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# Health and fitness online communities and product behaviour

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## Abstract

**Purpose** – This paper aims to determine the impact of online community participation on attitudes and product-related behaviour in the health and fitness sector.

**Design/methodology/approach** – Survey data are collected from 221 users of the social medium Instagram, members of the self-proclaimed health and fitness community (#fitfam). Data are analysed with structural equation modelling.

**Findings** – The study shows that online community identification and engagement significantly increase health environment sensitivity, resulting in heightened engagement in physical fitness and healthy product choices.

**Social implications** – Given the difficulty to remain engaged in pro-health behaviour and the growing impact of social media on young adults' lives, these findings are encouraging. They show that online health and fitness communities provide a supportive environment in which consumers can identify and freely engage and a fertile ground to the development of health sensitivity and product-related behaviour.

**Originality/value** – The study advances knowledge on the role of social media and online communities in promoting health and fitness product behaviours and attitudes.

**Keywords** Social media, Community participation, Product management, Online community, Health and fitness products

**Paper type** Research paper

## Introduction

Health and fitness products have experienced a “second boom” in the past few years, which sheds a new light on the relation of individuals to their health (Millington, 2016) and health-related consumption. This boom, supported by the proliferation of digital devices and technologies, results in redefined communication codes that contribute to a growing industry of fitness apparel, equipment, services, apps, connected wearables and other products. A part of this second boom can be attributed to modern media and communication tools. While the first fitness boom in the 1970s and 1980s was supported by mass media communication (Powers and Greenwell, 2016), these have been replaced by social media and mobile apps. As a result, Hollywood celebrities who used to endorse brands now share the spotlight with social media influencers such as bloggers, vloggers and social media celebrities (Millington, 2016). One of the key roles of social media is that they enable individuals to take part in “wider online communities” (Millington, 2016, p. 1185). Indeed, if TV advertisement and video tapes contributed to the success of early fitness movements (Powers and Greenwell, 2016), new

media are now sustaining the fitness trend with more and more consumers using social applications for health and fitness information (Kim *et al.*, 2013) and monitoring purposes (Millington, 2014; Lowe *et al.*, 2015).

Increased usage of social media and networked mobile applications is thus not a stranger to the growth of the fitness movement. Social media are used by young people to access to other people's experiences of health and expert health information (Liang and Scammon, 2011; Royal Society for Public Health, 2017), while also allowing them to showcase their selves and bodies and to negotiate health and fitness-related meaning (Cavusoglu and Demirbag-Kaplan, 2017). In particular, mobile-based social platforms such as Instagram contribute to the proliferation of health messages (Vaterlaus *et al.*, 2015; Cavusoglu and Demirbag-Kaplan, 2017) and mass consciousness because of self-declared communities of interest focussed on fitness, exercising and health and fitness products (Holmberg *et al.*, 2016).

Although it seems clear that social media and fitness-related online communities play a part in the worldwide growth of the health industry and the tendency towards healthier and fitter lifestyle, there is a dearth of research about their effect on actual health attitudes and product-related behaviour (Vaterlaus *et al.*, 2015). This role is an under-researched, yet important concern for several reasons. First, because of the age of the population

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social media appeal to. Indeed, almost 90 per cent of teenagers and young adults use social media in developed countries (Pew Research Center, 2016). These “emerging adults” are at a developmental stage where health habits are formed, and such habits are easily influenced by communities of peers (Nelson *et al.*, 2008). Understanding how online health and fitness communities impact digital natives in their health habit formations is a critical issue because the practices and images they develop not only have implications on their purchase behaviours but also most importantly on their life-long well-being (Royal Society for Public Health, 2017). Second, vulnerable, low-income population often rely on social media alone to acquire health literacy (Roberts *et al.*, 2017). Health and fitness community management on social media is therefore of increasing importance. Third, health- and fitness-related behaviours typically require a lot of effort on the part of the consumers (Cavusoglu and Demirbag-Kaplan, 2017) and changing health and fitness attitudes and consumption may involve demanding lifestyle changes that can be challenging (O’Reilly *et al.*, 2012).

