How does social media act as a persuasive platform to facilitate nutrition and health behaviour change in young adults?: A qualitative study

Vanessa Friedman, Cassandra Wright, Annika Molenaar, Tracy McCaffrey, Linda Brennan, Megan Lim

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Abstract

Background: Globally, sub-optimal dietary choices are a leading cause of non-communicable diseases. Evidence for effective interventions to address these behaviours, particularly in young adults, is limited. Given the substantial time young adults spend using social media, there is interest in understanding the current and potential role of these platforms in shaping dietary behaviour.

Objective: This study aimed to explore the influence of social media on young adult's dietary behaviours.

Methods: We recruited 234 young adults aged 18-24 years and living in Australia using market and social research panels. We applied a digital ethnography approach to collect data from online conversations in a series of forums, where participants responded to different health-themed questions relating to health behaviour change and persuasion on social media. We undertook a qualitative thematic analysis.

Results: Participants described how social media influenced their decisions to change their health behaviours. Access to social support and health information through online communities were juxtaposed with exposure to highly persuasive fast-food advertising. Some participants expressed that exposure to online health-focussed content induced feelings of guilt about their behaviour, which was more prominent among females. Fast-food advertising was discussed as a contributor to poor health behaviours and was indicated as a major barrier to change.

Conclusions: Young adults reported that social media is highly persuasive towards dietary behaviour through different pathways of social influence. This suggests that social norms online are an important aspect of changing young adult's health behaviours. The commercialisation of social media also encouraged poor health behaviours, largely through fast-food advertising. Future social media-delivered dietary interventions should acknowledge the social and environmental factors challenging the ability of young adults to make individual health behaviour improvements. Care should also be taken to ensure that future interventions do not further elicit guilt in a way that contributes to poor mental health within this community.

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Abstract

Background: Globally, sub-optimal dietary choices are a leading cause of non-communicable diseases. Evidence for effective interventions to address these behaviours, particularly in young adults, is limited. Given the substantial time young adults spend using social media, there is interest in understanding the current and potential role of these platforms in shaping dietary behaviour.

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Abstract: 303 words

Keywords

Young Adults, Nutrition, Physical activity, Mental health, Social media, Qualitative methods, Health Promotion

Background

Non-communicable diseases are increasing in prevalence globally and have become a leading health concern. It is known that sub-optimal diets with low intakes of fruits and vegetables and high intakes of processed fatty foods are contributing to this trend (1). It is therefore concerning that the diet quality of young adults typically reduces as they navigate the challenging shift from adolescence to adulthood (2). Transitioning away from school and family resources towards the workforce or further study leaves a strong and lasting impact on a young adult's dietary behaviours (3, 4). Studies show that many young adults prioritise other aspects of their lives above healthy eating, which may be perceived as costly and time-consuming for an age bracket that is typically on a lower income (5, 6). The transitional nature of young adulthood can also present challenges for creating targeted and effective dietary interventions to reach this population (4). Previous research has shown that young adults conceptualise health more broadly than physical health or the prevention of chronic disease and value mental, social, financial and spiritual aspects (7). As such, to develop engaging, feasible and acceptable approaches targeting dietary behaviours in this age group, the focus needs to extend beyond long-term health and should incorporate holistic views and short-term benefits (7).

Previous qualitative studies suggest that dietary behaviours during young adulthood are strongly influenced by internal perceptions and social norms (5, 8, 9). Young adults were seen to base their food choices on what they perceived their friends or family were eating, highlighting the power of socially normative messages in this domain (9). Social media has become a key component of the social environment of young adults (8, 10, 11). The ability to share, comment on and react to other users' posts heightens interactions in this setting (12). Social media delivers a constant stream of social input to young adults and has become a place for them to view and compare themselves to idealised versions of both their peers' and strangers' lives (7). A recent systematic review has indicated that image-related comparisons on social media may be negatively impacting the body image of young adults as well as driving poor eating behaviours such as restriction or overeating

(13).

In 2018, 99% of Australians aged 18-29 years used social media regularly with 89% accessing their accounts at least once daily (14). High rates of social media usage has led food brands and companies to look to social media to enhance their engagement with young adults (15). Many fast-food companies use largely unregulated social media advertising regimes to promote energy-dense nutrient-poor foods that are shared throughout young adult peer networks (8, 15). Social media 'influencers' have emerged as key players in these marketing strategies (16, 17). They are recognised as people who hold persuasive power through sharing their lives on various platforms and by forming emotional ties to their audiences (16, 17). As such, companies work with influencers who provide paid product reviews to their audiences to boost the company's sales and consumer engagement rates (17). Some influencers exclusively post health and lifestyle content, although many of these 'health-focussed influencers' lack professional accreditation and may post mis-leading nutrition advice that is not evidence-based (18). Currently, experts in nutrition are becoming less trusted (19) and social media users are more likely to engage with and trust health-focussed content from influencers than food industry or health promotion (20). Hence, commentary from influencers has a relatively large impact on the values, beliefs and behaviours of consumers regarding nutrition in both positive and negative ways (18).

