

Emerging social media “platform” approaches to alcohol marketing: a comparative analysis of the activity of the top 20 Australian alcohol brands on Facebook (2012-2014)

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Abstract

Social media platforms are important actors in the development of alcohol marketing techniques. While public health research has documented the activities of brands and consumers related to alcohol promotion and consumption on social media, there remains the need to develop an account of the native, participatory and data-driven advertising model of these platforms. This article examines the relationship between alcohol brands, media platforms and their users by analysing the activity of the 20 most popular alcohol brands’ Australian Facebook pages in 2012 and 2014. We report that the number of fans of alcohol brands increased 52% from 2012 to 2014. While the number of posts dropped 12% from 2012 and 2014, total interactions with posts by users increased by 9%. Overall, brand activity and engagement became more consistent between 2012 and 2014. We argue that the changing character of user engagement with alcohol brands on Facebook can be related to changes in the platform architecture. Facebook is orchestrating a shift from exposure to engagement as its key advertising metric, and thus departing substantially from established mass media advertising paradigms. Effective policy responses to alcohol marketing in the digital era depend on a more rigorous examination of the marketing infrastructure of social media platforms.

Introduction

Social media platforms like Facebook, Instagram, Twitter and Snapchat are important actors in the development of alcohol marketing (Atkinson et al. 2016; Carah and Meurk 2016; Jernigan and Rushman 2014; McCreanor et al. 2013; Nicholls 2012). Studies of social media have offered taxonomies of brand activities, and determined effects on alcohol consumption, but not yet

examined the role that the platforms themselves play in shaping alcohol marketing (Anderson et al. 2009; Atkinson et al. 2016; Carah et al. 2014; Christlow et al. 2015 De Bruijn et al. 2016; Jernigan and Rushman 2014; Jernigan et al. 2016; Jones et al. 2015; Lobstein et al. 2016; Mart et al. 2009; Meier 2011; Nicholls 2012). Public health researchers need to pay ‘critical and analytical attention’ to alcohol marketing on media platforms (McCreanor et al. 2013; Niland et al. 2016). This requires specific examination of how the activities of alcohol brands are conditioned by the algorithmic recommendation and advertising models of media platforms (Gillespie 2014; van Dijck 2013). This article considers the relationship between alcohol brands, media platforms and their users by comparing the ‘native’ engagement generated by the 20 most popular alcohol brands’ Australian Facebook pages in 2012 and 2014.

A media platform perspective on alcohol marketing

The concept of the ‘media platform’ has been advanced by media sociologists to describe platforms like Facebook that configure user participation using a combination of interface and protocol design, data collection and processing, and algorithmic recommendation (Gillespie 2014; van Dijck 2013). Media platforms and their advertising models are significantly different to mass media channels because of their capacity to customise user experience by processing and responding to data in real-time. With respect to these platforms, McCreanor et al. (2013) argue that consumers who document their drinking practices on social media are labourers who produce both peer-to-peer promotional narratives and rich troves of data. However, these accounts of consumer participation in marketing need to be contextualised within a more precise specification of the advertising model that media platforms are engineering.

The advertising model of media platforms is native, data-driven and participatory (Napoli 2011; Turow 2012; Zwick et al. 2008). A native model is one where advertising is not distinguishable from other kinds of content on the platform. Brands generate news stories, events and videos that appear like any other kind of content as opposed to creating discrete advertisements. A data-driven advertising model is one where data are used to target content at specific users in real time. This targeting is not restricted to demographic variables, but also takes account of contextual variables like time, place, and proximity to cultural events or peers. When a user logs on to Facebook they see a uniquely generated feed of content based on what the platform has ‘learned’ about the preferences of users like them.

User participation is critical to this model in both symbolic and data-driven terms. Users can incorporate brands into their own self-narratives by producing their own content or by liking or sharing brand content. Self-narratives, whether incorporating brands or not, double as data about their preferences, and the preferences of other users like them, enabling more refined targeting of marketing messages. In other words, even when users are generating content not related to an alcohol marketing campaign, they may still be generating data that is useful in future targeting of alcohol marketing material. When a user posts content related to alcohol they don't just promote alcohol they also generate data that registers their preference for alcohol in specific times, places and cultural contexts.

Systematic reviews (Anderson et al. 2009; Jernigan et al. 2016) of the effects of marketing on alcohol consumption continue to operationalise exposure to a marketing message as per a mass media channel, even where they examine digital marketing material. While platforms are now critical actors in shaping brand activity and user engagement, these reviews neglect, or set aside, the role platforms and their users play in alcohol marketing. This routine exclusion of actors such as users and the platforms themselves in studies of alcohol marketing is a potential limitation in the 'evidence-base' about marketing effects.

The studies included in these key systematic reviews make several assumptions about alcohol marketing. First, that an advertisement is a discrete and definable symbolic message, delivered to an audience who make sense of it in a predictable way; second, that the medium through which the message is delivered is a relatively neutral actor; and third, that the audience is a relatively passive recipient who receives and makes sense of the message, but does not affect its content or delivery in any way. The native, participatory and data-driven advertising model that has emerged on social media platforms like Facebook undermines all of these assumptions.

Effective regulation of alcohol marketing in the digital era depends on accurately describing the form that marketing takes on media platforms. Three areas of inquiry are critical for public health researchers and policy-makers: (1) consumer participation in integrating brand content into the mediation of their everyday lives, and the commercial use of data their participation generates, (2) the content of marketing messages on platforms, particularly where the infrastructure of platforms enable brands to produce content not open to public scrutiny, and (3) the algorithmic and data-driven model that shapes engagement between consumers and alcohol marketers on platforms. Some attention has been given to consumer participation in alcohol marketing (McCreanor et al.

2013) and the content of marketers' messages, but the emergence of platforms as architects of, and vested commercial interests in, the development of alcohol marketing remains a blind spot in research and policy.

In the next section we overview the development of Facebook's native advertising model, to illustrate why bracketing out user-generated content and the algorithmic capacities of platforms in studies of alcohol marketing is an arbitrary and potentially misleading theoretical approach.

Facebook's "native" advertising model

Facebook is the world's largest social media platform. It had 1.13 billion daily active users as of June 2016, 1.03 billion of whom access the platform via their smartphone app. The platform generated \$6.2 billion in advertising revenue in the second quarter of 2016, 84% of which was generated via the mobile app (Facebook 2016). 2012 to 2014 was a critical period in the development of Facebook's advertising model. This was the period in which the platform transitioned toward a primarily 'native' mode of advertising, an industry term for brand content that is indistinguishable from other forms of content in a media channel (see Supplementary Box 1 for definition of key Facebook terminology).

