

Food Trends and Popular Nutrition Advice Online – Implications for Public Health

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Abstract

Objectives: Consumers routinely seek health and nutrition-related information from online sources, including social media platforms. This study identified popular online nutrition content to examine the advice and assess alignment with the Australian Guideline to Healthy Eating (AGHE).

Methods: We used Facebook page “likes” as an indicator of popularity to identify online nutrition and diet content. Websites and blogs associated with pages that had more than 100,000 Australian likes on 7th September 2017 were included. The dietary advice promoted was collected and compared with the AGHE across nine categories (Vegetables, Fruits, Legumes, Grains, Lean Meat, Dairy/Alternative, Fat, Sugar, Salt)

Results: Nine Facebook pages met the inclusion criteria. The four most-liked pages were hosted by celebrities. Only two pages and their associated websites had advice consistent with AGHE recommendations across all nine categories reviewed. The concept of “real food” was a popular theme online. While most sources advocated increasing vegetable consumption and reducing processed food, other advice was not evidence-based and frequently deviated from the AGHE.

Discussion: Health information seekers are exposed to a variety of online dietary information and lifestyle advice. While few public health goals are promoted, there are many contradictions, as well as deviations from the AGHE, which can create confusion among health information seekers. Public health organisations promoting AGHE on Facebook are few and not as popular.

Conclusion: Public health organisations need to be more engaged on popular internet platforms such as Facebook. The prevailing popular nutrition advice online may increase consumer confusion, scepticism and even avoidance of dietary advice. Proactive efforts are needed by public health organisations, in partnership social marketing experts, to create and share engaging and accurate nutrition content. Partnership with celebrities should be explored to improve reach and impact of evidence-based diet recommendations online.

Keywords: public health, health communication, diet fads, nutrition guidelines, social media, internet

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Introduction

Optimal nutrition is important for improved health and wellbeing and reducing the risk of diet-related health conditions including chronic disease [1]. In Australia, the National Health and Medical Research Council (NHMRC) publishes the Australian Dietary Guidelines (ADG) and the Australian Guidelines to Healthy Eating (AGHE) for healthy eating based on the best available scientific evidence [2]. However, most Australians do not follow recommended guidelines for healthy eating [3]. Consumers have reportedly found dietary guidelines confusing [4]. This confusion is aggravated by exposure to conflicting and changing nutrition information [5]. The continuously evolving body of nutrition evidence and inaccurate news media reporting contributes to the public perception that “the science keeps changing” [6]. Exposure to these contradictions provokes negative responses ranging from consumer scepticism to anger and anxiety [7]. In some, it induces a sense of inaction and avoidance of all guidelines [5,6] or a backlash which can potentially deter intentions to adopt healthy lifestyle behaviours [5]. In others, it promotes an active search for ‘truth’ [7] or looking for information from sources perceived to be neutral and free from hidden agendas [8].

Online health and nutrition information seeking is a common phenomenon [9]. A national survey in the US reported that nearly 60% of all adults accessed health information online with over a quarter accessing it through social media [9]. Nearly 32% of US adults shared their perceptions and knowledge of health online, and 9% of social media users had started or joined a health-related group. Information on diet, nutrition, vitamins and supplement information has been reported as one of the more common reasons why people use the internet [10]. A similar phenomenon is evident in Australia, with a study in Western Australia showing a dramatic increase in online nutrition information seeking, from less than 1% in 1995-2001 to 33.7% of all adults in 2012 [11].

In order for public health organizations to address nutrition misinformation, it is essential to first understand the current online nutrition information landscape. This study aimed to identify popular online nutrition content in Australia and examine the dietary advice promoted and its alignment with the AGHE.

Methods

Study Design and Approach

Facebook is the most popular social media platform [12] and searching for health information on social media is a growing phenomenon [13]. We therefore, used Facebook “likes” as an indicator of popularity to identify most popular diet and nutrition content producers in Australia. The “About” section of Facebook pages provide a description of the page including links to associated websites and blogs. These websites or blogs contained the page hosts’ food philosophy and diet advice. In order to do a contained study, we excluded analysing individual Facebook posts, but extracted relevant content from the “About section” of the Facebook page, and from the publicly available content on associated websites or blogs.

