunities for healthy food marketing, these findings introduce the idea that adolescent-targeted marketing strategies like *product appeal* can be used to promote healthier food choices among adolescents through its influence on engagement and potentially on peer behaviour. It is important to note that the

association between food marketing and consumption among adolescents could be confounded by the intrinsic qualities of fast food which makes these foods more attractive to this age group than healthier food. For example, adolescents have directly indicated that high levels of whole grain, salt, protein and sugar are important attributes which influence their food choices [97] suggesting that foods without such attributes might be difficult to promote. It has also been suggested that food promotion on social media is influential mostly because it increases adolescents' ability to recall such foods [98]. Further research is needed to understand how adolescents perceive these strategies and its influence on their food choice. Health promotion workers in this setting would also benefit from an exploration of the relationship between adolescent-targeted marketing strategies and user engagement during healthy food promotion.

Few findings have already raised doubts about the usefulness of some child-directed strategies in promoting healthy food, including that of Coates and colleagues [99] which found that influencer marketing of healthy foods showed no effect on children's intake despite increasing their intake of unhealthy food. However, these inconsistencies could be due to the limitations of the marketing campaigns [93]. Recent studies stress that efforts to improve adolescent food choice must harness widely shared adolescent values beyond nutrition or health [100]. Thus despite the promise shown by social media as a medium that can drive healthier food choices among adolescents, [101, 102, 103, 104] more exploratory study designs would increase understanding of adolescents' perception of popular marketing strategies and their influence on healthy eating habits.

Study considerations

Food marketers can advertise on social media in two ways. They can pay social media platforms for advertisements which appear strategically on a user's feed, with the post carrying a disclaimer to indicate its sponsored nature. Alternatively, companies can post image advertisements through a free official account which the platform confirms as legitimate through an account verification tick, to encourage users to follow them [19, 105]. This study through its design, has captured company-generated exposure but with research suggesting that 80% of adolescents on social media follow at least one unhealthy food brand, it is clear that majority of those in this age group are exposed to company-generated advertisements by fast food brands.

Conclusion

This examination of how transnational fast food companies promote fast food via Instagram revealed the prominent use of adolescent-directed strategies such as emotional appeal, product appeal and teen language. Fast food companies heavily target lower income adolescents through the use of Instagram, raising health concerns related to the consumption of unhealthy food that arises from regular advertising in that demographic. Key differences between how these strategies were operationalized in this setting versus in high-income contexts were observed including the fact that fast food brands in this setting did not make any health claims. Regarding the secondary objective of the study, the use of adolescent-aimed strategies were also associated with higher user engagement, indicating increased interaction with fast-food related posts when adolescent themes are involved and a potential increase in positive attitudes towards fast food.

Altogether, the study raises concerns that fast food marketing of the manner observed in this study serves to normalise fast food marketing and its consumption among adolescents in LMICs, especially as adolescents are highly susceptible to normative peer behaviours. While the potential remains for these strategies to be used to effectively promote the consumption of healthier foods like fruits and vegetables via a similar pathway, future research should explore how adolescents perceive fast food marketing and whether the relationship between these strategies and user engagement remains when healthy diets are involved. Findings indicate the need for actions aiming to limit adolescents' exposure to fast food marketing on social media, and reduce its potential effects, to target the interactive features of social media which encourage positive attitudes towards fast food. Ultimately, fast food companies have failed to abide by self-pledges to protect children from unhealthy marketing. This article shows that these brands continue to target the most vulnerable and so mandatory rather than voluntary regulations are urgently needed.

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Data availability
Data supporting Fig. 1; Tables 2, 3 and 4 are publicly available on https://doi.org/10.6084/m9.figshare.23118359.

Declarations

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