Facebook is the first media platform to develop a data-driven native advertising model at scale (Napoli 2011; Turow 2011; van Dijck 2013). Advertisers create their own content that is then circulated on the platform in the same format as the photos, stories and events created by other users; there is no clear distinction for users between "advertising" and other kinds of content (Niland et al. 2016).

Facebook's native advertising model emerged with the launch of the News Feed (2006) and Pages (2007) as key components of the interface between platform and user. The News Feed is a customised feed of content served to each user when they login to the platform. The content that users see is generated by a recommendation algorithm that is trained to predict and select the items of content that the individual will find the most engaging. Facebook engineers have said that the average Facebook user has 1500 items of content that could be shown to them when they log on (Boland 2014). Facebook's strategic objective in designing the News Feed algorithm is to sustain user engagement with the platform. The more that users engage with the platform, the more opportunities there are to sell their engagement to advertising brands.

Initially, the Pages tool enabled brands to produce and post content into the News Feeds of users who had become ‘fans’ of the brand’s page. Before this, alcohol brands’ digital marketing was on standalone websites and via paid advertising (Chester et al. 2010; Gordon 2011; Turow 2011); these were separated from other content in the News Feed at the side of the web interface and had very low engagement. However, advertisements were not visible on the mobile app which made the model unviable once the mobile app overtook the website as the primary touchpoint with users (Turow 2011). Page posts have been the primary vehicle for promotion on the platform since mid-2013 but few users ever directly visit a brand’s Page (Simo 2013). Instead, they mostly see a brand’s post as a singular item in their News Feed.

Facebook’s advertising model combines “organic and paid reach”. Organic reach is the industry term for free reach generated through user engagement. Brands generate organic reach when they post content that users interact with. Interactions signal to the News Feed recommendation algorithm that users on the platform find the content engaging, thereby making it more likely to be displayed to other users. The effort to generate organic reach has stimulated culturally-embedded marketing tactics such as “influencer marketing” (where brands informally contract with people who are influential within their peer networks to promote their brand) and event sponsorship (Carah 2015, Carah et al. 2014; Carah and Dobson 2016; Nicholls 2012).

Facebook claims to balance “organic” and “paid” reach in the News Feed by using machine learning techniques that take account of over one thousand factors (Kacholia 2013a). Since 2012 Facebook has strategically decreased the amount of organic reach brands can generate via their pages. This shift has been accompanied by the introduction of a “Promoted Posts” feature that allows brands to pay to boost the circulation of content on their Pages (Simo 2013). The purpose of this is threefold: it sustains user engagement with the platform by limiting overtly promotional content; it encourages brands to produce engaging content; and it maximises profit by forcing brands to pay for the engagement they generate (Ge 2013; Kacholia 2013b).

Brands now participate in real-time programmatic auctions of space in the News Feeds’ of targeted users. Brands bid for space in individual users’ News Feeds they want their posts to appear in, at which locations and at what times. For instance, a brand might promote football themed content to young men interested in a football code on the Friday evening of a scheduled game. Brand content is seamlessly embedded in larger cultural narratives on the platform (Niland et al. 2016).

Facebook continuously develops and expands the constructs that brands can use to target content. These can include the amount of time users spend viewing content, how they compare to similar users, and the time and location within which they engage with content (Boland 2014; Kacholia 2013a). In this model, alcohol brands benefit from the larger depiction of drinking culture by consumers (Atkinson et al. 2013; Goodwin et al. 2016; Griffiths and Casswell 2010; McCreanor et al. 2013; Moreno et al. 2010; Ridout et al. 2012). When platform users depict their own drinking practices they generate data that signal their interest in alcohol consumption and its relation to specific times, places and cultural interests (like sport or music). This information can then be used to target them.

In the present study, we undertake an analysis of alcohol brand activity on Facebook in Australia in 2012 and 2014, specifically focussing on patterns associated with native alcohol branding. In addition to the value of documenting the extent of brand activity and engagement with users over this period, our intended conceptual contribution is to stimulate the development of interdisciplinary, mixed methods, approaches to conceptualising the native, data-driven and participatory mode of alcohol marketing emerging on media platforms. The relationship between timing and frequency of brand posts and user engagement with those posts offers a new lens on alcohol brand activity and how it is shaped by Facebook. For commercial-in-confidence reasons Facebook does not publish information about the parameters of algorithms that shape user engagement. There is thus a pressing need to develop methods that enable a partial reverse-engineering of Facebook's advertising model. Longitudinal and time series approaches based on an analysis of brand posting and publically viewable interaction metrics (i.e., Likes, Comments, and Shares) offer one way of scrutinising Facebook's impact, and how this changes overtime. By looking for perturbations and changes overtime that can be linked to known changes in Facebook's processes or cannot be explained by other factors (e.g., changing societal practices or individual brand activity), researchers can get some sense of the extent of influence platforms have on brand activity. As a first step towards such a research agenda, we investigated:

- (1) What is the timing and frequency of brand content posting on Facebook and how is this changing?
- (2) What is the relationship between the timing and frequency of brand posts and user engagement and how has this changing?

Methods

Sample and Data Collection

This article analyses data from the top 20 brands marketing in Australia through Facebook in 2012 and 2014. To generate these data a list of over 258 alcohol brands distributed in Australia was created (McCusker Centre 2012). Each brand was searched on Facebook to determine if it had a dedicated Australian Facebook brand page and if so, how many fans it had. Fifty-one brands in Australia with a Facebook fan base of more than 5000 were identified in 2012. We selected the 20 brands with the largest fan base. The same exercise was repeated in 2014.

Data were collected relating to every public post a brand made to their page during 2012 and 2014. Data relating to all posts made in 2012 were collected between January and March 2013. Data relating to all posts made in 2014 were collected between November 2014 and January 2015. Data generated on the platform from October to December 2014 were not collected until January 2015. Given that most engagement with a post in the form of likes, comments and shares occurs a short period of time after the initial post, these differences in collection periods are likely to have little impact on comparability across years (Liotto and Altman 2014).