Although most studies remain exploratory, research also suggests that digital communication around health and fitness topics contributes to an increased passion for consuming health-related products (Lagrosen and Grundén, 2014; Cavusoglu and Demirbag-Kaplan, 2017), based on the notion that networks generate desire for consumption (Kozinets *et al.*, 2017). Therefore, health and fitness product managers can also benefit from understanding how online community participation might influence health and fitness attitudes, to better leverage online community dynamics in their social media communication and promote pro-health behaviour and consumption. Whether online communities have the power to significantly positively influence health and fitness attitudes and behaviours is largely still unclear and clearly bears significance to general consumer behaviour research and health product management.

Focussing on the health and fitness trend on the social medium Instagram, this study investigates the impact of self-proclaimed online health and fitness communities of interest (popularised because of topical markers using hashtags). Specifically, the aim of this study is to determine the impact of online health and fitness community participation on social media on individual’s health attitudes and product-related behaviour. The paper starts with a review of online health and fitness communities of interest on social media, before developing the research model and hypotheses. The model investigates social issues of online community identification and engagement and their impact on health-related attitudes and behaviours. Structural equation modelling is used to model the data collected on Instagram. Results are presented and discussed highlighting their managerial and theoretical contributions.

## Health and fitness communities on social media

Online communities are aggregations of individuals in the cyberspace, where social relationships are mediated by highly personalised technology. Sproull (2003, p. 733) defined an online community as a:

Large, voluntary collectivity whose primary goal is member or social welfare, whose members share a common interest, experience or conviction, and who interact with each other primarily over the Net.

Today, online communities proliferate on social media in different forms. Firm-hosted official pages and communities (Zaglia, 2013; Claffey and Brady, 2017) coexist with closed peer to peer communities (Nambisan and Baron, 2009), communities on social networking sites (Boyd and Ellison, 2007), and with fluid entities akin to open consumer “web tribes”, where members communicate effortlessly about all sorts of interests and topics, creating discourses about brands, products and matters without clear boundaries. Specifically, communities now emerge on social media because of searchable topics created with hashtags. Hashtags allow community affiliation based on an emergent bonding because of the searchable theme rather than direct interaction (Zappavigna, 2014).

Indeed, the popularisation of hashtags on social media (Stathopoulou *et al.*, 2017) allows users to follow, contribute and identify to a specific topic of interest (e.g. #fitfam) without having to remain within the confines of a formal group (Schlesselman-Tarango, 2013). Hashtags are strings of characters preceded by the hash (#) character, which acts as a topical marker for social media content. Social media platforms then aggregate all posts using a specific hashtag, allowing users to see all messages related to their topics of interest. Informal and fluid communities of interest or “ad hoc” communities thus proliferate online because of the usage of hashtags: these new communication conventions allow users to associate a message with a specific group, topic, user or even values (Zappavigna and Martin, 2018) and follow such messages.

Marketing research on hashtag-enabled communities is scarce, but Kozinets *et al.* (2017) show that the #selfie hashtag, for instance, is used by individuals in museums to participate in a network of individuals, construct their identity and communicate with others. Hashtags on social media create loosely defined communities (Stathopoulou *et al.*, 2017) that support an individual’s need for social connexion. While hashtag-enabled communities seem to derive from the traditional definition of online communities, they offer a form of identity-based connexion that evolves that to communal sense-making (Zappavigna, 2014), which is the premise of the community literature in marketing (Muniz and O’guinn, 2001). Like traditional communities, hashtag-based groups can be consumer- (Guidry *et al.*, 2015) or company-initiated (Stathopoulou *et al.*, 2017).

An interesting aspect of hashtag-based communities from the managerial perspective, is that they can cover a very wide, and at the same time very specific scope. Emergent research on hashtags shows that they can identify specific brands (Stathopoulou *et al.*, 2017), general product categories, such as coffee (Zappavigna, 2014) or even feelings (Zappavigna and Martin, 2018). Therefore, hashtags allow fluid communal association about various types of referent, in not only making them relevant to brands but also broader product types.