The ability for social media to influence young adult audiences has also sparked public health interest as a potential platform for health promotion (21). Social media has previously been shown to influence health knowledge with some studies identifying its positive influence on young adults through access to healthy recipes and exercises (10, 11, 22). A recent systematic review identified that social media-delivered nutrition interventions targeting adolescents and young adults lead to significant dietary improvements in 11 of 16 studies (11). However, many of the interventions used were complex, with social media often part of a secondary component, thus making it difficult to distinguish the true impact (11). Our systematic review evaluated the efficacy of social media-delivered nutrition interventions in young adults only and identified

that engagement with social media content varied greatly, between 3-69% (22). Young adults preferred to use social media passively, in a unilateral interaction, receiving information rather than sharing information (22). Young adults were also not comfortable talking about their weight online, highlighting the need to move away from a weight-centric narrative in health promotion (22). In two separate analyses we have also found that social media users engage more frequently with food industry and lifestyle brands than with health promotion (20, 23). This highlights the need to develop more effective social media-delivered health promotion tools to encourage healthy behaviours in Australian young adults. To do this, the impact of social media on dietary behaviours must be further explored and its persuasive abilities further understood.

Phase 1a of the Communicating Health project seeks to gain insight into the use and application of social media as it relates to 12 health and eating-related topics. This will allow for the identification of the channels, tones and content-types that have the largest potential for health promotion development. In order to understand how to develop effective social media-delivered health promotion tools, it is first important to explore if social media is currently impacting young adult dietary behaviours, and if so, how it is being used as a platform for persuasion. As such, this study aims to investigate what prompts young adults to make positive health and nutrition behaviour changes, and to understand the influence of social media as a persuasive medium on young adult health and nutrition behaviours.

Methods

Online conversations

This study is part of the larger Communicating Health study (24), which is a multi-stage mixed methods study exploring the dietary behaviours and social media usage of Australian young adults. It aims to develop health promotion strategies using social marketing techniques. The data used in this current study forms part of the formative phase of Communicating Health, Phase 1a, which involved online conversations that explored young adults' health, eating behaviours and social media usage (24). An outline of all four phases of

Communicating Health has been published previously (24). The qualitative online conversations were hosted by an independent market research field house over a four-week period. The online conversations were prompted by questions posed by the market research facilitators in interactive, moderated and secure online chat rooms. This method is based on digital ethnographic principles to understand how digital aspects of society interact with the other material, sensory and social pillars of human existence (25, 26). As a responsive data collection technique commonly used in consumer behaviour research, online conversations allowed participants to interact with each other for a longer period than in traditional focus groups or interviews (27).

