

#ad on Instagram: Investigating the Promotion of Food and Beverage Products

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The recent rise in popularity of social networking sites has prompted modern-day food and beverage companies to switch their marketing objectives from the traditional top-down strategies to a peer-to-peer approach, utilizing social media influencers to promote products online. The current study investigated the promotion of food and beverage products on Instagram tagged with #ad. Findings of this study indicated that the majority of food and beverage products promoted were processed, premade, and not considered healthy in nature. In addition, the majority of authors did not list credentials on their Instagram pages thereby

making it unaware if they were credible sources of nutrition information. An overall positive audience reaction to images suggests a low message resistance to food and beverage products advertised on Instagram. These findings support the implementation of policies targeted at online food and beverage marketers, as well as the further development of public health initiatives involving digital literacy education specific to food and beverage marketing.

Keywords: Instagram, food, beverage, advertisement, influencer

In recent years, the rising popularity of social networking sites has led to an associated increase in user-generated photographic content relating to various aspects of users' personal lives (Lee, Lee, Moon, & Sung, 2015). Food is an important component of our daily lives; it provides us with the life-sustaining energy we require as well as defines our social and cultural identities (e.g., traditional cultural foods, preparation methods, social gatherings; Almerico, 2014). Food also fosters the building of relationships through shared cooking and dining (Almerico, 2014; Woodruff & Hanning, 2008). As such, it is unsurprising that sharing food photography has become a popular means of social interaction between friends and strangers online (Chung et al., 2017; Santarossa, Lacasse, Larocque, & Woodruff, 2018), and has fostered online communities around shared dietary choices (e.g., vegan, plant-based, gluten-free; Pasho,

2017). User-generated content including images and videos have been described as a “social currency” online (Rainie, Brenner, & Purcell, 2012) and posting photos of food and meals has been described as an act of shared experience among users; thus, mimicking the experience of eating together offline (Bouvier, 2018). The popular notion that we “eat with our eyes” is increasingly apparent when you consider that as of April 2019 there were 334 million posts on Instagram using the hashtag #food.

As such, in order to evolve and capitalize on the popularity of food-related, user-generated content on popular social networking sites such as Instagram, food and beverage companies are using these online platforms in order to advertise their products and remain competitive in a fast-evolving online world. The high prevalence of individuals using social networking sites (e.g., 1 billion users on Instagram as of June 2018; Hartmans & Price, 2018) has contributed to the rising popularity of marketing via company-operated social media accounts (Killian & McManus, 2015). Using social networking sites, brands are able to reach a diverse range of audiences through personalization of advertisements, which increases consumer receptivity to advertising (Montgomery & Chester, 2009; Vassallo et al., 2018). On Instagram, brands are able to highly curate the images that they post to their account feeds in order to represent particular views or interests of their target audience, as well as visually appeal to users through the style and composition of posted images. The pervasiveness of visual appealing (i.e., aesthetic) images on Instagram has driven brands to specifically develop products based on photogenicity (i.e., the ability to look good in photos) alone (Vassallo et al., 2018), as this determines a brand’s ability to build a trend around their product both on the online and offline world. According to Cresci (2017), a product that is visually appealing is more marketable and sharable, thus providing an opportunity for brands to convince customers to share their product online. An example of a company that uses visual appeal to gain a following on Instagram and other social networking sites is Starbucks, a coffeehouse chain and beverage brand that has gained notoriety for creating and promoting colourful, themed drinks that are meant to visually appeal to consumers. Examples of such drinks have included the Unicorn Frappuccino (Vassallo et al., 2018), Tie-Dye Frappuccino, and Dragon Drink, all of which received publicity around their visual appeal on social media websites prior to and following their release (Cash, 2019; Cresci, 2017; Schnurr, 2019). Furthermore, Starbucks

has openly acknowledged the influence of social media as inspiration for their new products (Cresci, 2017). As Instagram and other social networking sites adapt to mirror shifting trends in modern media, food and beverage companies must also shift their marketing strategies, including the content and products they promote, in order to maintain relevance and capture consumers' attention in the online and offline world.

While Instagram has shaped the way food and beverage companies respond to consumer demand for certain types of products, it has also influenced the way that consumers interact with food and beverage companies and the products they promote. For example, brands often cue consumers to engage with their posts by "liking" the posts, commenting on the posts, and more importantly, sharing the posts with their friends. When users share a brand's post with their friends, this extends the reach of advertisements beyond the individual user and creates the notion that specific brands or products are endorsed by peers (Montgomery & Chester, 2009; Vassallo et al., 2018). Instagram allows users to communicate with their friends or followers about a brand or product using various methods, including tagging a friend in a brand's post, sharing the brand's post on their own Instagram account, or creating their own posts featuring a particular brand or product.

In addition to direct brand-to-consumer advertising, Burke-Garcia, Kreps, and Wright (2018) suggest that some companies have also shifted their marketing objectives from the traditional top-down strategies (i.e., treating the consumer as a passive target of their message) to a more modern peer-to-peer approach (i.e., actively involving the consumer to spread their message through "word of mouth"). In transitioning to peer-to-peer marketing, brands often use a two-step flow of communication to market and sell products online (Uzunoğlu & Kip, 2014). Originally published by Katz (1957), the two-step flow of communication is the idea that companies communicate their ideas to "opinion leaders" (i.e., highly influential, socially connected individuals) who then promote these ideas to the general, less-connected population. An early example of selling via opinion leaders was displayed by Edward Bernays, who recruited various opinion leaders in order to sway public opinion and sell companies' products (Serazio & Duffy, 2018). Referred to in the early-twentieth century as the "father of public relations" (Serazio, 2013, pp. 27), Bernays is recognized for coaxing thousands of physicians into recommending bacon to

their patients (Serazio, 2013, pp. 32), thereby introducing bacon as a staple breakfast food in the American diet (Serazio & Duffy, 2018). Bernays understood that in deviating from traditional print advertising, using opinion leaders provided an opportunity to “casualize” the nature of advertising and turn nearly every moment of human interaction into an opportunity for publicity (Ewen, 1996; Serazio, 2013, pp. 32).