Health and fitness communities on social media respond to these norms and evolve around hashtags such as #fitfam (short for fit family), #fitspo (fitness inspiration), #eatclean, #healthyfood, #fitgirl, etc., which are widely used by brands and individuals alike. The topics pertaining to health and

fitness discussed on these communities are varied, as health-related consumption and behaviour not only refer to domains as diverse as food choice and portion sizes (McFerran *et al.*, 2010), fat, sugar and calories control (Mohr *et al.*, 2012) but also exercising practices (Yap and Lee, 2013), with the sharing of fitness routines (Vaterlaus *et al.*, 2015) and workouts or even radical body transformations (St James and Lacoursiere, 2016). The community allows individuals interested in these topics to find like-minded others (because of the hashtags), to promote their own lifestyle or transformations (St James and Lacoursiere, 2016) and enjoy the feeling of being part of a community. This feeling of community appears essential to motivate consumers to remain engaged with their health and with health and fitness products and brands (St James and Lacoursiere, 2016; eConsultancy, 2017). This results in a large network of entities communicating and exchanging on the topic of health and fitness on social media.

If computer-mediated communication research has already shown the impact of online social interactions on self-presentation, relationship maintenance and social bonding in general (Ellison *et al.*, 2007; Wellman *et al.*, 2001), little is known about the impact of these media on health and fitness behaviours (Cavusoglu and Demirbag-Kaplan, 2017).

Vaterlaus *et al.* (2015) started investigating the connection between social media and health behaviours among young adults. In an exploratory study, they find that social media influence dieting and exercising behaviours and that depending on the context, statuses and pictures posted by others could either be motivations or barriers to health behaviours. Social media can act as barriers to healthier behaviour, as they can distract exercising and meal times, create hunger or cravings when seeing others' pictures and result in poor food decisions. However, participants also indicate being motivated by social media, when they see other's transformations, find cool new exercises to perform, get ideas for healthy recipes and discover products. Food and exercising choices and ideas are widened, but the implications of such increased options are yet to be determined. In a similar study, Holmberg *et al.* (2016) show that heavy and sugary food pictures are generally more represented on social media than colourful and appealing pictures of fruits and vegetables, but healthy options still represent 9.4 per cent of the Instagram pictures that were content analysed in their study, which can be seen as positive, from a health promotion standpoint. Similarly, influential bloggers on Tumblr are sources of inspiration for other's physical transformation because of the photos they share (St James and Lacoursiere, 2016). Of importance, recent studies suggest that, while media have in the past been associated with negative health outcomes because of their sedentary and distracting nature (Kim *et al.*, 2013), social media and online communities could also be drivers of positive health attitudes and behaviours such as conscious food and product choice and physical fitness (Lowe *et al.*, 2015).

## Theoretical framework and hypotheses

### Participation in the online health and fitness community

Communities embedded on social media play an influential role on consumers and on their behaviour (Dholakia *et al.*, 2009;

Jahn and Kunz, 2012; Laroche *et al.*, 2012; Dessart *et al.*, 2015). They enable the exchange of experiences and to gain support from others (Nambisan and Baron, 2009; Johnson and Lowe, 2015; Greenhow and Robelia, 2009), which is particularly crucial when it comes to health-related concerns (Kim *et al.*, 2013). Extending current work on social media and consumer behaviour, understanding the social phenomena that underlie online community participation is thus paramount to explaining behavioural consequences in terms of health and fitness (Vaterlaus *et al.*, 2015; Cavusoglu and Demirbag-Kaplan, 2017).

Being a part of an online community manifests itself through engagement (Dessart, Veloutsou and Morgan-Thomas, 2015) and identification with the community (Algesheimer *et al.*, 2005). In line with Tajfel's (1974) social identification theory, Algesheimer *et al.*'s (2005) define community identification as the conscious knowledge of the individual's belonging to the community together with the emotional and evaluative significance attached to that membership. Community identification is a cognitive, evaluative and emotional concept (Bagozzi and Dholakia, 2006; Dholakia and Bagozzi, 2004) which is associated, on the one hand, with the extent to which the individuals see themselves connected with the others (Bergami and Bagozzi, 2000) and on the other, with the affective sense of belonging to the community (Algesheimer *et al.*, 2005; Muniz and O'guinn, 2001). Community engagement on the other hand satisfies the intrinsic need of the members to help each other and engage in community interactions (Algesheimer *et al.*, 2005), which promote the notion of the community for the benefit of each member, the community as a whole and the brand (Zhang and Luo, 2016). Engaging with the community is thus an extension of merely identifying with it, as it requires active participation and allows experiencing the community (Mollen and Wilson, 2010), positioning community engagement as the strongest representation of one's active involvement with an online community on social media (Dessart *et al.*, 2015, 2016).