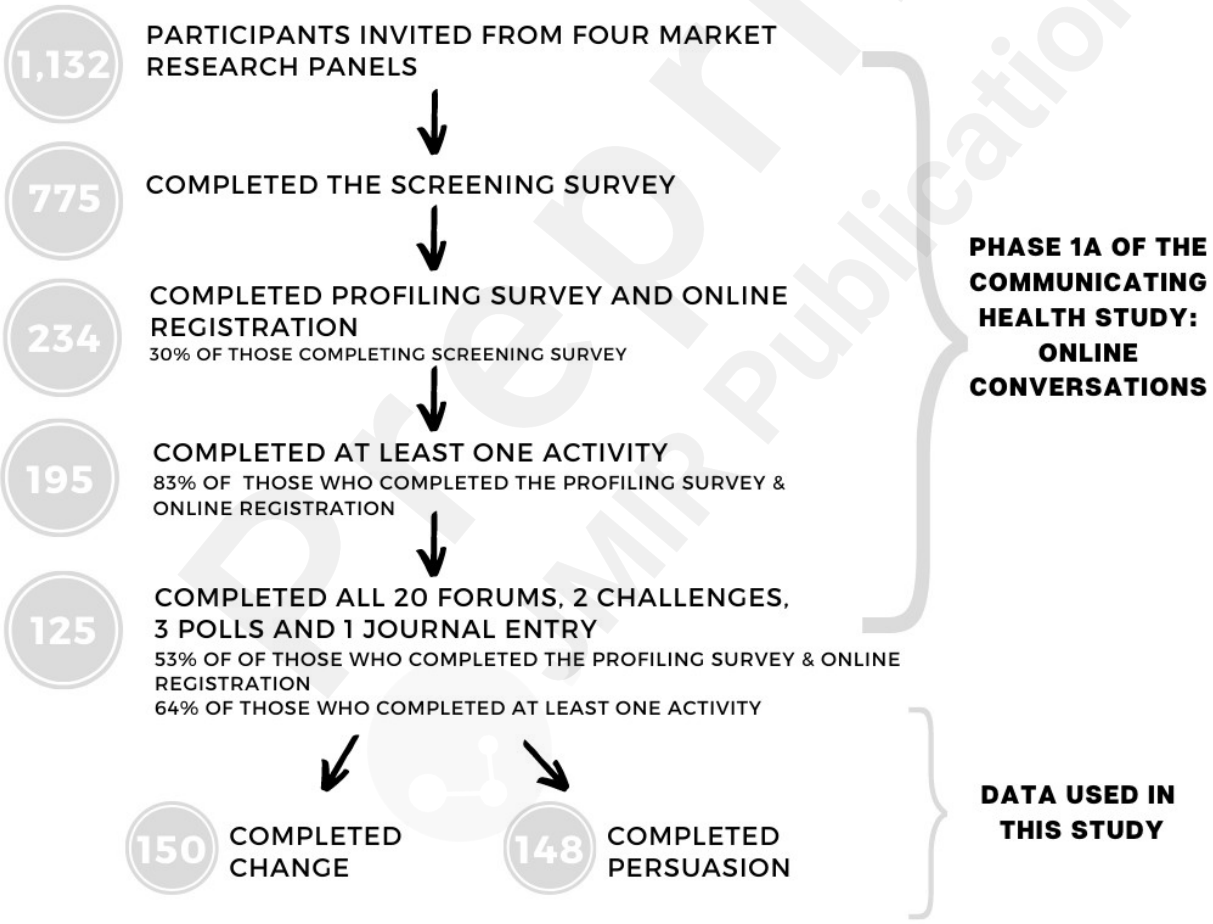
Recruitment

Guided by prior studies with similar methodologies (28), the recruitment target was 200 young adults aged 18-24 years, living in Australia and using social media at least twice a day. The recruitment period ran from May until June 2017. This process was facilitated by an Australian Research Society-certified field house (29). Young adults who had previously given consent to participate in research through signing up to market research panels were invited to this study. Participants were from three research panels that were accredited by the International Organization for Standardization (30-32).

Panel members were sent an email invitation to complete a short screening questionnaire to assess their eligibility. Those who were eligible were then sent a profiling survey collecting demographic information, self-reported weight and height (to calculate body mass index (BMI, kg/m^2)), social media use and interest in health (33). Health interest (low or mid/high) was determined by the median value of the following question asked in the profiling survey: “On a scale of 1-7 where 1 means “Strongly Disagree” and 7 means “Strongly Agree”, please indicate how strongly you agree with the following statement - I take an active interest in my health.” The profiling survey was completed by 234 participants who were then emailed a link to sign up to the online conversation website. A participant flow diagram is provided in Figure 1. Participants were then stratified into four communities based on their age (18-21 years, 22-24 years) and interest in health (low,

mid/high). Those with a low interest in health were grouped separately to those with a mid/high interest in health and then further divided by age, amounting to four groups with 42-60 participants in each. Profiling was set to achieve approximately even numbers of participants in each group and to achieve an approximately nationally representative split on gender and location (both Australian State or Territory and location type, i.e. metropolitan and regional locations) (34). All four communities had access to the same forums but could only interact with the other members of their community. The dropout rate was large, which is expected for this age group. Therefore, a referral system was put in place where existing participants could refer a friend who was then screened and profiled in the same way.

Figure 1. Participant flow diagram.



Data collection

The online conversations were conducted on a private online forum portal from 10th May to 6th June 2017.

There were 20 forums in total (each took approximately five minutes to complete), three short polls and an ongoing journal entry that participants were asked to contribute to at least four times. The participants were also asked to complete two different challenges. Challenge one invited the participants to come up with a creative way to get more young adults to eat more fruits and vegetables. The second challenge asked the participants to persuade someone to kick-start a healthier lifestyle in 160 characters or less. Participants were then able to see each other's ideas and comment on their favourites. These different aspects of the online conversations explored different areas of health, nutrition and social media and participants responded to prompts from the market research moderators. The forums were released at different times but remained open for the four-week period. Due to different aspects being released on separate weeks, there are different numbers of participants who completed each forum (Figure 1). As per standard practice by Australian Market and Social Research Society Limited, the participants were reimbursed for their time with an AU$100 gift voucher upon completion of all aspects of the online conversations, with a further AU$100 given to the five most descriptive and detailed forum responses from each online community (i.e., 20 in total). This current study reports on two of the forums that formed the online conversations, 'Catalysts for change' (referred to as 'Change') and 'Persuasion on social media' (referred to as 'Persuasion'). These were chosen for analysis as they discussed health behaviour change and persuasion on social media which aligned with the research aim of this study. Table 1 describes the prompt questions used in both forums.

Table 1. Forum prompt questions (35).

Forum title	Discussion guide	Logic of enquiry
Catalysts for change	Have you changed anything recently to make you happier? Healthier? What triggered that change? How did you go about making that change? Did it change the dynamic within your friendship circle? Have you kept up with that change? (for	An exploration of what prompted lasting health behaviour change in the young adult participants and whether social media played a role in this process.

	how long – or probe for that?) What (if anything) was pulling you back to your old ways? Did social media give you any inspiration? Help? Hinder? Did anything else or any other tools play a role too e.g. apps, websites or even just people… ?	
Persuasion on social media	Can you think of times when you have used social media to persuade others to do something? Can you think of times when you have been persuaded? More broadly, can you think of how social media has influenced things you do in relation to health and healthy lifestyle?	To determine whether the participants viewed social media as a persuasive medium and to understand some of the factors that influenced its persuasiveness.