Sample Selection

Socialbakers [14], a social media analytics company, lists pages with most likes on their website. We used data available on Socialbakers on 7th September 2017 and identified the most “liked” Facebook pages in Australia that made recommendations on healthy eating. All categories of pages were examined, however only the categories “celebrities”, “brands” and “lifestyle” under “communities” contained the pages of interest. Pages that had 100,000 Australian “likes” or more under these three categories were extracted (n =1304). We then excluded pages that were not related to food (n= 1120), food and beverage brands, industry groups, and food retailers (n = 136), recipe pages (n = 28), and news service pages that simply channelled health and nutrition news articles from various sources but did not develop original content (n=7), and thirteen pages remained. Three of these pages (Clean Eating Recipes, Just Eat Real Food, Fitness Recipes) catered to paleo, vegan, gluten-free, dairy-free lifestyles; and one page (Skinnytastes) promoted low-calorie eating. However, the content in these pages and associated websites did not contain explicit statements comparable with AGHE food groups, and so were subsequently excluded from the sample, leaving a final sample of nine pages for analysis.

Data Collection

We used a two-step approach to first, describe the popular Facebook pages, and second, to examine the dietary advice made by the authors of pages on their websites or blogs. Data recorded included Facebook page name, associated website/blog link, and the number of global and Australian page ‘likes’. All websites had either main or sub-pages or blog posts that indicated author's food preferences and advice on what to eat or not.

Step 1 – Description of popular Facebook Pages

In order to describe the pages, we developed a unique coding scheme to categorise type of author, diet pattern or theme, references to dietary guidelines, using the definitions below.

Author type

The type of page host, including ‘Celebrities’, ‘Weight loss programs’, ‘Dietitians/nutritionists’, or ‘Other’

Diet pattern or theme Whether the page promoted a particular theme or pattern of diet, including:

- ‘Real food’ (a diet consisting of organic whole foods that are as close to their natural state as possible, with an avoidance of processed foods);
- ‘Paleo’ (consumption of foods presumed to have been the foods available to or consumed by humans during the Paleolithic era. Therefore, grains, dairy, oil, sugar, processed foods are all excluded)
- ‘Calorie-count’ (diets that recommend tracking calories consumed in a day)
- ‘Raw’ (diets that emphasize mostly raw food, rather than cooked)
- ‘Vegan’ (diet based on plant-based foods, avoiding animal-based foods including dairy, eggs and honey)
- ‘Sugar free’ (a diet that emphasizes elimination of almost all sugar from the diet)
- Dairy free (a diet devoid of dairy products)
- Gluten free (a diet devoid of wheat, wheat products and barley)
- ‘Other’ (other diet themes – e.g. fruit and vegetables for children, protein powders, Gut and Psychology Syndrome or GAPs Diet)

Reference to dietary guidelines Whether there was any reference or mention of alignment with any government-backed dietary guidelines.

Step 2 – Assessment of the dietary advice and alignment with AGHE

Data extraction for this step was guided by three questions:

1. Do the authors recommend eating, limiting, and/or avoiding food groups?
2. Do authors specify items to eat, limit, and/or avoid within the food groups?
3. Do authors prescribe the selection of food in any manner (for example: organic, grass-fed, pesticide-free, non-GMO, canned, frozen), or cooking technique (for example: soaking, fermenting).

The content extracted was recorded verbatim along with a link to the content.

Two reviewers (DR and AV) independently coded the content, and summarised diet advice using the three questions listed above as a guide. Where coding differences could not be reconciled between the two primary reviewers, they were referred to a third reviewer (JK). Examples of coding are available in the Appendix. We then assessed the coded summaries for alignment with

the AGHE recommendations for each of the five food groups - vegetables, fruit, lean meat, grain, dairy/alternative; we coded legumes separately as they are included under vegetables as well as lean meat food groups in AGHE; and for fat, sugar and salt.

Results

Step 1 – Description of popular Facebook Pages

As described above, nine pages were found to meet the eligibility criteria for inclusion: Michelle Bridges 12 Week Body Transformation (12WBT), Jamie Oliver, Chef Pete Evans (Pete Evans), I Quit Sugar (IQS), The Healthy Mummy (Healthy Mummy), Super Healthy Kids (SHK), Quirky Cooking, Weight Watchers AUNZ (Weight Watchers), and Rebel Dietitian.