On social networking sites such as Instagram, modern “opinion leaders” often have a high number of followers and are referred to as social media influencers (i.e., “third party endorsers who shape audience attitudes through blogs, tweets, and the use of other social media”; Freberg, Graham, McGaughey, & Freberg, 2011, pp. 90). While brands have used paid endorsers (e.g., celebrities) for many decades (Childers, Lemon, & Hoy, 2018), modern social media influencers have surpassed traditional celebrities in their ability to shape public perception of objects and activities that they feature on their posts, as they are seen as more credible and relatable to their audience (Djafarova & Rushworth, 2017; Klassen et al., 2018). Unlike traditional celebrities, social media influencers are often niche personalities with very specific audiences (Marwick, 2016). As a result, social media influencers carefully construct their online personas and strategically share information with their audience in order to boost their popularity and attention within their social network (Marwick, 2016). Furthermore, while traditional celebrities often only give the illusion of direct interaction with fans, social media influencers both know their followers and respond to them, often feeling the obligation to break down the audience/performer dichotomy in order to boost their popularity (Marwick, 2016). Through direct interaction with their followers, social media influencers provide instant engagement between brands and consumers that has only been made available in recent years via social networking websites (Childers et al., 2018). Social media influencers are a vital part of social diffusion (Uzunoglu & Kip, 2014; Santarossa & Woodruff, 2018), meaning that their shared opinions often spread broadly and promote conversation and action in individuals (i.e., followers both share and incorporate recommendations that the influencer makes into their own lives). As brands continue to abandon traditional advertising techniques (De Veirman et al., 2017), advertising efforts have become focused on utilizing influencers’ capacity for social diffusion in order to promote products, often by incorporating brands’ products into the influencer’s daily online narrative. Brands endorsed by influencers may

receive lower message resistance (i.e., better reception) from consumers compared to brands that utilize traditional advertising (e.g., television commercials, magazine advertisements, etc.) because their posts are likely to be interpreted as credible “word of mouth” recommendations rather than paid advertisements (De Veirman et al., 2017).

In a 2017 survey of marketers and their agencies ($n = 181$) from various industries (including food and beverage), 86% ($n = \sim 155$) reported using social media influencer marketing, of whom 92% ($n = \sim 143$) found it effective (Linqia, 2017). Furthermore, 39% ($n = \sim 70$) of the 181 marketers planned to increase their social media influencer marketing budget in 2018 and 92% ($n = \sim 166$) identified Instagram as being their most important social media platform in utilizing social media influencer marketing strategy (Linqia, 2017). In 2017, influencer marketing was worth an estimated \$2 billion, and is projected to reach \$10 billion by 2020 (Childers et al., 2018). Social media influencers are valuable assets to marketers, as 83% of American consumers have reported trusting peer recommendations over traditional advertising (McCaskill, 2015). Due to the increased credibility associated with influencers, marketers often recruit influencers to create sponsored posts featuring their products (De Veirman et al., 2017).

Product placement on Instagram and other social networking sites is an effective form of marketing largely because sponsored posts are perceived as product reviews or product recommendations, as opposed to paid advertisements (Wnent, 2016). The casual nature of influencer marketing on social networking sites has changed the way that consumers interact with advertised products. Specific to the food and beverage industry, social media influencers have transformed audience perceptions of food and beverage advertising by convincing their followers that their own health is enhanced or maintained through everyday consumption of the advertised products. Influencers may post images and videos of their physical bodies as proof of health, thus building a connection between the advertised product and the influencer’s external beauty or perceived well-being (Pilgrim & Bohnet-Joschko, 2019). Messages present in posts may imply that in order to achieve optimal health, an ideal body image, and/or happiness, followers must adhere to advice provided by the influencer, which often translates into purchasing the advertised products (Pilgrim & Bohnet-Joschko, 2019). Furthermore, as influencer marketing has become a professional business, brands often provide influencers with instructions

detailing the use of specific hashtags, timing of the post, visual aesthetics of the post, and in some cases, even provide exact wording for the post (Wnent, 2016). Allowing brands control over the content of influencers' posts may translate into potentially inaccurate and/or exaggerated claims or advice about a product being perpetuated in online communities. Food and beverage companies often designate that the purpose of advertising is to provide information about their brands and products in order to allow consumers to make an informed decision about purchase and consumption (Vassallo et al., 2018). However, evidence has shown that marketing strategies employed by brands often include a greater emphasis on relatable content and a positive emotional salience (Klassen et al., 2018).