Data analysis

Descriptive analyses of profiling survey data were conducted (Table 3). We undertook a thematic analysis of forum responses using open-coding and inductive techniques in alignment with a constructivist interpretation. As detailed in Table 2, this was guided by Braun and Clarke's systematic six-step approach: data familiarisation, generating initial codes, searching for themes, reviewing themes, defining and naming themes and lastly producing the report (36). This process enabled the large dataset to be broken down into small units of comparison (codes) and re-built into themes that provided a systematic description of the participants' experiences of health behaviour change and social media usage. A constant comparison approach was used to identify themes associated with healthy eating and other health behaviours (37). Within this approach, each data point was compared to pre-existing data points to identify commonalities that existed within and between the participants' responses. These commonalities became codes and similar

codes were later grouped into broader themes that encapsulated the dataset. Investigator triangulation was used to reduce subjectivity and enhance the rigour of the research findings (38). As such, double blind coding was conducted by two authors (VF and AM) who both coded each dataset independently and then met to discuss their findings and reach an agreement. The researcher and primary coder of this study (VF) had a background in biomedical science and fell within the age bracket of the participants. Growing up with social media, her empathetic connection to the study allowed her to extract details that may have otherwise been missed. The other coder (AM) had a disciplinary background in nutrition which may have influenced her perception of the participant responses. The different backgrounds of each coder allowed the data to be looked at from two different perspectives which decreases subjectivity in the interpretation of the results. Although the forums occurred separately, data from both were analysed together as overlapping themes were identified. Due to different prompts in each forum (Table 1) some contributed more to certain themes than others.

Table 2. Approach to thematic analysis (36).

Step number and outline	**How it applied to the analysis of both forums: Catalysts for change (Change) and Persuasion on social media (Persuasion)**
1 – Data familiarisation: Full read through of the dataset, noting emerging concepts and codes.	Each forum was read through twice. Emerging patterns and potential codes were noted for each.
2 – Generating initial codes: Systematic identification and coding of relevant phenomena to generate a long list of codes.	Three rounds of coding were conducted for each forum. Round 1: - Inductive line by line coding: each line of the dataset was labelled based on its content, identifying novel and expected codes - Similar codes were collapsed and redundant codes (i.e. scarcely present in the dataset) were deleted, leaving 57 codes for Change and 76 codes for Persuasion Round 2: - Key elements were focussed on (Change: drivers of health behaviour change; Persuasion: how social media acted persuasively); emerging themes were noted - Codes were further collapsed leaving 54 in Change and 72 in Persuasion - VF and AM met to discuss Change - high level of agreeance; more explicit coding was needed for health behaviours beyond nutrition (exercise, smoking, alcohol) in VF's codes Round 3: - Codes in Change were drawn out more distinctly and coding for

	Persuasion focussed on the impact of persuasion on health behaviours; emerging themes were noted - VF and AM met to discuss Persuasion and had complete agreeance - Final collapsing and deleting left each forum with 61 codes
3 – Searching for themes: Codes are compared and grouped into common themes. Considering the relationships between codes, emerging sub-themes are generated.	Relationships between codes within each forum were considered to develop appropriate themes. Theme maps were generated in a hand-written format, using sticky notes to move codes around until they fit in the most logical sequence. These candidate themes were approved by AM with some slight adjustments to be made in Change.
4 – Reviewing themes: All themes are reviewed for their relevance to the overall dataset. Themes must be internally homogenous (contain similar codes) and externally heterogeneous (each theme is distinct).	Candidate themes were assessed for coherence (internal homogeneity) and distinction (external heterogeneity) in two steps: 1. All extracts within each code were reviewed to ensure that they fit logically and were coherent 2. The dataset was re-read against the theme map to ensure the themes were valid and representative of the overall dataset. Any previously missed extracts were coded: Change (2 new codes), Persuasion (0 new codes)
5 – Defining and naming themes: The essence of what a theme captures within the dataset is formed with textual evidence identified to portray each point. Each theme has a clear scope and succinct heading.	All themes were revised with textual evidence sought from the dataset to support each included code. Dot-point summaries were written for each theme and sub-theme to capture their meaning, which were later developed into more comprehensive outlines. Theme and sub-theme headings were developed. Throughout the process a large degree of overlap emerged between the Change and Persuasion forums. As such the themes were re-adjusted to combine the two analyses.
6 – Producing the written report: The themes are collated into a written report that tells the story of the dataset using extracts from the dataset.	An integrated analysis of Change and Persuasion forums was synthesised incorporating textual evidence and written explanations to present the findings of the dataset.

Results

Participant Characteristics

The characteristics of the participants based on self-reported data are outlined in Table 3. Each forum had a different completion rate; Change was completed by n=150 and Persuasion by n=148. Of the 150 respondents, a majority were female (58%), reported a mid/high interest in health (54%), had a healthy BMI (55%), and were currently studying (69%). Most participants lived in New South Wales (30%) or Victoria (28%) and spoke English at home (72%).

Table 3. Demographic information of the participants who completed Change (n150).