For each of the top 20 brands the following data were extracted manually in both 2012 and 2014:

- i) number of fans of the brand page,
- ii) the date the page was founded (one time point only for each brand),
- iii) the number of posts the brand made,
- iv) date of post (and timing of a selection of posts),
- v) number of likes for each post,
- vi) number of comments for each post,
- vii) number of shares for each post,
- viii) the Facebook defined age group who are fans of the page, and,
- ix) qualitative coding of post content.

Screenshots were taken of posts to the Facebook pages for cross-checking of data and qualitative analysis of thematic content. Data on post content are excluded from the current analysis which focusses on the frequency and timing of posts.

Brands that were in the top 20 in one but not both years were excluded from comparative analysis. Brands that had undergone a shift from an Australian targeted Facebook page to a global Facebook page between 2012 and 2014 were also excluded from comparative analysis because their Australian fan base could not be extracted from the global figures. Australian based brands active at

a global level (i.e., Jacob's Creek) were included for comparative analysis. Posts were excluded from analysis if the date of posting fell outside the 2012 or 2014 calendar years.

Analysis

Exploratory and descriptive statistical analyses, including graphing, of post content in 2012 and 2014 were undertaken using the statistical software R to identify associations between brand activity, user engagement and time (R Core Team 2016). Posts per week were calculated by dividing the total number of posts by the total number of weeks in 2012 and 2014 (52.29 and 52.14, respectively). The log of the counts of likes, comments and shares were used because this transformation normalised these distributions. The distribution of shares comprised a composite distribution (Supplementary Figure 1).

Medians, interquartile range and range were calculated, with Wilcoxon rank-sum tests used as the test of significance for comparison between 2012 and 2014. The summary total for age was calculated using median of the age range. Total interactions were calculated as the sum of likes, comments and shares for a brand. Linear regression models were fitted to the log data on posts, likes, comments and shares in 2012 and 2014 to examine patterns across the years. Models for posts data were based on the log counts of posts per day. We also examined differences in brand activity and engagement between youth brands whose fan-base was 18-24 and non-youth brands with a fan-base 25 years or older.

Results

Sample characteristics

The sample characteristics are provided in Supplementary Table 1. Of the top 20 brands, 19 were consistent across 2012 and 2014 years. Midori was a top 20 brand in 2012, replaced by Canadian Club in 2014. These two brands were excluded from further analysis.

Data relating to total fans in 2014 for the six brands Absolut, Jagermeister, Jameson Irish Whiskey, Jim Beam, Johnnie Walker and Smirnoff reflect a global rather than Australian user base because the Australian and global fan pages were merged between 2012 and 2014. Australian fan and interaction data could not be extracted for these brands in 2014 and these brands were excluded from further analysis. The remaining 13 brands were included for year-on-year analysis.

The number of fans increased by 52%, from 1,752,978 fans in 2012 to 2,658,449 fans in 2014. The increase ranged from 4% for Pure Blonde to a 225% increase for Jacob's Creek. There was a 12% overall drop in posts by alcohol brands between 2012 and 2014, from 46.40 to 41.10 posts per week respectively. The largest proportional change was for Bundy R Bear, which experienced a 62% drop in posts (from 2.43 posts per week in 2012 to 0.92 posts per week in 2014). Conversely, XXXX Gold showed the strongest percentage increase in posts between 2012 and 2014 of 40% (from 2.64 per week in 2012 to 3.70 per week in 2014). While posts declined overall, total interactions with posts increased by 9% between 2012 and 2014. The brand with the largest percentage increase in interactions was Carlton Dry, which experienced a 341% increase in 2014. Pure Blonde had the largest percentage decrease, an 82% drop between 2012 and 2014.

Changes in user interaction with brand posts

Log counts of likes and comments followed a normal distribution (Supplementary Figure 1) but the log of shares per post had two distinct maxima, one at 0 shares in both 2012 and 2014 and another, lower maximum, at 12 shares per post in 2012 and 15 shares per post in 2014. There was evidence of discordance between the patterns of likes, comments and shares within and between 2012 and 2014 (Table 1).

[Insert Table 1 here]

As Table 1 shows, the median likes per post almost doubled between 2012 and 2014, from 196 in 2012 to 392.5 in 2014 ($W=2060100$, $p<0.001$). Over the same period, the range of likes per post contracted from a maximum in 2012 of 22,277, to a maximum of 14,346 in 2014. The overall increase in likes per post was more pronounced in the posts for brands whose fan base was 25 and older, than those whose fan base was between 18 and 24.

Likes increased between 2012 and 2014 but the median number of comments decreased from 25 to 18 per post ($W=2831900$, $p<0.001$) while the overall range remained the same. The overall decline in comments per post was more pronounced for youth focussed brands ($W=824830$, $p<0.001$), where the absolute range also contracted. There was no significant change in comments per post between 2012 and 2014 for brands whose fan base was 25 or older ($W=602640$, $p=0.15$).

The largest proportional shift in interaction was in number of shares per post where the median rose from 3 shares per post in 2012 to 24 shares per post in 2014 ($W=1918800$, $p<0.001$). This change

was accompanied by an increase in the range of shares per post from a maximum of 1496 in 2012, to 5125 in 2014. The increase in shares per post was most pronounced for brands with a fan-base 25 years of age or over. The significant increase in median shares per post is partly explained by a substantial drop in the number of posts that received no shares from 29.5% of total posts in 2012 to 11.7% of total posts in 2014.

Inter- and intra-year effects

There was no evidence of a trend in the log of posts per day through the year for either 2012 or 2014 (Table 2, Supplementary Figure 2). Regression models on the log of likes, comments and shares, however, found a statistically significant and substantial increase in likes and shares over 2012. There was a smaller but still statistically significant increase in comments over this period. In 2014, these trends tapered and in some cases reversed. Likes continued to increase but at a lower rate, while comments did not increase significantly. Shares declined over the course of 2014.

[Insert Table 2 here]

Posting by day of week

The distribution of posts across the week changed from 2012 to 2014 (Supplementary Figure 3). In 2012, posts from Monday to Thursday were fairly uniform, with a peak at Friday followed by a sharp drop over Saturday and Sunday. This changed in 2014: posts from Monday to Friday increased linearly to a slightly lower peak on Friday, before declining over the weekend. Weekend posts (Saturday and Sunday) increased from 9.4% of total posts in 2012 to 22.6% of total posts in 2014.