On Instagram, advertisements should be identified with the hashtag #ad, or designate when there is a "material connection" between the endorser and the advertiser (i.e., a connection which may affect the credibility that the consumers give the endorsement), in compliance with guidelines set by the Federal Trade Commission (FTC, 2017). However, users can violate the FTC's guidelines by not including #ad in their post or disclose when their posts contain product advertising, which could make it difficult for followers and/or the FTC to distinguish between a paid advertisement and an individual sharing an unsponsored opinion (Evans, Phua, Lim, & Jun, 2017). Canadian disclosure guidelines identify that advertisement disclosures should use clear and widely accepted hashtags (e.g., #ad, #sponsored) as opposed to subjective terminology (e.g., #spon, #promo; Ad Standards, 2019). Furthermore, disclosures should appear as part of the main caption in image posts, as opposed to buried amongst other hashtags (Ad Standards, 2019). For some influencers, the "Paid partnership" tool on Instagram allows for sponsorship disclosure to appear above the image advertisement and is recommended as a supplement to disclosure in the caption (Ad Standards, 2019). Finally, influencers should avoid the use of "blanket disclosures", whereby influencers disclose sponsorship without mention of specific brands, as blanket disclosures that are not product or brand-specific do not describe the material connection present between the influencer and brands (Ad Standards, 2019).

Despite the numerous existing guidelines for influencer marketing, additional policies that apply to Instagram advertisements (i.e., sponsored advertisements regulated

and approved by Instagram) do not apply to posts tagged with #ad (i.e., sponsored posts created and posted by individual users of the platform). For example, Instagram has strict policies on the promotion of personal health products that prohibits advertisers from posting before and after images or images of a person on a scale to promote a weight loss product (Facebook, 2018). This advertising policy does not apply to users posting sponsored images to their own accounts; therefore, influencers are permitted to advertise products using techniques (e.g., photo editing) that could cause their audience to believe misleading claims about a product. Finally, while textual disclosure (e.g., #ad) in image captions allows for recognition of image advertisements, Instagram is a visual platform and, therefore, the impact of textual disclosure is limited by the tendency of users to actually read image captions. For this reason, users viewing image content as opposed to written content (e.g., blog post) may be more likely to be unaware of the advertising intent of images. The most recent edition of Canada's Food Guide (released January 2019), a publication released by the Canadian government to aid Canadians in making healthy dietary choices, acknowledges emerging practices of online and influencer marketing and warns consumers about the difficulty of recognizing advertising via sponsored posts on social networking sites (Government of Canada, 2019). Canada's Food Guide also provides tips to become more aware of food and beverage marketing in digital media and peer-to-peer networking sites, emphasizing that food and beverage marketing can affect food choices (Government of Canada, 2019).

On Instagram, social media influencers often operate an account targeted toward a specific niche category (e.g., food or fashion) or a broader category (e.g., lifestyle; Carter, 2016). However, influencers do not require credentials in order to be looked upon as experts in their niche categories by their followers and may portray themselves as equally credible sources for nutrition and health information as industry experts or health professionals (e.g., dietitians, physicians, nurses, etc.), thus potentially putting the public at risk for unreliable and harmful advice (Chan, Drake & Vollmer, 2018). Influencers without proper credentials giving nutrition advice online may be a concern for public health, as previous findings indicate that popular diet and nutrition information frequently promoted on social media are not fully aligned with evidence-based guidelines that one would receive from certified nutrition experts (i.e., Registered Dietitian) or

government-authored publications such as Canada's Food Guide (Ramachandran et al., 2018). Furthermore, many influencers promote eating behaviours/diets (e.g., paleo, ketogenic, gluten-free) that are not necessary unless advised by a health care professional and may be potentially harmful as they eliminate whole food categories and can lead to an increased risk of nutritional deficiencies (Byrne, Kearney, & MacEvilly, 2017). In spite of potentially harmful health consequences, however, followers may still choose to engage in specific dietary behaviours recommended by an influencer. In a study of the relationship between Instagram and nutritional behaviour in adolescent girls, Riesmeyer, Hauswald, and Mergen (2019, p. 166) concluded that Instagram images "inspire their self-representation and nutritional behavior because they adapt what they see into their eating habits, adopt trends, and even act against their knowledge of negative consequences to reach the socially expected body image and socially expected type of Instagram images".

Social media influencer marketing for food and beverage products has become a widespread and successful marketing tactic (Byrne et al., 2017; Linqia, 2017) that has garnered much attention in recent years. Previous research has investigated the types of food and beverage products that influencers promote on Youtube (Coates, Hardman, Halford, Christiansen, & Boyland, 2019) and Instagram (Qutteina, Hallez, Mennes, De Backer, & Smits, 2019), and how influencer endorsement affects brand attitudes and purchase intention (Evans et al., 2017; Fernandes, 2018; Mathisen & Stangeby, 2017; Wnent, 2016). Research has also investigated advertising methods employed by brands on Instagram (Klassen et al., 2018) and how different advertising methods influence audience engagement with advertisements (Adegbola, Gearhart, & Skarda-Mitchell, 2018). However, there is currently limited research in the area of influencer expertise and advertising, as well as the discourse surrounding influencer-endorsed food and beverage products. Knowledge is also limited on the elements of Instagram advertisements specific to food and beverages that allow posts to achieve the greatest popularity among followers. Consumers are constantly presented with conflicting messages about food, making it increasingly difficult to make healthy food choices, particularly when products are promoted in a creative and/or subtle manner. Examining methods employed in advertising food and beverage products on Instagram may further the knowledge on how consumers

can critically evaluate nutrition recommendations and advice communicated by social media influencers. Therefore, the present study aimed to investigate images of food and beverage products promoted on Instagram tagged with #ad. Specifically, authors recorded and analyzed the types/content of #ad images, authors of #ad images, and audience reaction (i.e., comments, likes) to images promoting food and beverage products. The following research questions (RQ) were developed to guide this study:

RQ 1: What elements of food and beverage images (e.g., nutritional value of food/beverage product) tagged with #ad makes them most popular (i.e., likes-to-follower ratio) among Instagram users?