Variable	Category	*n* Participants (% of Total)
Gender identity	Female	87 (58%)
	Male	62 (41%)
	Non-binary/genderfluid/genderqueer	1 (1%)
Age (Years) and health interest level (Low, Mid/ high)	18-21 Low	38 (25%)
	18-21 Mid/high	47 (31%)
	22-24 Low	31 (21%)
	22-24 Mid/high	34 (23%)
State	Australian Capital Territory	1 (1%)
	New South Wales	45 (30%)
	Northern Territory	1 (1%)
	Queensland	21 (14%)
	South Australia	10 (7%)
	Tasmania	4 (3%)
	Victoria	42 (28%)
	Western Australia	26 (17%)
Language spoken at home	Culturally and linguistically diverse (CALD)	42 (28%)
	English	108 (72%)
Body mass index (BMI) kg/ m²	Underweight (BMI < 18.5 kg/m^2)	16 (11%)
	Healthy weight (BMI 18.5-24.9 kg/m^2)	82 (55%)
	Overweight (BMI 25.0-29.9 kg/m^2)	33 (22%)
	Obese (BMI ≥ 30.0 kg/m^2)	19 (13%)
Currently studying	No	47 (31%)
	Yes	103 (69%)
Level of current study	High school year 12	7 (5%)
	TAFE, college or diploma	12 (8%)
	University undergraduate course	75 (50%)
	University postgraduate course	9 (6%)

* Of the 150 participants who completed Change, 148 went on to complete Persuasion.

Thematic Analysis

Following a manual thematic analysis of both forums the datasets were collated to develop four major themes from key recurring concepts. These included: (1) peer support, (2) access to influencers and online communities, (3) advertising and (4) constant exposure to content (Table 4).

Table 4. A brief description of the major themes from the dataset.

Theme	Description
Theme 1: Peer support	Many participants described that social media provided them with access to support from their 'real-world' peers that helped them to make and maintain a health behaviour change. Alternatively, peer influence sometimes led to negative health behaviours such as buying fast-food. Overall, participants simply wanted to be involved in what their peers were doing whether this meant taking an exercise class together or buying fast-food.
Theme 2: Access to influencers and online communities	Health-focussed communities run by persuasive social media influencers were seen by many participants as sources of support for making positive health behaviour changes. Some participants believed that these communities bolstered their willpower while others shared that they influenced their health attitudes but not their health behaviours. These communities also tended to promote an image-based perspective of health which evoked feelings of guilt in some participants.
Theme 3: Advertising	Participants described social media newsfeeds that were flooded with advertising which they found persuasive. This included health products, although fast-food advertising had a more dominant presence. Promotions based on taste and affordability prompted fast-food purchases, which some participants viewed as a lack of willpower.
Theme 4: Constant exposure to content	The design of social media to constantly expose its users to content was described as highly persuasive. Repeated exposure to health-themed content made the participants more conscious of their own health behaviours. Some participants explained that constantly viewing health content alongside fast-food advertisements made them feel conflicted and guilty if they consumed fast-food.

Peer Support

The young adults in our study noted that their peers influenced their health behaviours through both direct communication online as well as through exposure to the content they posted on social media feeds. One participant shared that *"One of my friends would always message me to double check I was having breakfast and would always ask me what I had because she could tell when I was lying*," (Change forum, female, 18-21, low interest in health). Participants reported feeling influenced to

make health behaviour improvements when their peers posted on social media about their own positive changes. This was exemplified by a participant who wrote *"I also sometimes get influenced to be fitter when people share on social media their own health transformations. I then reconsider my lifestyle and see what I can do to be more active and healthy myself."* (F11, male, 18-21, low interest in health). Many participants shared that peer influence on social media drove both positive and negative health behaviours based on the content being shared:

> *"Knowing what my friends eat…can encourage me to eat certain things. When a person shares an exercise [post], I am more inclined myself to exercise…when a friend makes a comment on a [Fast food brand name removed]'s post, I am more inclined to check out their deals."* (Persuasion forum, male, 22-24, mid/high interest in health).

Some participants, most of whom were male, also shared their health activities with peers on social media to reach-out for support and hold themselves accountable. One participant explained that *"To put myself out there on social media really gave me the confidence and gumption to stick to my routine."* (Persuasion forum, male, 22-24, low interest in health).

Access to influencers and online communities

As well as receiving peer support from friends or acquaintances, the participants also experienced community support through health-focussed pages/communities on social media which were often run by health-focussed influencers. These communities provided participants with access to useful diet and lifestyle information and motivated them by providing a sense of unity and connection with others. A participant shared that *"Social media has had an extremely positive influence on me when it comes to maintaining a healthy lifestyle…It's 24/7 access to help, reassurance and motivation."* (Persuasion forum, female, 22-24, mid/high interest in health). Female participants with a mid/high interest in health more commonly discussed social media as a positive influence.

The participants also described willpower as an important moderator of the influence that social media content had on their behaviour. One believed that *"If I try hard enough to work on my eating and doing more exercise then I will be able to be like them [models] with their hundreds of likes on their photos."* (Persuasion forum, male, 18-21, mid/high interest in health). For these more driven participants, online health communities could motivate them to remain self-disciplined and self-reliant which helped them to resist negative external influences such as fast-food advertising. A participant explained *"I find it's easier to stay motivated if I stay home and in routine (without access to bad food of course), and interact regularly with the online fitness/health community,"* (Change forum, female, 22-24, mid/high interest in health). This was most often discussed by participants aged 18-21 years with a mid/high interest in health. Conversely, some participants revealed that health-focussed communities influenced their attitudes towards health but not always their behaviours. A participant shared that *"I'm following many health and 'fitspo' blogs and pages which teach me simple recipes and exercise regimes- now whether I actually follow them or not is another question,"* (Persuasion forum, female, 18-21, low interest in health). This concept was most often described by females aged 18-21 years with a low interest in health.