Discussion

The results illustrate three important changes in brand engagement on Facebook between 2012 and 2014: the number of fans of alcohol brands increased 52% from 2012 to 2014. While the number of posts dropped 12% from 2012 and 2014, total interactions with posts by users increased by 9%.

Generating more engagement from less posts

Alcohol brands made fewer posts but generated more engagement in 2014 compared with 2012. Reduced posting was accompanied by more consistent engagement with posts over the course of 2014 (Table 2, Supplementary Figure 2). Notably, the substantial increase in engagement through likes in 2012 appears to be similar to trends in user engagement with US alcohol brands over that period, noted by Jernigan and Rushman (2014).

These data suggest that Facebook based alcohol marketing is becoming more sophisticated and increasingly engaging. However, they also indicate that, for 2014 at least, the trend with respect to likes, tapered off. The upward trend we observed in 2012 in relation to brand activity and engagement are in keeping with adjustments Facebook made to its advertising model and News Feed algorithm. Specifically, increases in interactions noticed over 2012 may be linked to Facebook's instigating a new feature - "sponsored stories" - on the mobile app which was rolled out iteratively, beginning in early 2012 (Facebook Newsroom 2012).

Optimising and standardising brand posting

Between 2012 and 2014 there was a smoothing out of posting during the week and across the weekend (Supplementary Figure 1). While Friday remained the peak day of posting in both 2012 and 2014, brand activity became more evenly spread across the rest of the week in 2014. The latter probably reflects changes made to Facebook's programmatic advertising model that uses price to spread brand activity more evenly through News Feeds. Friday afternoon is the most popular time for alcohol brands to post because this is when consumers will be thinking about or drinking alcohol and brands want to intersect with cultural drinking patterns (Nicholls 2012).

Regulators and researchers should be concerned about Facebook's apparent manipulation of brand activity away from peak times in order to optimise their profits. This change has the potential to effectively spread alcohol consumption over more days of the week.

Influencer impact

The composite distribution in shares, evident in Supplementary Figure 1, may reflect the effects of a small number of brand influencers who are paid to stimulate brand appeal by integrating brand advertising into their online presence. A brand's semi-contractual relationships with these influencers effectively guarantees a minimum amount of engagement with posts that may be parlayed into greater reach. The number of posts receiving no shares declined substantially between 2012 and 2014, however, it appears difficult to engineer organic reach through shares without this assistance.

Limitations and Future Research Directions

There are significant limitations to our capacity to analyse alcohol brand activity on Facebook. First, the platform's News Feed algorithm and advertising model are not open to public scrutiny. It is not

possible to know exactly what factors influence engagement with posts nor how much engagement is attributable to paid versus organic reach. Secondly, media platforms do not enable the standardised collection of datasets. This differs from the content analysis of broadcast or print media texts, which are immutable on publication and publically available. Brands and Facebook can manage who sees their content and when, and control the flow of content to particular regions and user demographics. After the Advertising Standards Bureau and Alcohol Beverages Advertising Code Complaints Panel found the Smirnoff and VB Facebook pages to be in breach of the Codes in September 2012, those brands removed much of their content (Brodmerkel and Carah 2013). Smirnoff was excluded from this analysis because it has globalised its page. The posts VB made during 2012 that were retracted were not included in our dataset. Consequently, this analysis underestimates activity and interaction in 2012 and thus may overestimate the changes in interaction in 2014. After data collection, Jacob's Creek deleted all of the content posted to its page before July 2013.

Limitations with the Facebook defined age group must be noted. Facebook did not provide detail on how these values are generated and no longer list it on Page profiles. There is no information on what proportion of the fan base of the Page match the listed age range. Furthermore, the age a Facebook user lists on their profile when they sign up is not verified. It is likely that some users will list an older age when they first sign up to Facebook so that they can access age-gated content.

Several areas of future research are critical. First, there is a need to repeat data collection of brand activity and engagement on Facebook for 2016 using a consistent methodology to maximise comparability of data over time. This is necessary to better understand and monitor brand activity. Second, the impact of influencers in stimulating brand reach through shares warrants further investigation as does the impact of organic reach via shares. Thirdly, further insights may be gained from analysis of individual brands' activities and the analysis of extreme values. This could include in-depth mixed methods investigations of post and comment content, type and interaction. Finally, further theoretical and empirical work is required to conceptualise and evaluate exposure to, and engagement with, alcohol marketing on media platforms. The use of data to integrate marketing into cultural practices and the role of consumer participation must be incorporated in models of marketing effects.

Conclusion

The comparison of alcohol brand activity on Facebook between 2012 and 2014 illustrates increasing consumer engagement. It also suggests that media platforms like Facebook have become key players in shaping alcohol marketing activity. Media platforms are orchestrating a shift from *exposure* to *engagement* as a key advertising metric by selling contextually-defined moments of engagement using real-time algorithmic auctions. For example, selling engagement with a particular user, at a particular time of day, who is in proximity to a nightlife precinct or a football game. Facebook also promotes tools like “Custom Audiences” and works directly with marketers, including major alcohol distributors, to analyse relationships between Facebook engagement and sales data (Crossley 2014; Diageo News & Media 2011; Facebook and Privacy 2012).

A media platform perspective on alcohol marketing is critical because of the need to scrutinise platforms as institutional actors in the development of alcohol marketing. Most critically, they are changing alcohol marketing in ways that public health researchers must take account of: brands no longer depend as much on discrete symbolic messages, rather, consumer participation is interwoven with brand content, and data processing is a real-time element of the construction and targeting of engagement. Systematic reviews indicate the existing ‘evidence-base’ on marketing effects has not contended with these issues. Policy reform is urgently needed to create regulatory frameworks that contend with this native, participatory and data-driven marketing model. This is especially important given its capacity to target and reinforce harmful and addictive forms of consumption.

There is good evidence for a link between exposure to alcohol advertising and consumption (Anderson et al. 2009, Jernigan et al. 2016). An evidence base on digital media channels is also emerging that includes evidence on the effects of increasing engagement with consumers on consumption (Anderson et al. 2009; Chritchlow et al. 2015; De Bruijn et al. 2016; Gordon et al. 2010; Jernigan and Rushman 2014; Jones et al. 2015). The critical challenge is to reconcile these two strands of research and take them forward in a way that produces understandings of the dramatically different advertising model utilised by media platforms: a model that can more precisely engage with targeted consumers in specific cultural contexts, times and locations than was possible with older broadcast paradigms. Marketing techniques on media platforms are also less open to public scrutiny. Public health researchers and policy makers need to expand their focus to the role of new players as vested interests in alcohol marketing (O’Brien and Carr 2016). This article takes a step towards conceptualising the marketing infrastructure of social media platforms, their effects and how these might be measured and monitored. This is essential in advancing public health policies that reduce alcohol-related harms.