As shown in **Table 1**, these nine pages had nearly 16 million ‘likes’, with 2,967,788 ‘likes’ from Australia. 12WBT had the highest number of Australian likes at 778,066, whereas Rebel had the least of those sites in our sample at 104,132 likes. The four most popular pages (12WBT, Jamie Oliver, Pete Evans and IQS) were hosted by celebrities. Two pages (SHK and Rebel Dietitian) were hosted by registered dietitians, two pages (Weight Watchers and Healthy Mummy) were commercial weight loss programs.

All pages except three (Healthy Mummy, SHK and Weight Watchers) promoted “real food”- or the shift to consuming organic whole foods that are as close to their natural state as possible, with an avoidance of processed foods. In addition, a variety of dietary patterns and themes such as paleo, gluten-free, sugar-free, raw, vegan and their variants were promoted. These niche diets were promoted as healthy ways of eating for everybody and not limited only to specific patient groups such as coeliac patients or those with allergies and intolerances. Six of the pages (12WBT, Jamie Oliver, IQS, Healthy Mummy, Weight Watchers, and SHK) quoted or referenced government-recommended dietary guidelines including those of Australia, UK and US. Two pages (12WBT and Weight Watchers) recommended tracking calories consumed.

Table 1. Top Nine Facebook Pages in Australia that provide nutrition advice (as on 7th September 2017)

Facebook Page	URL	Australia n Likes	Total Likes	Author	Diet type / theme	Reference to Dietary Guidelines
Michelle Bridges 12 Week Body Transformation (12WBT)	https://www.12wbt.com/	728 214	778 066	celebrity	real food, calorie-count	Yes - Australian Dietary Guidelines [2]
Jamie Oliver	http://www.jamieoliver.com/	450 198	6 525 310	celebrity	real food	Yes - UK Guidelines [26]

Chef Pete Evans (Pete Evans)	http://www.thepaleoway.com	440 339	1 528 167	celebrity	paleo, real food	no
I Quit Sugar (IQS)*	https://iqualsugar.com/ , http://www.sarahwilson.com	402 756	980 875	celebrity	sugar free, real food	Yes – Australian Dietary Guidelines [2]
The Healthy Mummy (Healthy Mummy)	https://www.healthyummy.com/	312 367	361 663	Other	Other –includes Healthy Mummy protein shakes	Yes – Australian Dietary Guidelines [2]
Super Healthy Kids (SHK)	http://www.superhealthykids.com	204 120	3 274 660	dietitian	Other – focus on fruit and vegetable intake for children	Yes – US Dietary Guidelines [27]
Quirky Cooking	https://www.quirkycooking.com.au/	198 340	267 268	Other	real food; paleo, dairy-free, gluten-free, other -GAPS Diet	no
Weight Watchers AUNZ (Weight Watchers)	https://www.weightwatchers.com.au/	127 322	160 867	weight loss program	calorie-count	yes – Australian Dietary Guidelines [2]
Rebel Dietitian (Rebel)	https://rebeldietitian.us	104 132	1 948 694	dietitian	real food, vegan, raw.	No

*Note: The IQS website was taken down May 31, 2018, however the Sarah Wilson website and blog as well as e-Books are still available online.

Step 2 – Assessment of the dietary advice and alignment with AGHE

Table 2 indicates alignment or deviation/ contradiction between advice of popular pages and the AGHE on what to eat or limit. Of the nine pages and associated websites reviewed, two (12 WBT,

Weight Watchers) aligned with all nine AGHE categories. Three (Rebel Dietitian, Healthy Mummy and SHK) aligned with 8 AGHE categories; and one aligned with the AGHE on 5 (Quirky Cooking), 4 (Jamie Oliver), 3 (Pete Evans), and 2 (IQS) categories. Two (Jamie Oliver, SHK) deviated from the guidelines only due to insistence on organic versions. IQS deviated from the guidelines by an inappropriate focus on fructose elimination.

Table 2 – Alignment of popular online dietary advice with the Australian Guide to Healthy Eating

Page	Vegetables	Fruit	Legumes	Grains	Lean Meat	Dairy/ Altern ative	Fat	Sugar	Salt
Michelle Bridges 12 Week Body Transformation (12WBT)	√	√	√	√	√	√	√	√	√
Jamie Oliver	X*	X*	√	√	X*	X*	X*	√	√
Chef Pete Evans (Pete Evans)	√	X	X	X	√	X	X	√	X
I Quit Sugar (IQS)	√	X	X	X	X	√	X	X**	X
The Healthy Mummy (Healthy Mummy)	√	√	√	√	√	√	X	√	√
Super Healthy Kids (SHK)	√	√	√	√	X	√	√	√	√
Quirky Cooking	√	√	√	√	X	√	X	X	X
Weight Watchers AUSNZ (Weight Watchers)	√	√	√	√	√	√	√	√	√
Rebel Dietitian	√	√	√	√	√	√	X	√	√

√ -aligned with AGHE.X-conflicting / contradictory to AGHE

* consumption advice aligns with AGHE but stipulates organic versions as healthier.