RQ 2: Who are the authors of food and beverage images tagged with #ad, and what interactivity cues (e.g., asking users to like image, comment on image, or tag other users in comments) are present in the captions of images?

RQ 3: What is the audience reaction (i.e., likes, comments) to food and beverage images tagged with #ad?

METHODS

Image/author selection and data collection

Since the purpose of this study was to investigate food and beverage advertisements, #ad was entered into the Instagram search engine to find images containing advertisements (i.e., author is promoting a product and/or blog) on July 11, 2017. Using the #ad search, the most recent 100 unique images posted to Instagram that contained food or beverage products were selected for analysis. These images were further coded on category, ingredient type, preparation method, nutrition rating, and image composition. In addition, all 100 images selected for analysis were posted by a unique author (i.e., no duplicate author selected). Data collected on the 100 unique authors included account type and nutrition credentials. Selecting 100 images from unique authors to analyze created a purposeful sample that was deemed reasonably manageable for manual coding by the authors (similar to Lacasse, Santarossa, and Woodruff, 2019) and in line with recent studies of similar coding methods (Cherian, Westbrook, Ramo, & Sarkar, 2018; Cowans, 2016; Kelly & Daneshjoo, 2019; Lacasse et al., 2019). Furthermore, due to the numerous coding parameters and complexity of manual coding in the sample, selecting

100 images allowed for the coders to invest sufficient time in coding each image and provide a significant reflection on ambiguous cases contained in the sample.

Coding training and reliability

Using a codebook with instructions and examples created specifically for this analysis, two individuals (one of the primary researchers and one undergraduate research assistant) were trained in image coding prior to beginning data collection. Coders completed training using food and beverage images, which were not contained in the dataset, in order to gain adequate experience in coding using the necessary criteria. These two individuals coded all images (RQ1), author information (RQ2), and image captions (RQ2). The overall agreement among coding of photos (Table 1) and captions/author information (Table 2) ranged from 0.75 to 1.0. This range of intraclass correlations demonstrates acceptable levels of agreement on all variables included in the coding process, based on minimum acceptable values (i.e., 0.40 to 0.75; Fleiss, 1986). Overall, percent agreement among the two coders was 89%. When a disagreement was present, coders were asked to meet, discuss, and agree on a final coding decision (Santarossa, Coyne, Lisinski, & Woodruff, 2016).

Three individuals (the same primary researcher who coded images, captions, and author information, and two additional undergraduate research assistants) were trained in comment coding prior to beginning data collection, using the codebook created specifically for this analysis. These three individuals coded comments posted on the images (RQ3). Each coder individually analyzed comments on the same 40 images to ensure coding reliability, and the remaining 60 images were evenly distributed among coders. The overall agreement among coding of comments (Table 3) ranged from 0.79 to 1.0, demonstrating acceptable levels of agreement based on minimum acceptable values (Fleiss, 1986). Overall, percent agreement among the three coders was 94%. When a disagreement was present, coders met, discussed, and agreed on a final coding decision, as was done for RQ1 and RQ2.

Table 1
Description of coded variables for the sample of images (N=100)

Variable	Description	Details	n	Intraclass Correlation
Category^a	The type of product advertised	Supplement (e.g., vitamin pill, protein powder)	14	0.939
		Food (e.g., pizza, snack bars)	48	
		Beverage (e.g., coffee, juice)	28	
		Food and beverage (e.g., snack bar and coffee)	10	
Ingredient type^a	The ingredients contained in the advertised product	Mainly processed ingredients (not in their natural form); may include some whole food pieces if not a significant amount	68	0.957
		Mainly whole natural foods, minimal processed addition if any (e.g., croutons on a salad)	5	
		Both processed and whole food ingredients	27	
Preparation method^b	How the advertised products were prepared	Premade foods (i.e., pre-prepared and/or pre-packaged)	54	0.762
		Fresh, homemade, or prepared fresh at a restaurant	42	
		Mix of premade and fresh items	4	
Nutrition rating^a	Rating of the nutritional value of advertised products	Alcohol	11	0.817
		Unhealthy (i.e., calorie-dense, nutrient-poor, unbalanced)	35	
		Moderately healthy (i.e., overall healthy with some unhealthy elements)	36	
		Healthy (i.e., nutrient-dense)	18	
Image composition^b	Visual description of how food/beverage products were displayed in the image	Food only (i.e., food with a simple background)	44	0.894
		Food in scene (i.e., food with other items in background)	25	
		Food with a person (i.e., a face is visible in the image)	31	

^a Coding variables adapted from Santarossa, Lacasse, Larocque, and Woodruff (2018). ^b Coding variables adapted from Holmberg, Chaplin, Hillman, and Berg (2016).