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References

Anderson P., de Bruijn A., Angus K., Gordon R., Hastings G. (2009). Impact of alcohol advertising and media exposure on adolescent alcohol use: a systematic review of longitudinal studies. *Alcohol and Alcoholism*, 44: 229–43.

Atkinson AM, Ross-Houle KM, Begley E, Sumnall H. (2016). An exploration of alcohol advertising on social networking sites: an analysis of content, interactions and young people's perspectives. *Addiction Research & Theory*, Online first: 1-12

Boland, B. (2014). Organic Reach on Facebook: Your Questions Answered [Internet]. 6 June 2014. Facebook Business. Available from: <https://www.facebook.com/business/news/Organic-Reach-on-Facebook>

Brodmerkel, S. & Carah, N. (2013). Alcohol brands on Facebook: the challenges of regulating brands on social media. *Journal of Public Affairs*, 13(3), 272-281.

Carah, N., Brodmerkel, S. and Hernandez, L. (2014). Brands and sociality: Alcohol branding, drinking culture and Facebook. *Convergence: International Journal of Research into New Media Technologies*, 20(3), 259-275.

Carah, N. (2015). Algorithmic brands: a decade of brand experiments with mobile and social media, *New Media and Society*, 1-17.

Carah, N. and Dobson, A. (2016). Algorithmic Hotness: Young Women's "Promotion" and "Reconnaissance" Work via Social Media Body Images, *Social Media + Society*, 2(4), 1-10.

Carah, N. and Meurk, C. (2016). 'We need a media platform perspective on alcohol marketing: a reply to Lobstein et al.' *Addiction*, doi: 10.1111/add.13599.

Chester J, Montgomery K, Dorfman L. (2010). *Alcohol Marketing in the Digital Age*. Berkeley: Berkeley Media Studies Group.

Critchlow N, Moodie C, Bauld L, Bonner A, Hastings G. (2015). Awareness of, and participation with, digital alcohol marketing, and the association with frequency of high episodic drinking among young adults. *Drugs: Educ Prev Policy*, doi: 10.3109/09687637.2015.1119247.

Crossley, H. (2014). The Future of Online Marketing [Internet]. AANA Connect. 20 May 2014. Available at: <https://www.youtube.com/watch?v=ceKvWJd8ALM>

De Bruijn A., Tanghe J., de Leeuw R., Engels R., Anderson P., Beccaria F. et al. (2016). European longitudinal study on the relationship between adolescents' alcohol marketing exposure and alcohol use. *Addiction*, 111: 1774–83.

Diageo News & Media. (2011). Diageo takes multi-million dollar global partnership with Facebook to the next level. Diageo. 19 September 2011. Available at: <http://www.diageo.com/en-row/newsmedia/pages/resource.aspx?resourceid=1072>

Facebook. (2016). Facebook Reports Second Quarter 2016 Results [Internet]. Facebook. 27 July 2016. Available from: <https://investor.fb.com/investor-news/press-release-details/2016/Facebook-Reports-Second-Quarter-2016-Results/default.aspx>

Facebook Newsroom. (2012). Announcing Offers, New Placements [Internet]. Facebook. 29 February 2012. Available at: <http://newsroom.fb.com/news/2012/02/announcing-offers-new-placements/>

Facebook and Privacy. (2012). Relevant Ads That Protect Your Privacy [Internet]. Facebook. 1 October 2012. Available at: <https://www.facebook.com/notes/facebook-and-privacy/relevant-ads-that-protect-your-privacy/457827624267125>

Ge, H. (2013). News Feed FYI: More Relevant Ads in News Feed [Internet]. Facebook. 27 September 2013. Available from: <http://newsroom.fb.com/news/2013/09/news-feed-fyi-more-relevant-ads-in-news-feed/>

Gillespie, T. (2014). The Relevance of Algorithms. In: Gillespie, T., Boczkowski, P., Foot, K., editors. *Media technologies: Essays on communication, materiality, and society*. Cambridge: MIT Press, 2014.

Goodwin I, Griffin C, Lyons A, McCreanor T, Barnes HM. (2016). Precarious Popularity: Facebook Drinking Photos, the Attention Economy, and the Regime of the Branded Self. *Social Media & Society*, 1-13.

Gordon R. (2011). An audit of alcohol brand websites. *Drug and Alcohol Review*, 30:638– 44.

Gordon, R., Hastings, G., & Moodie, C. (2010). Alcohol marketing and young people's drinking: What the evidence base suggests for policy. *Journal of Public Affairs*, 10, 88–101

Griffiths R and Casswell S. (2010). Intoxigenic digital spaces? Youth, social networking sites and alcohol marketing. *Drug and Alcohol Review*, 29: 525–30.

Jernigan, D., Noel, J., Landon, J., Thornton, N., and Lobstein, T. (2016). Alcohol marketing and youth alcohol consumption: a systematic review of longitudinal studies published since 2008. *Addiction*, doi: 10.1111/add.13591.

Jernigan DH and Rushman AE. (2014). Measuring youth exposure to alcohol marketing on social networking sites: challenges and prospects. *Journal of Public Health Policy*, 35(1): 91-104.

Jones SC, Robinson L, Barrie L, Francis K, Lee JK. (2015). Association between young Australian's drinking behaviours and their interactions with alcohol brands on Facebook: results of an online survey. *Alcohol and alcoholism*, 1-7.

Kacholia, V. (2013a). News Feed FYI: Showing More High Quality Content [Internet]. Facebook. 23 August 2013. Available from: <http://newsroom.fb.com/news/2013/08/news-feed-fyi-showing-more-high-quality-content/>

Kacholia, V. (2013b). News Feed FYI: Helping You Find More News to Talk About [Internet]. Facebook. 2 December 2013. Available from: <http://newsroom.fb.com/news/2013/12/news-feed-fyi-helping-you-find-more-news-to-talk-about/>

Liotto, J. and Altmann, E.G. (2014). Predictability of Extreme Events in Social Media. *PLoS/One*, 2014. <http://dx.doi.org/10.1371/journal.pone.0111506>

Lobstein, T., Landon, J., Thornton, N., Jernigan, D. (2016). The commercial use of digital media to market alcohol products: a narrative review. *Addiction*, 2016. doi: 10.1111/add.13493

Mart, S., Mergendoller, J., & Simon, M. (2009). Alcohol promotion on Facebook. *The Journal of Global Drug Policy and Practice*, 3(3), 1-8.