** consumption advice aligns with AGHE, but advice to eliminate fructose is not supported by evidence.

Table 3 provides the advice of popular online authors summarised by food groups. *Italics* have been used where:

1. the advice is directly contradictory to AGHE such as limiting fruit, dropping food groups, eating saturated fat; and
2. non-evidence-based advice that overstate the health benefits or harms of categories and sub-categories of food that deviates from government guidelines – for example

eating organic food, choosing Himalayan salt, replacing sugar with natural sugar or eliminating fructose.

Only two websites, 12WBT and Weight Watchers, were fully consistent with recommendations in the AGHE, across all food groups, fat, sugar and salt. Jamie Oliver was consistent on all nine AGHE recommendations; however, the advice on fruits, vegetables, lean meat and dairy goes beyond the guidelines by stipulating organic versions of are healthier. Similarly, the website of SHK too aligned on all nine categories, but promotes organic meat. The AGHE does not recommend organic varieties over conventionally grown foods, as there is no consistently proven nutritional advantage [15]. Further, Food Standards Australia and New Zealand (FSANZ) specify a maximum residual limit (MRL) for agricultural or veterinary chemical residue that is legally allowed for all food sold in Australia [16] ensuring conventionally grown food is safe for consumption. Thus, insisting on only organic versions as the healthier option may compromise attempts to increase fresh food consumption among all Australians due to the additional costs and lesser availability of organic produce. The Healthy Mummy and Rebel Dietitian were aligned with AGHE on all food groups, salt and sugar except in the promotion of saturated fats.

Pete Evans, Quirky Cooking, and IQS presented the most contradictions with AGHE, with advice including limiting fruit (Pete Evans, IQS) to going dairy-free (Pete Evans and Quirky Cooking) or gluten-free or dropping grains completely. All three promoted “real food” versions such as grass-fed meat, pastured and free-range poultry and eggs, wild caught fish and espoused consuming full-fat dairy, and saturated fats, including coconut oil. Although these websites limited sugar, IQS advice claimed only fructose elimination (component of fruits) was more important than addressing total added sugars. These websites also promoted Himalayan, Pink or Celtic varieties of salt.

Discussion and Conclusion

Our assessment revealed that the most popular nutrition information pages on Facebook are often hosted by celebrities, followed by dietitians, weight loss programs or other persons. Only two were fully aligned with government guidelines, while the rest deviated from AGHE in some way – either through direct contradiction on one or more categories, misinformation, or through overly-restrictive recommendations, exposing health information seekers to conflicting nutrition information. While some public health goals such as consumption of vegetables and avoiding ‘junk’ foods are prominent, the balance of the advice does not align closely with AGHE. The “real food” trend characterized by organic food choices is very popular online within our study sample. Public health organisations promoting AGHE on Facebook are few and have negligible likes compared with popular pages. Proactive efforts are needed by public health organizations in partnership with social media and social marketing experts to leverage Facebook to promote dietary guidelines. Partnering with celebrities may be a vehicle to boost reach of evidence-based nutrition information and countering misinformation, by improving quality and consistency of nutrition messaging.