Table 2
Author information and image captions for the sample of images (N=100)

Variable	Description	Details	n	Intraclass Correlation
Author's account type (n=100)	Type of account operated by the author	General interest (i.e., images depicting the author's life, no distinct theme)	6	1
		Niche category (i.e., images display a theme)	94	
Niche category account types (n=94)	Type of account, based on author's biography or noticeable theme of images	Fashion/beauty (e.g., clothing, makeup products)	10	0.785

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	on author's account	Fitness/sports (e.g., working out, sporting gear)	16	
		Lifestyle (e.g., daily content including family, home, travel, food, etc.)	23	
		Photography (e.g., portraits, landscape images)	5	
		Travel (e.g., plane tickets, sightseeing)	5	
		Food (e.g., daily meals, cooking)	27	
		Other (i.e., images did not fit into any category)	8	
Nutrition credentials (n=100)	Presence or absence of credentials listed in the author's biography on their account page	Author listed credentials (e.g., Registered Dietitian, personal trainer)	11	0.876
		Author did not list credentials	89	
Advertisement type (n=100)	Promotional details contained in caption	Ad to promote author's blog (e.g., link to blog post)	3	0.927
		Ad to promote a product made by a company or restaurant (e.g., link to company/restaurant website)	94	
		Ad to promote both a blog and a company/restaurant (e.g., link to blog post and company/restaurant website)	3	
Interactivity^a (n=100)	Presence or absence of interactivity cues in caption	The author cues viewers to interact with the ad (e.g., like, comment on image)	39	0.945
		None present	61	
Interactivity type^a (n=39)	Type of interactivity cues present in caption	Cue to like the image	1	0.949
		Cue to follow author's page or page of advertised company	1	
		Cue to tag friends who would like/want the product/enter a contest	0	
		Cue to comment on the image and answer a question asked in the caption	15	
		Cue to click a link/download an app	7	
		Cue to purchase/use a coupon code to purchase	7	
		More than 2 of the above	8	
Recipe (n=100)	Presence or absence of recipe/link to recipe in caption	Caption contains a recipe or link to a recipe	17	0.9
		No recipe	83	
Caption nutrition/health info (n=100)	Presence or absence of nutrition/health information in caption	Caption refers to nutrition or health (e.g., healthy, low-calorie)	32	0.755
		No nutrition/health in caption	68	

^a Coding variables adapted from De Vries, Gensler, and Leeﬂang (2012).

Table 3
Audience reaction on the sample of images (N=100)

Variable	Details	n	M (SD)	Range	Intraclass Correlation
Total number of likes		91,598	916 (3,081)	10- 26,256	1.00
Total number of comments		2,765	27.6 (84.9)	0-821	1.00
Number of positive comments	Comments with a positive connotation, including positive emojis (e.g., smiling face, heart emojis)	1,487	15.0 (24.6)	0-152	0.98
Number of negative comments	Comments with a negative connotation, including negative emojis (e.g., angry face, frowning face emojis)	5	0.1 (0.3)	0-2	1.00
Number of not rated comments	Comments that were not rated as having a positive or negative connotation	1,273	12.7 (81.5)	0-812	1.00
Number of tagged friends	Tagged friends, only counting each user's name as a single tag even if they are tagged more than once in a thread of comments on the same image	245	2.5 (14.2)	0-136	1.00
Number of comments about the author	Comments tagging/mentioning the author of the image instead of the advertised product	329	3.3 (9.5)	0-53	0.79
Number of nutrition/health comments	Comments that contain words or hashtags related to nutrition or health (i.e. calories, vegan, protein, etc.)	17	0.2 (0.5)	0-3	0.91

Note. Intraclass correlation values for comment coding were based on 40 images that were coded by all three coders. The remaining 60 images were evenly divided among coders.

RQ 1. Image elements and popularity of Instagram images

Image coding. Using a similar coding scheme to Holmberg, Chaplin, Hillman, and Berg (2016) and Santarossa et al. (2018), variables used to code the images (see Table 1) included the category (supplement, food, beverage, or food and beverage); type of ingredients used (processed, whole, or mixed); preparation methods (premade, freshly prepared, or mixed); nutritional rating (unhealthy, moderately healthy, healthy, or alcohol); and image composition (food only, food with a predetermined setting/background, or food with a person in the image).

RQ 2. Author information and interactivity cues present in image captions

Author coding. Author information was coded (see Table 2) based on the author's account type (general interest or niche category). General interest accounts included those that were mainly a personal account with no noticeable theme, whereas niche category accounts consisted mainly of images that displayed a noticeable theme (e.g., fashion, beauty, fitness, food). If the account type was coded as niche category, it was then further

coded based on themes present in the majority of posts (fashion/beauty, fitness/sports, lifestyle, photography, travel, food, or other). Author information was also coded based on if the author listed any credentials in their biography (e.g., Registered Dietitian, personal trainer, fitness instructor, etc.).

Caption coding. Using a combination of emergent coding and adapting a coding scheme from De Vries, Gensler, and Leeftang (2012; see Table 2), image captions were coded for advertisement type (author is promoting a blog, a product, or both a blog and product); interactivity (presence or absence of cues for viewer to interact with the advertisement); interactivity type (cue to like post, comment on post, follow an account, tag friends, download app, purchase product, or more than two interactivity cues); if the caption contained a recipe or link to a recipe; and if the caption contained nutrition or health information (any words or phrases that refer to nutrition or health).

RQ 3. Audience reaction (i.e., likes, comments) to images

Coding of audience reaction. Reactions including likes and comments were coded and recorded for each image (see Table 3). Variables used to code the comments included the number of positive comments (those with a positive connotation and/or positive emojis); number of negative comments (those with a negative connotation and/or negative emojis); total number of tagged friends; total number of comments mentioning the author of the post instead of advertised product; and total number of comments containing words or hashtags relating to nutrition or health (calories, vegan, protein, etc.).