McCusker Centre (2012). *Guide to the Australian Alcohol Industry*. Accessible at: <http://mcaay.org.au/news/guides-to-the-alcohol-industry.aspx>

McCreanor T, Moewaka Barnes H, Kaiwai H, Borell S, Gregory A. (2008). Creating intoxicogenic environments: marketing alcohol to young people in Aotearoa New Zealand. *Social Science and Medicine*, 67:938–946.

McCreanor T, Lyons A, Griffin C, Goodwin I, Moewaka Barnes H, Hutton F. (2013). Youth drinking cultures, social networking and alcohol marketing: implications for public health. *Critical Public Health*, 23:110–120.

Meier PS. (2011). Alcohol marketing research: the need for a new agenda. *Addiction*, 106: 466–71.

Moeweka Barnes, H., McCreanor, T., Goodwin, I., Lyons, A., Griffin, C. & Hutton, F. (2016). Alcohol and social media: drinking and drunkenness while online. *Critical Public Health*, 26: 62-76.

Moreno MA, Briner LR, Williams A, Brockman L, Walker L, Christakis DA. (2010). A content analysis of displayed alcohol references on a social networking web site. *Journal of Adolescent Health*, 47:168–75.

Napoli, P. M. (2011). *Audience Evolution: New Technologies and the transformation of media audiences*. New York: Columbia University Press.

Nicholls J. (2012). Everyday, everywhere: alcohol marketing and social media—current trends. *Alcohol and Alcoholism*, 47(4): 486-93.

Niland, P., McCreanor, T., Lyons, A., Griffin, C. (2016). Alcohol marketing on social media: young adults engage with alcohol marketing on Facebook. *Addiction Research & Theory*. DOI: 10.1080/16066359.2016.1245293

O'Brien, K. S., and Carr, S. M. (2016). Commentary on de Bruijn et al. (2016): Effective alcohol marketing policymaking requires more than evidence on alcohol marketing effects—research on vested interest effects is needed. *Addiction*, 111: 1784–1785.

van Dijck, J. (2013). *The culture of connectivity: A critical history of social media*. Oxford: Oxford University Press.

R Core Team (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.

Ridout B, Campbell A, Ellis L. (2012). 'Off your Face (book)': alcohol in online social identity construction and its relation to problem drinking in university students. *Drug and Alcohol Review*, 31(1):20-6.

Simo, F. (2013). An Update on Facebook Ads [Internet]. Facebook. 6 June 2013. Available from: <http://newsroom.fb.com/news/2013/06/an-update-on-facebook-ads/>

Turow J. (2012). *The daily you: How the new advertising industry is defining your identity and your worth*. Yale University Press: New Haven.

Zwick, D., Bonsu, S. K., & Darmody, A. (2008). Putting Consumers to Work: Co-creation and new marketing govern-mentality. *Journal of Consumer Culture*, 8(2), 163-196.

Tables

Table 1 Changes in Likes, Comments and Shares 2012-2014

		2012			2014			
		Median	Range	IQR	Median	Range	IQR	
Total	Likes	196	0-22,277	654.75	392.5	1-14,346	737	$W=2060100, p<2.2\times 10^{-16}***$
	Comments	25	0-2,181	48	18	0-2,162	44	$W=2831900, p=7.44\times 10^{-8}***$
	Shares	3	0-1,496	44	24	0-5,125	82	$W=1918800, p<2.2\times 10^{-16}***$
Youth	Likes	278	0-10,620	904	406	1-14,346	842	$W=634870, p=1.06\times 10^{-6}***$
	Comments	30	0-2,181	59	20	0-1,493	43	$W=824830, p=2.38\times 10^{-10}***$
	Shares	4	0-1,496	54	16	0-3,514	50	$W=636910, p=1.65\times 10^{-6}***$
Non-Youth	Likes	151	0-22,277	412	376	5-8,751	654	$W=400330, p<2.2\times 10^{-16}***$
	Comments	20	0-1,945	34	17	0-2,162	46	$W=602640, p=0.15$
	Shares	2	0-1,228	37	48	0-5,125	106.75	$W=332650, p<2.2\times 10^{-16}***$

***significant at the 0.1% level

Table 2 Trends in the log of Likes, Comments, Shares and Posts over 2012 and 2014

	2012		2014	
	β	p	β	p
Likes	3.10×10^{-3}	$p=8.66 \times 10^{-104}***$	4.19×10^{-4}	$p=3.61 \times 10^{-4}***$
Comments	8.87×10^{-4}	$p=2.81 \times 10^{-14}***$	1.43×10^{-4}	$p=0.281$
Shares	3.48×10^{-3}	$p=5.21 \times 10^{-103}***$	-3.53×10^{-4}	$p=0.04^*$
Posts	-9.91×10^{-6}	$p=0.98$	1.64×10^{-4}	$p=0.51$

*significant at the 5% level; ***significant at the 0.1% level

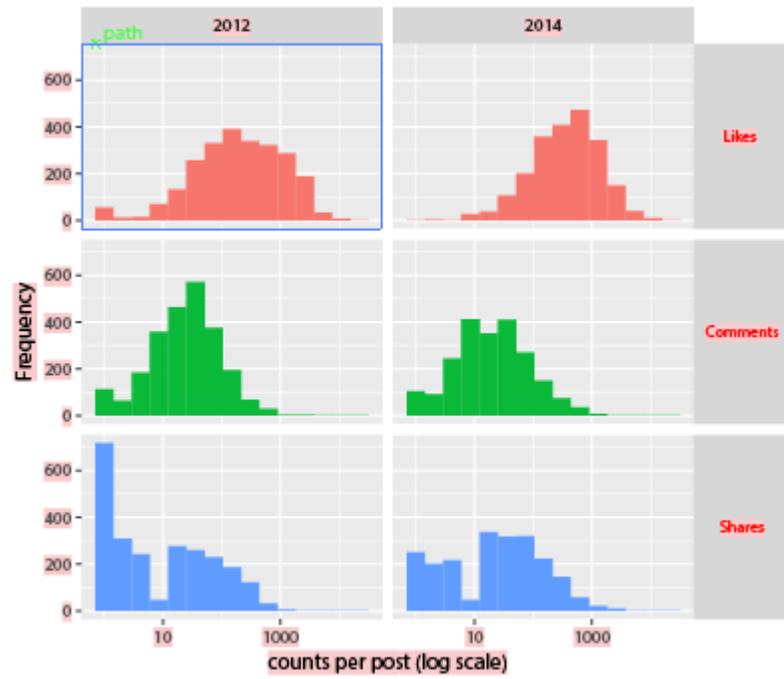
Supplementary Table 1 Brands ordered by 2012 fan base