Table 3 – Diet and Nutrition Advice of popular Facebook Pages / Websites

Page	Vegetables	Fruit	Legumes	Grains	Lean Meat, poultry, fish, eggs	Dairy/Alternative	Fats	Sugar	Salt
Michelle Bridges 12 Week Body Transformation (12WBT)	Eat all vegetables. Choose non-starchy vegetables. 5 serves a day.	Eat fruit. Choose seasonal, variety. Avoid dried fruit and juice	Eat legumes	Eat wholemeal or whole grain.	Eat meat, poultry, fish, eggs. Eat lean, grilled. 1 serve a day.	Eat dairy or alternatives. Choose low-fat option. Two serves a day	Limit butter/margarine. Use unsaturated fat options. Avoid deep-frying	Eliminate soft drinks. Eliminate salt.	Choose low-sodium foods
Jamie Oliver	Eat vegetables. Choose variety of colours, seasonal, <i>organic</i> .	Eat fruit. Choose variety of colours, seasonal, <i>organic</i> .	Eat beans. Regularly.	Eat wholemeal or whole grain. Choose complex carbohydrates.	Eat. Quality over quantity. Choose <i>organic, free-range or higher-welfare, responsibly sourced</i> .	Eat dairy. Choose low fat, reduced saturated fat and reduced sugar. Choose <i>organic</i> .	Eat unsaturated fat. <i>Coconut oil (saturated fat) may be exception</i> .	Avoid added sugar.	Reduce salt.
Chef Pete Evans (Pete Evans)	Eat vegetables. Choose fibrous (non-starchy) vegetables and greens. Choose <i>cultured and fermented vegetables</i> .	<i>Limit fruit</i>	<i>avoid legumes</i>	<i>avoid grains</i>	Eat meat, poultry, fish and eggs. Choose <i>grass-fed meat, pastured and free-range poultry and eggs, wild caught fish</i>	avoid dairy	<i>eliminate vegetable oils. Use olive or nut oil unheated. use natural fats such as duck fat, tallow, pastured lard. use coconut oil.</i>	Eliminate refined sugar.	<i>Choose Himalayan and Celtic Sea salt</i>
I Quit Sugar (IQS)	Eat vegetables. Choose variety of colours. Plenty. Maximise green vegetables.	<i>Limit fruit. Avoid dried fruit and juice</i>	<i>Avoid legumes. If eaten then soak / activate.</i>	limit carbohydrates. Choose <i>Gluten-free</i> . Use fermented, sprouted, wholegrain.	Eat meat, poultry, eggs and fish. Choose <i>sustainable, organic, grass-fed, grain-fed (organic grain), free range</i>	<i>Eat full fat dairy. Eliminate low-fat products.</i>	<i>Eat saturated fats. Avoid polyunsaturated fatty acids. Avoid omega 3 supplements. Get Omegas from food sources. Eliminate trans fats.</i>	<i>eliminate fructose. eat glucose, maltose and lactose in moderation.</i>	Eliminate refined table-salt. Choose <i>pink salt, whole food sources of salt</i> .

The Healthy Mummy (Healthy Mummy)	Eat vegetables	Eat fruit	Eat legumes and beans. Use dried or canned varieties.	Eat wholegrains. Try quinoa a <i>gluten-free</i> grain.	Eat. Choose less calorie, lean, low-fat, high protein like turkey.	Avoid high sugar dairy.	<i>Eat saturated fats, eat coconut oil</i> Avoid processed fats	Eliminate soft drinks	reduced salt or no salt
Super Healthy Kids (SHK)	Eat a variety of fresh, frozen, canned, dried, raw or cooked vegetables	Eat fresh, frozen, canned. Limit fruit juice. or dried fruit.	Eat legumes	Eat wholegrain	<i>Eat organic or hormone free</i>	Eat low fat/fat free dairy	Avoid trans fat		Salt – not too much
Quirky Cooking	Eat vegetables. <i>Eat organic.</i>	Eat fruits. Avoid fruits affected by pesticides. <i>Eat organic.</i>	Eat Legumes. Soaked.	<i>Eat grain free and/or gluten free/ low gluten</i> Pesticide free, soaked, sprouted, fermented grains	<i>Eat grass fed, free-range, organic meat</i>	<i>Avoid dairy, except for butter/ghee</i>	<i>Eat saturated fats. avoid polyunsaturated vegetable oils. choose macadamia oil, tallow, duck fat, or ghee. Chose fats with high smoke point.</i>	Avoid refined sugar. Replace with more natural sugars.	<i>Choose Himalayan or Celtic Salt</i>
Weight Watchers AUSNZ (Weight Watchers)	Eat vegetables. choose variety and in season	Eat fruit. Variety and In Season	Eat pulses as a meat replacement	Eat wholegrains	Eat lean meats	Eat low fat dairy	Eat vegetable, nut and seed oils	limit sugar	limit sugar
Rebel Dietitian	Eat a variety of vegetables	Eat a variety of fruit. Naturally dried fruit is ok	eat legumes. Minimally processed. Soaked.	Eat wholegrains Recommend soaking. Avoid processed grains	limit meat and processed meat. If eaten, choose organic. Avoid fish and shell-fish products - toxic contaminants.	Limit dairy	avoid animal sources of saturated fat. use unrefined and cold-pressed oils at room temperature <i>Sparingly use. saturated plant-based fat for cooking</i>	avoid added sugars, avoid processed sugars	Iodised salt

Note: Italicised text indicate non-evidence-based advice or those that deviate from AGHE.