Statistical analyses

Descriptive statistics, including means, standard deviations, and frequencies were used to analyze the coded images, author information, image captions, and audience reaction. Using frequencies obtained in the coding of authors and audience reaction, a likes-to-follower ratio (LFR) was calculated to help determine how popular the particular #ad image was among viewers, by dividing the number of likes on each image (from audience reaction) by the number of followers the author currently had (from author coding). In computing the LFR, it allowed equalization of the number of likes each image received, as authors with more followers are likely to garner more likes compared to authors with fewer followers (Santarossa et al., 2016). Based on the coding of images and the computed LFR, a generalized linear model was used to determine the effect of

category, ingredient type, preparation, nutrition rating, and image composition (from image coding) on LFR. All data were analyzed using Minitab version 17.0 for Windows (Minitab, Inc., 2016). Prior to analysis, data were checked for accuracy of entry and missing values. All assumptions were satisfied for a generalized linear model analysis.

RESULTS

RQ 1. Image elements and popularity of images

Of the 100 Instagram images (Table 1), the majority were of food ($n = 48$), contained mainly processed ingredients ($n = 68$), looked to be premade ($n = 54$), and were moderately healthy ($n = 36$) or unhealthy ($n = 35$) items. In the majority of posts, the food product was the sole item in the image ($n = 44$). The mean LFR was 0.059 (ranged from 0.002 to 0.49), suggesting that only a small number of potential followers liked the images. The generalized linear model suggested there was a significant main effect of image category on LFR, $F(3, 87) = 3.25$, $p = 0.026$, with beverage only images having a significantly higher LFR than food only images and supplement images ($p = 0.005$).

RQ 2. Author information and interactivity cues present in image captions

Among the authors (Table 2), the majority did not list credentials ($n = 89$). Of those that listed their credentials ($n = 11$), credentials included 2 Registered Nurses, 3 Registered Dietitians (1 student), 1 nutritional therapist, 4 fitness instructors (2 of which were also personal trainers), and 1 fitness coach/recipe creator. Most accounts were considered niche category accounts ($n = 94$), primarily focussing on food, lifestyle, and fitness/sports. The average number of followers per author was 86,723 ($SD = 629,297$) and ranged from 33-6,300,000. The average number of accounts authors were following was 1,466 ($SD = 1,734$) and ranged from 38-7,502.

Of the photo captions, the majority were to promote a product made by a company or restaurant ($n = 94$). Only 39% ($n = 39$) of posts contained interactivity cues, however, the most popular interactivity cue was the author asking users to comment on the image and answer a question asked in the caption of their post, which was present in 15% ($n = 15$) of posts. Additionally, 17% ($n = 17$) of post captions contained a recipe and 32% ($n = 32$) of captions referred to nutrition or health.

RQ 3. Audience reaction (i.e., likes, comments) to images

A description of the reaction and comments to the images are depicted in Table 3. Among the 100 images, the average number of likes per image was 916 ($SD = 3,081$) and ranged from 10 - 26,256. The average number of comments per image was 27.6 ($SD = 84.9$) and ranged from 0 - 821. Just over half of the comments were considered positive ($n = 1,487$; 54%), versus neutral ($n = 1,273$; 46%) or negative ($n = 5$; <1%). Users tagged a total of 245 (9%) friends and tagged or mentioned the author in 329 (12%) comments. Only 17 (<1%) comments referred to health or nutrition.

DISCUSSION

This study investigated food and beverage products promoted using #ad on Instagram, with an emphasis on the types/content of #ad images, authors of #ad images, and the audience reactions (i.e., comments, likes) to #ad images. In evaluating food and beverage images, the finding that the majority of food and beverage products contained mainly processed ingredients in addition to being premade may be an indicator that convenience foods are frequently promoted on Instagram, thus contributing to the convenience-food culture that has grown substantially over the past century (Engler-Stringer, 2010). Although convenience food options are often moderately healthy to unhealthy in nature (Remnant & Adams, 2015), as found for products promoted in this study, the prevalence of convenience food choices for individuals and families has sustained their popularity for several decades (Peltner & Thiele, 2018). Lack of time for food preparation and cost efficiency have been cited as major determinants of convenience food purchasing behaviour (Peltner & Thiele, 2018). In a qualitative study of university students' food choices, Lambert and Farrington (2019) reported that students consumed convenience food because it was cheaper and more convenient, regardless of the knowledge that convenience food is unhealthy. Due to consumer demand, convenience food is highly marketable (Keller, 2012), and this marketability may explain the prevalence of convenience foods being featured in images in this study. Moreover, while there is substantial evidence that marketing convenience food on social networking sites is associated with increased consumption behaviour in youth (Dunlop, Freeman, & Jones, 2016), research has also suggested that convenience food marketing contributes to the

image content that youth post to their own social networking accounts. Holmberg and colleagues (2016) examined the type of food and beverage products promoted by youth on social networking sites and found that they often posted images of convenience food and beverage products. In addition, youth designed their images to copy existing food and beverage advertisements, with brand names clearly visible (Holmberg et al., 2016). Due to the rapid diffusion of online content, and the proliferation of food and beverage advertising present on social networking sites, it is vital that public health initiatives consider the social nature of online food and beverage advertising. While Canada's Food Guide recognizes and seeks to educate the Canadian population on online food and beverage marketing techniques (Government of Canada, 2019), it becomes essential that further initiatives are taken to ensure that individuals using social networking sites are aware of the healthfulness of food and beverage products promoted.