Brand	Fans			Age		Number of posts (posts per week)			Likes		Comments		Shares		Total interactions		
	2012	2014	% change	2012	2014	2012	2014	% change	2012	2014	2012	2014	2012	2014	2012	2014	% change
Total¹	1752978	2658449	52	18-24	18-24	2426 (46.40)	2143 (41.10)	-12	1478806	1562238	132684	118999	118998	206067	1730488	1887304	9
Rekorderlig	223687	316156	41	18-24	18-24	336 (6.43)	376 (7.21)	12	261201	344019	18742	14457	9787	11110	289730	369586	28
Wild Turkey	221120	308515	40	18-24	18-24	164 (3.14)	134 (2.57)	-18	200589	126503	13306	11004	16717	10124	230612	147631	-36
Pure Blonde	215369	223896	4	18-24	18-24	151 (2.89)	93 (1.78)	-38	131611	23707	8972	1270	11512	1653	152095	26630	-82
Bundaberg Rum	187197	275722	47	18-24	18-24	185 (3.54)	123 (2.36)	-34	217818	285847	14561	16839	23011	34256	255390	336942	32
Smirnoff ²	180000	11283193	-	18-24	18-24	209 (4.00)	171 (3.28)	-	27501	73779	2484	13616	2619	4099	32604	91494	-
Jim Beam ²	166001	2038314	-	18-24	18-24	603 (1.65)	199 (3.82)	-	273429	116966	20262	8149	36624	12327	330315	137442	-
Johnnie Walker ²	144678	10309494	-	25-34	25-34	164 (3.14)	181 (3.47)	-	87074	109630	6119	5427	8319	8646	101512	123703	-
Bailey's	141863	165870	17	35-54	35-54	192 (3.67)	157 (3.01)	-18	167685	134268	14844	8793	19037	29500	201566	172561	-14
Jack Daniel's	138557	210621	52	25-34	25-34	258 (4.93)	233 (4.47)	-10	149481	149792	10067	6560	12300	15403	171848	171755	0
Jacob's Creek	134993	439338	225	35-54	35-54	266 (5.09)	203 (3.89)	-24	31844	46541	4132	2075	2042	8016	38018	56632	49
Tooheys Extra Dry	111128	127106	14	18-24	18-24	130 (2.49)	99 (1.9)	-24	53316	37211	11016	8797	1249	4008	65581	50016	-24
American Honey	93867	157267	68	18-24	18-24	102 (1.95)	133 (2.55)	30	65057	26453	8281	4057	5246	4610	78584	35120	-55
Jagermeister ²	79022	3570582	-	18-24	18-24	301 (5.76)	126 (2.42)	-	37321	99777	4047	130529	2450	5190	43818	235496	-
Bundy R Bear	78906	88212	12	25-34	25-34	127 (2.43)	48 (0.92)	-62	45133	17160	4209	590	6581	4669	55923	22419	-60
Carlton Dry	76698	142690	86	18-24	18-24	187 (3.58)	190 (3.64)	2	19401	90174	4630	10128	1232	11188	25263	111490	341
Victoria Bitter	65885	87203	32	25-34	25-34	190 (3.63)	161 (3.09)	-15	58595	143888	8091	19865	6354	27843	73040	191596	162
XXXX Gold	63708	115853	82	25-34	25-34	138 (2.64)	193 (3.7)	40	77075	136675	11833	14564	3930	43687	92838	194926	110
Absolut ²	63362	5151046	-	18-24	18-24	299 (5.72)	180 (3.45)	-	30138	45415	2537	3423	1921	4208	34596	53046	-
Jameson Irish Whiskey ²	59056	1795182	-	25-34	25-34	139 (2.66)	211 (4.05)	-	22786	101659	3865	5577	1319	7498	27970	114734	-
Midori ³	55579	-	-	18-24	-	217 (4.15)	-	-	58478	-	1933	-	2567	-	62978	-	-
Canadian Club ⁴	-	239026	-	-	18-24	-	48 (0.92)	-	-	7790	-	1511	-	643	-	9944	-

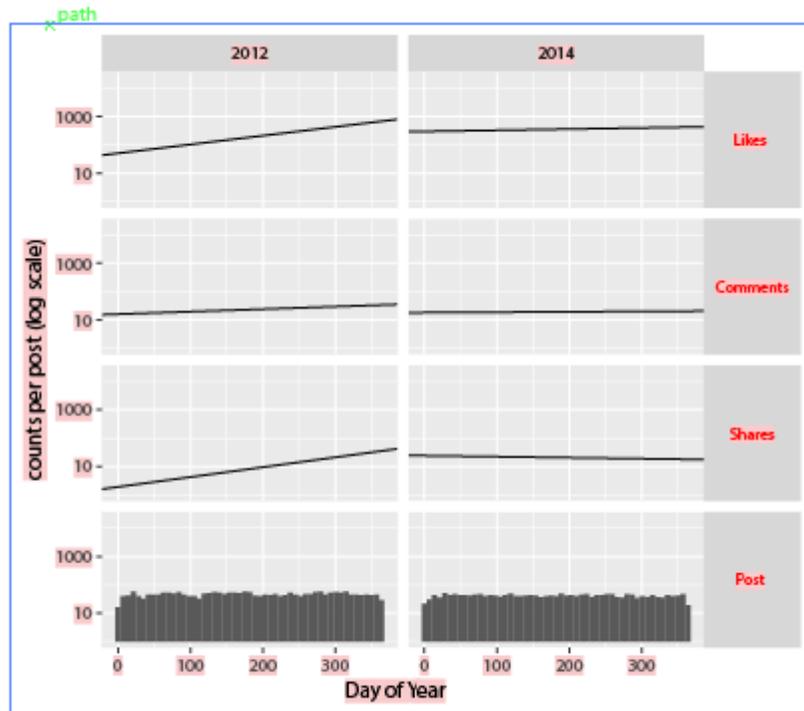
¹Totals are for 13 brands meeting inclusion criteria. ²Excluded due to merging of Australian and global Facebook pages between 2012 and 2014; ³Excluded because not a top 20 brand in 2014; ⁴Excluded because not a top 20 brand in 2012.