Although the sources we reviewed were consistent with AGHE on increasing vegetable consumption and limiting sugar and ‘junk foods,’ food fads and misinformation were otherwise common. Promotion of ‘niche’ dietary patterns such as gluten-free and dairy-free are concerning because they are promoted to everybody, and not limited only to special patient groups for whom they may be necessary. Equally, although some health benefits have been reported in small samples and for specific health conditions for the Paleo diet [17] there is no evidence around its long-term safety and efficacy within the general population. Paleo pages’ advice to the general population to eat saturated fat, exclude grains and legumes, and exclude dairy not only directly contradict official dietary guidelines, but can potentially aggravate the problem of Australians not eating minimum recommended serves of several food groups [3]. While the government guidelines are evidence-based and promote balanced diets drawing on all food groups, diet trends such as promotion of coconut oil and pink salt, or arousing public fear of fructose, deviate from guidelines [18]. Such emphasis to consume or eliminate particular foods or food components, and the trend of dropping entire food groups, create fertile ground for contradictory nutrition messaging and may lead people to doubt dietary guidelines and health recommendations in general [5].

The “real food” trend is predominant online and promoted across popular Facebook pages. While there are no formal definitions for “real food,” the pages in our study broadly refer to “real food” as organic and responsibly sourced whole foods, and exclusion of highly processed foods. Sustainability and sources of food appear to be important to Facebook followers of popular nutrition pages. This is consistent with findings from an earlier study on food beliefs and perceptions of Australians [18]. Public health organizations can learn much from popular pages on fostering public engagement by linking discussions on healthy eating with other values important to Australians, such as environmental sustainability and animal welfare.

The lack of Facebook pages dedicated to the promotion of government dietary guidelines amidst various popular pages was particularly striking. For example, pages of Nutrition Australia [19] and DAA [20] had less than 25,000 likes and seemed to be followed by professional nutritionists and dietitians, rather than by the general public. We also found a single post on Australian Dietary Guidelines on the page of Department of Health [21] which had less than 75,000 likes. An earlier study looking for Facebook presence of public health organizations also found only one nutrition-related page - that of Nutrition Australia [22]. It appears that current online dissemination of evidence-based dietary guidelines does not have a large reach in the general population and lacks a strong enough presence on Facebook to counter misinformation propagated by popular pages.

Our study finds a clear opportunity for public health organizations and health communicators to leverage Facebook to promote healthy eating guidelines. For example, public health organizations can create Facebook pages dedicated to promoting healthy eating, by disseminating evidence-based guidelines, and countering misinformation. Content should be tailored in light of popular online nutrition themes and broader food choice issues identified in this study and leveraged along with effective Facebook strategies identified in existing research [22]. Building a network and reaching audiences on Facebook is not easy. Celebrity-power, on the other hand, allows their pages to have vast following and social media influence. Positive influences that celebrities can have on public health has been highlighted before [23] and this is exemplified by popular and government response to Jamie Oliver’s Ministry of Food [24] and the more recent Sugar Smart UK [25] campaigns. We recommend public health organizations explore partnerships with celebrities in

promoting accurate healthy eating guidelines. We believe this can vastly improve reach and impact of nutrition and diet communication.

Study Limitations

As Facebook is the single largest social media platform, we used number of “likes” to extrapolate nutrition websites that are popular in Australia. It is possible that some popular dietary trends not promoted on Facebook or did not have more than 100,000 Facebook likes were not included in our study (for example intermittent fasting and ketogenic diets). We did not analyse data across all online and social platforms or quantify repetitions of themes within these platforms. Nonetheless, while not definitive, the approach taken may be a reasonable indicator of the predominant nutrition and food choice related themes trending, to inform public health agencies in approaching nutrition communication efforts. As a next step, research examining effectiveness of a dedicated evidence-based nutrition Facebook page, and countering misinformation is recommended. Celebrity partnership may be explored for such a page along with assessment of reach and impact.