Because feeling a close bond with the community is likely to generate active participation and exchange with the community, community identification considered to be one of the most relevant predictors of community engagement (Algesheimer *et al.*, 2005; Laroche *et al.*, 2012). While online community identification and engagement studies have addressed their relative importance and relationship in areas such as technology (Hollebeek, Glynn and Brodie, 2014), automotive (Algesheimer *et al.*, 2005) or gaming industry (Gummerus *et al.*, 2012), health and fitness communities remain to date misrepresented, and no conclusion can be made regarding the link between identification and engagement behaviours in this context. Studies on health and fitness community however, suggest the same participative links deriving from association with a health group (Vaterlaus *et al.*, 2015). Netnographic work further indicates that online health communities exhibit feelings of shared consciousness and common identity (Cavusoglu and Demirbag-Kaplan, 2017), which may foster engagement with the group (Brodie *et al.*, 2013). For these reasons, the following hypothesis is proposed:

*H1.* Health and fitness online community identification positively influences online community engagement.



### Impact of community participation on health attitude

Individuals who seek a healthy lifestyle are concerned with nutrition, fitness, stress and the impact of these factors on their well-being (Kraft and Goodell, 1993). Health environment sensitivity is an attitudinal construct that refers to a real concern for the impact of the environment on one's health and the information-seeking that is associated with it (Kraft and Goodell, 1993). Health-oriented consumers are concerned about their well-being and interested to find out more about how to maintain a good health. They are motivated to engage in healthy beliefs and behaviours (Cavaliere *et al.*, 2017), and new media are credited as factors that influence shifts in perceptions, attitudes and beliefs about nutrition and health (Freeland-Graves and Nitzke, 2013; Cavusoglu and Demirbag-Kaplan, 2017).

Understanding the impact of online community participation on health environment sensitivity is of particular interest, in a context where health literacy is increasing acquired online, particularly for younger adults (Holmberg *et al.*, 2016). Indeed, being exposed to online social media communities content generates affective and cognitive processes that shape consumer's attitudes. The information acquired when engaging in the community, acts as a repository of knowledge that fosters one's familiarity with a topic: online communities are sources of information and support (Maloney-Krichmar and Preece, 2005; Greenhow and Robelia, 2009), in multimedia forms. As a result, when consumers identify and engage with a community, they are likely to develop shared attitudes (Algesheimer *et al.*, 2005).

Similar patterns are found in online health and fitness communities and networks (Liang and Scammon, 2011; St James and Lacoursiere, 2016). Based on the notion that our food consumption choices are influenced by people we interact with (McFerran *et al.*, 2010), recent studies suggested that social media and virtual communities could be used to help motivate consumers to health awareness and goals, by providing peer support and guidance (Liang and Scammon, 2011; Lowe *et al.*, 2015). Further supporting this notion, members of health and fitness communities are known to benefit from their engagement in such groups by being more empowered and in control of their choices (Millington, 2016). The communication of health and fitness messages on Instagram has been shown in an exploratory study to be, in certain instances, associated with well-being representations (Cavusoglu and Demirbag-Kaplan, 2017). Additionally, the feeling of community appears essential to motivate consumers to remain engaged with their health and with health and fitness products and brands (St James and Lacoursiere, 2016; eConsultancy, 2017).

For these reasons, it is expected that participating in the community, through identification and engagement, will make consumers more interested and concerned with their health, and thus develop positive health attitude, the following hypotheses is proposed:

- H2a. Online community identification.
- H2b. Online community engagement positively influence health environment sensitivity.