Figures

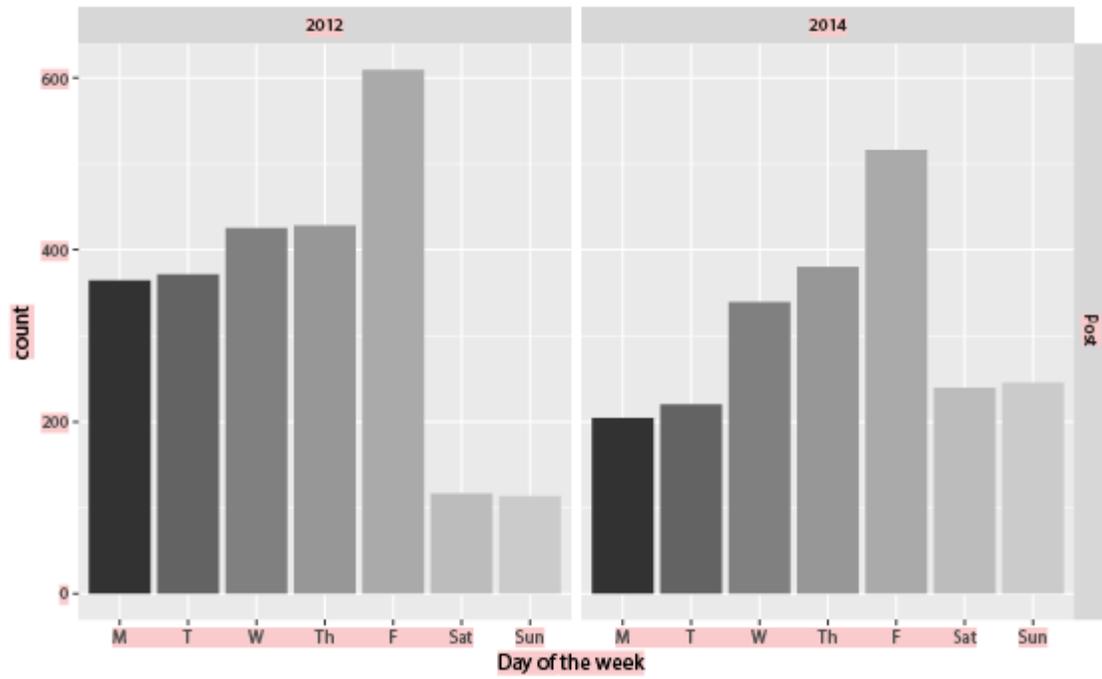
Supplementary Figure 1: Distribution of counts of likes, comments and shares per post



Supplementary Figure 2: Trends in interactions and posts through the year for 2012 and 2014



Supplementary Figure 3: Posts by day of the week for 2012 and 2014



Box 1: glossary of Facebook terminology

Comments: User generated content supplied in a comments box that is linked to an item of content. Comment on an item of content makes it more likely to display in the News Feeds of their friends.

Custom Audiences: A target audience created by an advertiser on Facebook. Facebook provide Custom Audience tools that enable advertisers to use their own marketing databases to identify particular consumers on the platform to simulate 'lookalike' groups of users similar to the advertisers current customer base.

Fans: Someone who has 'liked' a brand's page on Facebook.

Influencers: A Facebook user with a large following (usually of several thousand or more). Brands generate engagement by asking an influencer to post content on their behalf. These arrangements typically involve a mix of direct payment and in-kind rewards (e.g., merchandise). Influencer posts are more likely to generate engagement than brand posts because they have a more engaged fan base than brands. This generates more organic reach.

Likes: Indicates appreciation for a post through users clicking the 'like' button relating to an item of content. Counts of likes are incorporated into the decision-making sequence of the News Feed algorithm and impacts on whether an item of content will display in the News Feeds of other users.

Native content: Content generated by advertisers or brands that is indistinguishable from other content formats in that channel. Product placement on television shows is an example of native advertising. On Facebook native content refers to Page posts viewed in the News Feed. These posts are not marked as 'advertisements' and appear like any other story on the Facebook platform.

News Feed: A customised feed of content users see when they log on to Facebook. The feed is generated by a content recommendation algorithm that selects and orders content based on user preferences. The algorithm itself is constantly evolving and is designed to learn individual user preferences and select the items of content they find most engaging.

Organic reach: Views or engagement generated without the advertiser paying Facebook. Organic reach happens when content is 'liked', 'commented' or 'shared' making it more likely to appear in the News Feeds of their friends and those of users that the Facebook algorithms indicate will find it engaging. Over time Facebook have reduced the organic reach brands are able to generate.

Paid reach: Refers to the number of users who view an item of promotional content. Paid reach is views or engagement generated via direct payment by the advertiser to Facebook.

Pages: A unique profile page for organisations on Facebook. Celebrities, brands and institutions can set up a Page where they post content. Other users can become 'fans' of the page by 'liking' it. Posts from liked pages are more likely to appear in their News Feed. Fans can like, comment and share posts made on Pages.

Promoted Posts: Organisations can pay to promote their Page posts so they are visible in the News Feeds of specific users.

Programmatic buying: Automated buying of advertising space online. Advertisers enter specified coordinates for their target market and place bids. The media platform runs an automated auction for available advertising opportunities. This model imposes a ceiling on how many impressions and engagement a particular brand can generate with a target user group.

Shares: An item of content a user re-posts onto their personal profile via a dedicated 'share' button. A share makes the item more likely to display in the News Feeds of their friends.

Sponsored Stories: Sponsored stories are advertisements generated by user activity. When a user engages with a brand on the platform, the brand may pay to have that engagement formatted into a story that is promoted into the News Feeds of that users' friends. Sponsored Stories were discontinued in the first quarter of 2014 and replaced with Promoted Posts (see above).