A downside to social media health-focussed communities described by some participants was their tendency to portray health in an "*'Image-fuelled' way,*" (Persuasion forum, female, 18-21, mid/high interest in health). For some participants this led to feelings of self-doubt from upward comparisons to photos of others online. This was exemplified by a participant who wrote that *"Seeing health/fit looking people on social media...can either inspire people to be healthier or they can discourage people as their body/lifestyle/look is unattainable,"* (Persuasion forum, female, 18-21, mid/high interest in health). Participants aged 18-21 years more readily associated guilt with health content on social media. While the female participants were largely discouraged by this guilt, the male participants discussed that upward comparisons motivated them to make a change.

Other participants described an awareness that their repeated exposure to social media health-focussed influencers persuaded their outlook on which health behaviours they adopted:

> *"While I love hiking and outdoors activities i'm not sure whether that's entirely due to my own interests or because I see social media influencers with the perfect life doing things like that too…maybe I feel like that's what having a healthy balanced life is like because that's how it's portrayed on social media,"* (Persuasion forum, female, 22-24, low interest in health).

Some participants also expressed an indifference or disinterest towards social media in general. One stated that *"Social media hasn't really changed anything, because I don't really like sharing my thoughts and activities through social media,"* (Change forum, male, 22-24, mid/high interest in health). This viewpoint was more commonly described by male participants. Similarly, most participants did not engage with social media as a means to actively interact with others but used it as a purely observational platform. This was most commonly seen in those participants who were aged 22-24 years with a mid/high interest in health.

Advertising

Participants reported that advertising on social media also had an impact of their drive to make a health behaviour change. Many participants described being drawn to health products which advertised benefits such as weight loss, feeling better or affordability. One participant was allured by a detox tea, as it claimed "*To help prevent bloating, slim your tummy and give you extra vitamins,*" (Persuasion forum, female, 18-21, low interest in health). Participants aged 18-21 years with a low interest in health more often discussed the persuasive effects of social media advertising. Exposure to advertisements from large corporations that appeared 'randomly' on participant's newsfeeds were more often discussed than paid influencer content or products.

Fast-food advertising was described as having a dominant presence on social media newsfeeds which influenced the participants' food choices. One participant explained that *"Most ads on Facebook influence my health negatively…as they are usually for unhealthy food options*," (Persuasion forum, male, 22-24, low interest in health). This notion was discussed more often by female participants and those aged 18-21 years. Male participants more commonly referred to cost-based advertising of fast-food as persuasive:

> *"These [fast-food] meals are cheap and easy, [and] although they're[sic] aren't healthy I know they will taste good. This [fast-food] advertising is very persuasive as it makes me believe that I am hungry and I can not[sic] stop thinking about the new promotion*," (Persuasion forum, male, 18-21, mid/high interest in health).

Some participants who revealed the difficulties of resisting fast-food advertisements viewed their temptation as a lapse in self-discipline. One participant remarked, *"I may have been 'persuaded' (read 'reminded of my weak will') to purchase [fast food brand name removed] on several occasions*," (Persuasion forum, male, 18-21, low interest in health).

Constant exposure to content

The participants described that being frequently exposed to health or food-themed content was a highly influential aspect of social media. They believed that the way content was presented on social media was more persuasive than the content itself, explaining that they were more likely to engage with something if it frequented their newsfeeds. This was exemplified by a participant who shared that *"While social media can be used as a platform…to persuade, I really thing[sic] social media… does most of the persuading [itself]*," (Persuasion forum, P65, female, 18-21, mid/high interest in health). Although this was discussed in reference to fast-food advertisements, it was more often applied to health content, which encouraged some participants to be more health-conscious:

> *"I see a lot about healthy lifestyle and fitness in my social media feeds and I think that constant exposure has made me much more conscious of the choice I make, and a bit more aware of exercising and eating healthy,"* (Persuasion forum, female, 22-24, low interest in health).

While constant exposure to both general and health-themed content increased engagement in healthy behaviours in most participants, one participant described that they *"didn't want to engage in something that was being shoved in my face every time I opened Facebook, Twitter, and even Instagram."* (Persuasion forum, female, 18-21, low interest in health).

Some participants described that the co-habitation of health content and food temptation online left them feeling guilty about their health behaviours. Their repeated exposure to these conflicting health ideals placed side-by-side evoked poor mental health and body image:

> *"In relation to health and lifestyle it [social media] has not at all helped because it always shows videos of tasty unhealthy recipes and ads for [Fast food brand name removed] and [Fast food brand name removed]...It also then shows me photos of tall, tan, skinny models which makes me feel so bad about eating all the fast food."* (Persuasion forum, female, 18-21, low interest in health)

Discussion

This study aimed to contribute to a growing body of research defining the interplay between young adult health behaviours and social media. Specifically, it aimed to address current gaps regarding what prompts young adults to make positive health and nutrition behaviour changes, and to understand how social media acts as a platform of persuasion in this process. Our study found that peer support was crucial in shaping young adult health behaviours and using social media to both message friends and view their posts prompted change. Online health-focussed communities were also identified as a source of support and the health-focussed influencers at their helm were seen to play a prominent role in persuasion. Other persuasive aspects of social media included fast-food advertising and constant exposure to content through the design of newsfeeds. These aspects influenced participant health behaviours, particularly regarding purchasing fast-food or being more conscious of dietary choices.