The image category was the only aspect of the coded images that had a statistically significant effect on image popularity (i.e., LFR). Although most images in this study contained food, beverage only images were significantly more popular than food only and supplement images. Beverages frequently featured in images included alcoholic beverages (e.g., wine, beer, cocktail), sugar-sweetened beverages (e.g., cola, slush drink), and weight-loss beverages (e.g., weight loss tea), with the brand name of the beverage often easily recognizable. It is thought that beverage images may have been more popular (i.e., highest LFR) among viewers due to brand recognition and/or product familiarity. Previous research has found that brands themselves have the greatest effect on advertisement effectiveness and purchase intention when compared with both the effects of the endorser (e.g., influencer) and of the elements of the advertisement itself (Mathisen & Stangeby, 2017). In the current study, the popularity of brands likely influenced the popularity of the images due to increased brand awareness and consequently, brand preference. Erkan (2015) and Freeman et al. (2014) reported similar findings to the current study, who suggested that user engagement was highest for beverage marketers on Instagram (Erkan, 2015) and beverage brand pages on Facebook (Freeman et al., 2014). Unfortunately, many beverages promoted in this study were sugar-sweetened and, therefore, unhealthy in nature; consistent with the finding that convenience food and beverages were frequently promoted. The promotion of sugar-sweetened beverages is of

particular concern because consumption of sugar-sweetened beverages have been cited as a risk factor for obesity, type 2 diabetes, and metabolic syndrome (Malik et al., 2010). Therefore, public health initiatives need to find creative and effective ways to address advertising efforts of sugar-sweetened beverage brands on social networking sites.

The majority of authors did not list credentials in their biographies, and it is thereby unlikely that they were credible sources of nutrition information. As inaccurate and sometimes harmful nutrition advice is often disseminated online, ambiguity in nutrition credibility of authors may put the public at risk for receiving unreliable and harmful advice (Chan et al., 2018). Chan and colleagues (2018) investigated the differences in nutrition information promoted online by Registered Dietitians and non-Registered Dietitians and found that non-Registered Dietitians often strongly promoted themselves as credible, nutrition professionals, regardless of the lack of credentials. In addition, non-Registered Dietitians were more likely to use technical, fear-based language in the delivery of nutrition messages compared to Registered Dietitians (Chan et al., 2018). In the image captions, however, only one third of authors referred to nutrition, regardless of credentials. While this proportion of image captions referring to nutrition is not representative of the majority of the sample, evidence suggests that nutrition information promoted on social networking sites does not often align with evidence-based nutrition guidelines (Ramachandran et al., 2018). Furthermore, as Instagram's advertising policies do not apply to sponsored posts made by individual authors, authors of sponsored posts may have used misleading language in their captions in order to persuade users to purchase a product. As a result, the audience may have not fully understood nutrition claims or information present in the captions of images, but trusted authors due to their perceived influencer relatability. However, audience understanding and influencer credibility/relatability were outside the scope of the current project and it is suggested that future research consider how people take in information from #ad posts on social networking sites. Lastly, influencers have been cited as frequent advocates for fad diets, supplements, and exercise programs (Lambert & Farrington, 2019) that if completed without proper guidance, could result in negative health implications. Previous research reported social networking sites to be the most commonly reported source of nutrition information among university students (Lambert & Farrington, 2019; Vaterlaus, Patten,

Roche, & Young, 2015). However, accuracy of nutrition information online has not been cited as a primary concern for users (Lambert & Farrington, 2019), thus potentially putting individuals at risk for accepting misinformation.

Caption content as well as the use of hashtags on Instagram have been cited as drivers of user engagement for brands advertising on social networking sites (Adegbola et al., 2018). In this study, interactivity cues were present in less than half of image captions, therefore, many authors did not promote conversation around the advertised product. However, authors may have intended for image advertisements to appear as unsponsored, daily content, as opposed to paid advertisements and, therefore, did not employ the same interactivity techniques as a brand engaging with a consumer audience. Editorial material (e.g., Instagram image advertisements) is generally perceived as more credible than commercial advertisements, because viewers understand that advertisers exist to sell products and will only provide positive information about advertised products (Gregersen & Dokken, 2018). If authors promoted greater interaction with the advertised products, viewers may have perceived image advertisements as biased and authors could have potentially lost credibility with their viewers. Instagram has been shown to play an important role in consumers' purchase intention (Fernandes, 2018), and consumer behaviour literature has suggested that purchase intention is strongly affected by social interactions (Fernandes, 2018; Richard & Guppy, 2014) and parasocial (i.e., users' perceived feeling of intimacy/bond with media figures; Lookadoo & Wong, 2019) relationships between influencers and their followers (Lookadoo & Wong, 2019; Rasmussen, 2018). For this reason, authors seeking to maintain positive relationships with their followers may not wish to appear as they are advertising a product, regardless of disclosure language present in image captions (i.e., #ad). In addition to increased skepticism of authors, recognition of advertising could have led to negative audience evaluations of the advertised product (Gregersen & Dokken, 2018). Social networking site users have been described as "less patient" with advertising when they recognize the advertisement's persuasive intent, as well as less likely to spread information about a brand through their own word-of-mouth (Evans et al., 2017). This affects brand attitude (Evans et al., 2017) and could result in negative evaluations of the influencer or the brand. Research by Lookadoo and Wong (2019) reported that when

parasocial relationships between influencers and followers is low, explicit advertisements lead to a more critical evaluation and lower product attitudes, which could have potentially occurred in this study if more interactivity cues were present in authors' posts. For this reason, it is thought that in order to avoid negative perceptions of themselves or advertised products, authors in this study likely focused their efforts on implicit advertising (i.e., subtly incorporating advertised products into their images). Rather than pushing audience interaction with the brand or product itself, image captions likely served to provide useful information about the advertised product, influencing consumer purchase intention without obvious indicators of advertising intent.