Conclusion

Our study shows that the popular diet and nutrition information websites are not fully aligned with evidence-based guidelines. Even those popular pages that reference government guidelines do so with their own interpretation and perceptions, which can create confusion among online health information seekers. A concentrated effort is required to promote healthy eating guidelines to the general public and counter the misinformation easily accessible online. Such online efforts may be well served by beginning with Facebook given its near universal popularity and reach.

References

1. Nutrition | National Health and Medical Research Council [Internet]. Nhmrc.gov.au. 2018 [Internet]. 2017 [cited 7 September 2017]. Available from: <https://www.nhmrc.gov.au/health-topics/nutrition>.
2. Nhmrc.gov.au. Australian Dietary Guidelines (2013) | National Health and Medical Research Council [Internet]. 2018 [cited 15 June 2015]. Available from: <https://www.nhmrc.gov.au/guidelines-publications/n55>.
3. 4364.0.55.012 - Australian Health Survey: Consumption of Food Groups from the Australian Dietary Guidelines, 2011-12 [Internet]. Abs.gov.au. 2018 [cited 12 June 2018]. Available from: <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4364.0.55.012>.
4. Boylan S, Louie JCY, Gill TP. 2012. Consumer response to healthy eating, physical activity and weight-related recommendations: a systematic review. *Obes Rev.* 13(7), 606-17. [PubMed https://doi.org/10.1111/j.1467-789X.2012.00989.x](https://doi.org/10.1111/j.1467-789X.2012.00989.x)
5. Nagler RH. 2014. Adverse outcomes associated with media exposure to contradictory nutrition messages. *J Health Commun.* 19(1), 24-40. [PubMed https://doi.org/10.1080/10810730.2013.798384](https://doi.org/10.1080/10810730.2013.798384)

6. Goldberg JP, Sliwa SA. 2011. Communicating actionable nutrition messages: challenges and opportunities. *Proc Nutr Soc.* 70(1), 26-37. [PubMed](#) <https://doi.org/10.1017/S0029665110004714>
7. Vardeman JE, Aldoory L. 2008. A Qualitative Study of How Women Make Meaning of Contradictory Media Messages About the Risks of Eating Fish. *Health Commun.* 23(3), 282-91. [PubMed](#) <https://doi.org/10.1080/10410230802056396>
8. Ward PR, Henderson J, Coveney J, Meyer S. 2012. How do South Australian consumers negotiate and respond to information in the media about food and nutrition?: The importance of risk, trust and uncertainty. *J Sociol (Melb).* 48(1), 23-41. <https://doi.org/10.1177/1440783311407947>
9. Fox S. The Social Life of Health Information, 2011 [Internet]. Pew Research Center: Internet, Science & Tech. 2011 [cited 9 November 2015]. Available from: <http://www.pewinternet.org/2011/05/12/the-social-life-of-health-information-2011/>.
10. Pew Research Center. Internet, Science & Tech. Online Health Search [Internet]. 2006 [cited 9 November 2015]. Available from: http://www.pewinternet.org/files/old-media/Files/Reports/2006/PIP_Online_Health_2006.pdf.pdf.
11. Pollard CM, Pulker CE, Meng X, Kerr DA, Scott JA. 2015. Who Uses the Internet as a Source of Nutrition and Dietary Information? An Australian Population Perspective. *J Med Internet Res.* 17(8), e209. [PubMed](#) <https://doi.org/10.2196/jmir.4548>
12. Sensis Social Media Report 2017. 2017 [cited 30 August 2017]. Available from: <https://www.sensis.com.au/asset/PDFdirectory/Sensis-Social-Media-Report-2017.pdf>.
13. Shaw RJ, Johnson CM. 2011. Health Information Seeking and Social Media Use on the Internet among People with Diabetes. *Online J Public Health Inform.* 3(1). [PubMed](#) <https://doi.org/10.5210/ojphi.v3i1.3561>
14. Socialbakers.com. Social Media Marketing, Statistics & Monitoring Tools [Internet]. 2017 [cited 7th September 2017]. Available from: <http://www.socialbakers.com/>.
15. Is organic food better for my health? – Dietitians Association of Australia [Internet]. Daa.asn.au. 2018 [cited 15 June 2018]. Available from: <https://daa.asn.au/smart-eating-for-you/smart-eating-fast-facts/healthy-eating/is-organic-food-better-for-my-health/>.
16. Food Standards Australia New Zealand [Internet]. 2018 [cited 24 July 2018]. Available from: <http://www.foodstandards.gov.au/consumer/chemicals/maxresidue/Pages/default.aspx>.
17. Manheimer EW, van Zuuren EJ, Fedorowicz Z, Pijl H. 2015. Paleolithic nutrition for metabolic syndrome: systematic review and meta-analysis. *Am J Clin Nutr.* 102(4), 922-32. [PubMed](#) <https://doi.org/10.3945/ajcn.115.113613>
18. Dietitians Association of Australia – Hot Topics [Internet]. Daa.asn.au. 2018 [cited 24 May 2018]. Available from: <https://daa.asn.au/voice-of-daa/hot-topics/>.