The participants of this study highlighted social influence as a key driver of health behaviour change in social media-based peer interactions. The significance of real-world peer influence towards young adult health behaviour change is well established in the literature (39-41). The results of this study suggest that young adults also find valuable social support in online environments. For example, seeing peers posting about their own healthy behaviours inspired some participants to follow their lead. Conversely, participants were also persuaded to purchase fast-food if their friends were sharing posts from these brands. As such, this study indicates that young adults are likely to align their health behaviours with the actions of their peers, regardless of whether it is a positive or negative action. These findings are supported by social cognitive theory which posits that people will mimic their peers to gain social acceptance (42). Moving forward, targeting peer networks rather than individuals may enhance social media-delivered health promotion techniques. For this to be done effectively, further research may be needed to gain a greater understanding of how peer networks communicate

on social media.

As well as their peers, the participants also identified health-focussed influencers and online communities as holding persuasive power over their dietary behaviours. Past research indicates that lifestyle brands, including influencer pages, on Facebook and Instagram have higher levels of engagement than both food industry and health promotion pages (20, 23). Their engagement is likely heightened by their use of relatable content, positive emotional messages, paid promotions and simple diet and exercise tricks that promise happiness through achieving appearance-related goals (20, 23, 43). Our results somewhat support this narrative as some participants discussed influencers, particularly health-focussed influencers, as a source of motivation to make and maintain a positive health behaviour change. However, some participants also explained that content from health-focussed influencers only altered their attitudes towards health and did not lead to tangible behavioural changes. Moreover, advertisements from large companies were discussed more often as a source of persuasion than influencers or influencer-promoted products in this study. These issues have recently been exemplified in the *Girls Make Your Move* campaign which received funding from the Australian Department of Health to increase the involvement of 12-21 year old girls in sport (44). While influencers were involved in the social media promotion of this campaign, other techniques such as viewing advertisements on Youtube or interacting with campaign posts on social media platforms led to more tangible behavioural changes (44). The Australian Federal Health Minister has also recently launched an investigation into the campaign after learning that some of the influencers involved were also sponsored by alcohol brands and displayed racist or homophobic behaviour online (45). Moving forward, public health organisations need to remain cautious about engaging with influencers on social media for health promotion. Furthermore, our study suggests that additional research may be needed to determine how influential influencers really are regarding young adult health behaviour change, particularly when competing with mainstream brands for attention.

Social media environments have become heavily commercialised and many companies pay to have greater exposure to maximise their young adult reach (46, 47). Advertising delivered on social media is poorly regulated compared to traditional advertising, making young users increasingly vulnerable to the persuasive tactics used by large corporations (48). The participants of this study discussed that viewing fast-food advertisements on social media often led them to purchase fast-food. The design of social media newsfeeds meant that participants were constantly exposed to this content, which they found to be a key aspect of their persuasive abilities. Research has demonstrated that passively receiving advertisements on social media increases brand engagement and product sales without consumers having had an initial interest in the product (8, 49). Our study also showed that exposure to health-focussed content in this fashion led participants to be more aware of their health behaviours. It could be deduced that it was not the content that each individual was viewing that was persuasive, rather their repeated exposure to it. The content that an individual views on their social media feeds is curated by an algorithm that predicts their likes, interests and needs based on their online behaviour (50), which leads to the creation of echo chambers (51). Consequently, the more often an individual or their peers engage with social media-delivered fast-food advertising, the more often they will be shown this content. Conversely, if an individual engages with health-focussed content more regularly, this is the content that will be more often displayed for them which can lead to more positive health behaviours. A key issue for future social media-delivered health promotion to overcome will be ensuring that those with a low interest in health still receive important health information that otherwise may not be 'selected' for them in their echo chambers, due to their patterns of online behaviour.

Regardless of the heavily commercialised and persuasive setting of social media, another finding of this study was that the participants still viewed their health behaviours as an individual responsibility. This was encapsulated in the participants' beliefs that their ability to achieve a healthy lifestyle as

sold to them by health-focussed influencers was solely dependent on their work ethic and willpower. As described by one participant, “Giving in to the temptation” of fast-food advertising was viewed as an indicator of their own weak will, rather than the persuasive tactics used by the fast-food brand. This outlook is well documented in the literature and indicates an association of moral values with an ability to practice positive health behaviours (52-55). Instead of approaching healthy lifestyles from this neoliberal meritocratic perspective, creating a more health-promoting environment on social media may garner greater community awareness of and involvement in healthy behaviours (41, 56, 57). One way this could be achieved may be to introduce regulation around social media-delivered advertising campaigns, such as limiting the number of times fast-food advertisements can appear on an individual’s newsfeed or using fact-checking systems for health posts. Policy reforms regarding social media may also help to open up more room for health promotion to reach a wider range of consumers.