Audience reaction to image advertisements on Instagram revealed that the majority of comments were positive, suggesting a low message resistance to advertisements. However, a very small number of comments referred to nutrition, indicating that dialogue surrounding food and beverage images was not focused on nutrition. Rather, more comments mentioned the author of the image, indicating that the positive user engagement found on images may have been directed toward the author themselves as opposed to the advertised product. Similarly, Pilgrim and Bohnet-Joschko (2019) explored audience perceptions of Instagram posts related to dieting and exercise, citing that comments on posts focused predominantly on the influencer themselves. User engagement in this study may have been driven by the desire for social connectedness with others rather than information sharing. "Liking" images on social networking sites can be considered as a social gesture to support others (Hayes, Carr, & Wohn, 2016) and/or satisfying individuals' own social needs as a means of maintaining relationships (Lowe-Calverley & Grieve, 2018). As Instagram is a social networking site, perhaps users' intentions for using the platform are not to gain knowledge of a particular topic (e.g., nutrition), but rather to feel socially connected to and foster relationships with other users of the platform. Previous research has found that primary motivations underlying users of the Instagram platform include social interaction and self-expression (Lee et al., 2015). Thus, users in this study may have perceived sponsored images as fun, socially-stimulating food photography (Chung et al., 2017), as opposed to commercial advertisements.

As the current study was the first to investigate food and beverage #ad images on Instagram, there are still several limitations. The current study's sample was small ($N=100$), relative to the number of #ad posts on Instagram (8.6 million as of April 2019) and, therefore, is limited in its generalizability and may not accurately represent the expansive number of food and beverage advertisements in the online world. Furthermore, sampling bias (day of week, seasonality) may exist, however, data were collected on a random day and it was assumed that results would be similar with multiple data collections. Collecting data over a longer time period or at different time points throughout the year may be more appropriate for future studies using this design. In addition, although this study did seek to gain insight into social media influencer marketing on Instagram, authors of image posts were not specifically chosen based on their number of followers. Therefore, future studies may aim to establish a guideline for who belongs in the category of "influencers" by giving the term "influencer" a quantifiable definition (e.g., by determining the number of followers an author must have in order to be considered an influencer; or assigning a follower/follower ratio to authors). Furthermore, since it is known that different strategies exist to increase the numerical popularity of an influencer (e.g., purchasing fake followers from third-party providers or automated chat bots to increase likes/comments; Pilgrim & Bohnet-Joschko, 2019), each user's number of followers, as well as likes and comments on posts, may have been subject to one or more of these tactics. Lastly, while it was possible within this study to analyze likes and comments on each image, it is difficult to discern the effectiveness of image advertisements as it is not possible to know how many users purchased the product advertised. While previous research has investigated purchase intentions of consumers on the Instagram platform (Evans et al., 2017; Mathisen & Stangeby, 2017), future research may seek to measure consumers' follow-up brand attitudes and repurchase intention of the advertised products. Research in the area of consumer repurchase intention using Instagram advertisements may provide insight into the ways in which influencer credibility is affected by sponsorship, and how consumers react to products purchased via recommendation by an influencer.

Overall, this study suggested that food and beverage products, tagged with #ad, on Instagram were considered moderately healthy-unhealthy in nature. In addition, the majority of #ad authors promoting food and beverage products on Instagram did not list

credentials and, therefore, cannot be determined to have been credible sources of nutrition information. This is of concern as authors did refer to nutrition in the captions of food and beverage images. However, users in this study did not often mention nutrition in the comment section of images, instead commenting much more frequently about the author without mention of the advertised product. Finally, while it is difficult to determine the effectiveness of advertisements due to unavailability of purchase information, the audience reaction to advertisements was largely positive. These results suggest that while users are generally receptive to food and beverage advertising on Instagram, products advertised are not considered healthy and, therefore, this exemplifies the potential that the Instagram platform has to promote consumption of unhealthy food and beverage products. For this reason, public health initiatives must continue to address social networking site advertising. In particular, education must continue on the effects of influencer advertising, as its focus is not often on the product itself, but rather how the product is incorporated into influencers' daily lives. The casual yet pervasive nature of sponsored food and beverage posts has the potential to influence consumers to integrate advertised products into their daily diets and disregard the "sometimes" recommendation for consumption of products (Vassallo et al., 2018). Incorporating "sometimes" food and beverages into the daily diet could in turn, could lead to negative health consequences for individuals consuming products promoted on Instagram. Finally, as the purpose of social networking sites is to create and foster relationships between users, companies utilizing the two-step flow of communication by way of influencer marketing may enhance the promotion of their products on social networking sites through sponsored images. Sharing food photography is a social activity that connects individuals beyond a digital screen (Bouvier, 2018), however, results of this study further the understanding of concerns relevant to influencer food and beverage marketing on social networking sites.

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