19. Nutrition Australia [Internet]. Facebook.com. 2018 [cited 25 June 2017]. Available from: <https://www.facebook.com/NutritionAustralia/>.
20. Dietitians Association of Australia [Internet]. Facebook.com. 2018 [cited 25 June 2017]. Available from: https://www.facebook.com/dietitiansassociation/?ref=br_rs.
21. Australian Department of Health [Internet]. Facebook.com. 2018 [cited 25 June 2017]. Available from: <https://www.facebook.com/healthgovau/>.
22. Kite J, Foley BC, Grunseit AC, Freeman B. 2016. Please Like Me: Facebook and Public Health Communication. *PLoS One*. 11(9), e0162765. [PubMed](https://doi.org/10.1371/journal.pone.0162765) <https://doi.org/10.1371/journal.pone.0162765>
23. Chapman S. 2012. Does celebrity involvement in public health campaigns deliver long term benefit? Yes. *BMJ: British Medical Journal*. 345, e6364. [PubMed](https://doi.org/10.1136/bmj.e6364) <https://doi.org/10.1136/bmj.e6364>
24. The Good Foundation [Internet]. Jamie's Ministry of Food. 2018 [cited 13 May 2018]. Available from: <https://www.jamiesministryoffood.com.au/the-good-foundation>.
25. Welcome | Sugar Smart UK [Internet]. Sugarsmartuk.org. 2018 [cited 13 May 2018]. Available from: <https://www.sugarsmartuk.org/>
26. The Eatwell Guide [Internet]. GOV.UK. 2018 [cited 19 April 2018]. Available from: <https://www.gov.uk/government/publications/the-eatwell-guide>.
27. 2015–2020 Dietary Guidelines for Americans - health.gov [Internet]. Health.gov. 2018 [cited 19 April 2018]. Available from: <https://health.gov/dietaryguidelines/2015/>.

Appendix

Supplementary Material - Content Analysis

Examples of coding of popular diet advice

The examples below show how popular diet advice summarised in **Table 3** were derived. Of each piece of content, three questions were asked: 1. Do the authors recommend eating, limiting, and/or avoiding food groups? 2. Do authors specify items to eat, limit, and/or avoid within the food groups? 3. Do authors prescribe the selection of food in any manner (for example: organic, grass-fed, pesticide-free, non-GMO, canned, frozen), or cooking technique (for example soaking, fermenting).

Example 1: Fruit Recommendation

URL: <https://www.12wbt.com/blog/nutrition/can-really-much-fruit/>

Content: "How Much Fruit is Enough? Finding the 'juicy' sweet spot is important for overall nutrition balance, BUT we need to keep in mind our energy requirements and our food intake for a whole day.

Aim to choose fruit in season and mix up your variety (berries, citrus, tropical, etc.) to not only get fabulous flavour and nutrient hits, but to keep costs down and support the local produce!

It is important to note that it is very easy to overeat dried fruit and fruit juices – both of which can increase the risk of tooth cavities due to their acidity (juice) and ability to stick to teeth (dried fruit). So keep these in check!"

Described as: Eat Fruit. Avoid dried fruit and fruit juice, Chose seasonal and variety.

Example 2: Fat Recommendation

URL: <https://www.quirkycooking.com.au/substitutes-recipe-conversions/dairy/>

Content: "In addition to the specific benefits of Omega 3s found in natural foods, there is a massive benefit to gut health that is to be gained by switching from polyunsaturated vegetable oils to animal fats." "I now mostly use macadamia oil, tallow, duck fat, or ghee for shallow frying, as they have high smoke points. I used to use coconut oil, but you need to be very careful with frying with coconut oil as the smoke point is only 170C."

Described as: *Eat saturated fats; avoid polyunsaturated vegetable oils; choose macadamia oil, tallow, duck fat, or ghee; Choose fats with high smoke point.*