Another key finding of this study was the association of guilt with content from health-focussed communities on social media, which is well-established in the literature (10, 18, 58, 59). Young adults are increasingly looking towards health-focussed communities for diet and lifestyle guidance which can have serious mental health and body image consequences (10, 18, 58-61). They often place a greater value on appearance than health and idealise lean physiques formed through restrictive diet and exercise regimes (58, 61, 62). Research indicates that visual comparisons to these body ideals can be detrimental to young adults’ self-image and lead to poor mental health (13, 58, 62-64). Other studies, including our systematic literature review by Rounsefell *et al.*, indicate a link between these comparisons and disordered eating behaviours such as dieting/restricting food and overeating (13, 18). Participants in this study shared their own feelings of guilt when they were unable to follow the advice of health-focussed influencers or achieve their health goals. The co-existence of health-focussed content with fast-food advertising on participants’ newsfeeds only exacerbated this. Previous findings from our Communicating Health project indicate a moral association with dietary

behaviours (55). In combination with this study, these findings suggest that people may perceive health-focussed influencers as the angel on one shoulder while fast-food advertising is the devil on the other. Those who follow health-focussed pages consume a message that makes them believe it is more moral to practice healthy behaviours. When they are unable to follow through with these behaviours, for example due to the persuasive impact of fast-food advertising, this may then lead to cognitive dissonance and guilt as seen in some of our participants.

This study also indicated a gendered response to guilt from viewing health content on social media. Female participants more often discussed the detrimental effects of health content and also felt discouraged by upward comparisons whereas male participants found these to be motivational. These findings contribute to an emerging conversation regarding the impact of health-focussed social media content on different genders (18, 65, 66). Females are often perceived to be more vulnerable to the negative impacts of health-focussed content on social media, as our own study indicates, and have previously been shown to access diet and exercise related social media posts more commonly than males (67). However, a growing body of literature suggests that these notions may be born out of gender norms that reduce the likelihood of males openly sharing their experiences with negative body-image (18, 65, 66). Male participants in Easton *et al.'s* qualitative study revealed similar negative impacts to those experienced by females (18), a pattern further indicated through a recent cross-sectional survey by DiBisceglie *et al.* (65). Moreover, a recent study identified that males were featured and objectified in health and fitness content on social media almost as often as females (68). Further research is needed to clarify if a meaningful gender difference exists in the way that online health-focussed content is consumed. Regardless, care should be taken to ensure that future social media-delivered health interventions steer away from appearance-based health messages to protect young adults' mental health.

This study had some limitations. As our data collection was completed during the exam period of Australian Universities, challenges regarding recruitment and participant dropout emerged.

Consequently, our participants may have not been generally representative of the Australian population. Our sample also included more females than males and a high proportion of students and young adults who were well educated. Our analysis technique included searching for commonalities among the data which may mean that the experiences of females and students were captured more strongly than others. However, we also spent time contrasting discrepant cases to ensure that less common but still important themes were captured. The conversational design of the forum may have also introduced groupthink, social comparison bias and recall bias. The drop-out rate and different numbers of participants completing each forum may be indicative of participant fatigue in completing the online conversations over an extended period. Participants may have also defined positive or negative health behaviours differently to each other due to the subjective nature of the topic. Finally, this study was conducted at a particular time with a particular group of Australian young adults. Social media, among other technologies, evolves rapidly. Hence further research will be necessary as the platforms grow and change.

Conclusions

This study has contributed to a greater understanding of health behaviour change and social media in young adults. Social factors played a key role in prompting positive health behaviour changes. Future studies should develop a greater understanding of social interactions and peer networks in an online environment to guide the development of integrated health promotion techniques. The persuasive nature of social media on participants' health behaviours was largely attributable to advertising and constant exposure to content. This study suggests that young adults view health as an individual responsibility and place great value in self-discipline. A shift towards minimising external pressures through policy changes and advertising regulation needs to be encouraged. Policy reform may also assist health promotion in reaching social media users who are disinterested in health. Lastly, future social media-delivered health interventions need to be mindfully developed to ensure they do not further elicit guilt in social media users.

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Declarations

Ethics approval and consent to participate

Phase 1a received ethics approval from the RMIT Business College Human Ethics Advisory Network (Project number: 20489) and Monash University Human Research Ethics Committee (Project number: 7807). Participants consented to anonymised findings being published when they completed the patient information and consent form prior to participating in the study. Ethics approval for this project was granted by Monash University Human Research Ethics Committee (Project ID: 19417).

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available as consent was not provided by the participants to provide their responses outside of the study team, as the data are qualitative, they cannot be shared without breaching participant confidentiality.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

VF and AM analysed and interpreted the data for the manuscript drafted by VF. CW and ML assisted with the interpretation of the findings. TM, LB and ML were involved in the development of the Communicating Health study and design of the online conversations. All authors contributed to the conceptual design and editing of the manuscript.

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Supplementary Files

Figures

Participant flow diagram.