### Health and fitness product-related behaviour

Studies note that to engage in health and fitness product behaviour, individuals first need to be sensitive to health-related issues (Kraft and Goodell, 1993). Health sensitivity is thus often associated with healthy behaviours, such as reading food labels (Cavaliere *et al.*, 2017), caring for the number of calories in a meal (Mohr *et al.*, 2012) or engaging in physical activity (Brennan *et al.*, 2010). In this study, we consider health and fitness product-related behaviour as related to two major aspects of the life of a consumer as follows: food consumption and physical fitness. Physical fitness refers to one's engagement in physical activity, exercise and active participation (Kraft and Goodell, 1993; Yap and Lee, 2013). It represents goal-oriented behaviours related to improving and maintaining one's physical condition and involve usage of a number of health-related products and services such as fitness apparel and exercising equipment (Millington, 2016), infrastructure or digital health products (Lowe *et al.*, 2015). Healthy food choices, on the other hand, is a lifestyle variable which represents the care a person has about the products he/she eats (Dutta-Bergman, 2006), and thus reflects active food consumption behaviour and choice (Lowe *et al.*, 2015).

The social environment and influences of an individual also play a role in consumers' health and fitness product behaviours. In offline settings, peer acceptance, family support and reference group membership are related to one's commitment to invest in their health (Scammon and Mason, 1999). Further, family and friends are known to influence normative beliefs which then lead to form health-related intentions and behaviours (Brennan *et al.*, 2010). The same has been shown to some extent in online settings, as, for instance, peers in social media settings can influence children and adolescents to change their quantity and type of food intake (Bevelander *et al.*, 2013; Bevelander *et al.*, 2012). Lowe *et al.* (2015) also propose a conceptual model whereby online technologies influence food choice healthiness. It can thus be expected that online community participation on social media would generate similar impact on healthy food choice and physical fitness behaviours, through the mediation of health sensitivity (Kraft and Goodell, 1993). As health and fitness communities on social media are hypothesised to generate health sensitivity, and as health sensitivity is a predictor of health behaviours, the following hypotheses are proposed.

- H3. Health environment sensitivity positively influences healthy food choices.
- H4. Health environment sensitivity positively influences physical fitness.

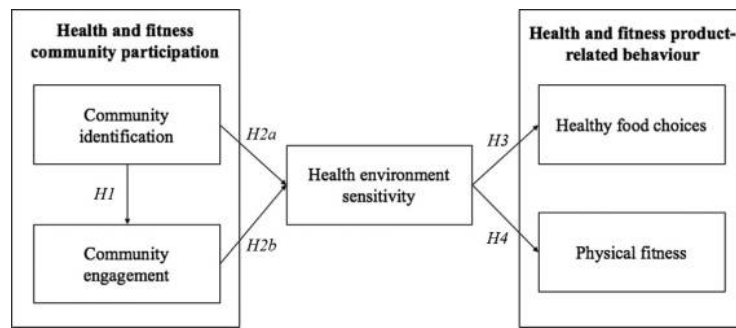
The conceptual model is depicted in Figure 1.

## Methodology

### Focus on the health and fitness community on Instagram

To test the research model, data were collected on the social medium Instagram. Instagram is a mainly mobile-based application, owned by Facebook and launched in 2010. Since then, Instagram has acquired over 700 million monthly users (Instagram, 2017a). Instagram's characteristic is the sharing of

Figure 1 Conceptual model



visual content (photos and videos) to a rate of 80 million photos on average every day (BrandWatch, 2016). In the USA, one-third of all people online use Instagram, with 60 per cent of young adults between 18 and 29 years old active on the platform (Pew Research Center, 2016). Instagram is also the social medium with the highest engagement rate on branded content (up to 2.2 per cent versus 0.21 per cent for Facebook), making it the most attractive platform for brands (Forrester, 2015).

To understand health and fitness product behaviour, the health and fitness community on Instagram is selected as the focus of this study. While Instagram as a medium for social media marketing research has proven increasingly pertinent, little effort has been focused on the health community. Instagram studies pertain to fashion goods (Roncha and Radclyffe-Thomas, 2016; Casaló *et al.*, 2017), fast food (Guidry *et al.*, 2015) or sugary goods (Evans *et al.*, 2017). Instagram is, however, recognised as the best platform to promote fitness products, because of the amount of fitness-related communities and influencers (eConsultancy, 2017). Extant research on Instagram health and fitness in marketing is scarce, but recent advances show that from images shared on Instagram, a substantial proportion are food items (Hu *et al.*, 2014); most of them of moderately healthy nature (Sharma and de Choudhury, 2015). Health and fitness influencers are legion, and a large number of users now post pictures of their meals, body transformations and gym selfies. Specifically, the #fitfam hashtag gathers 65 million posts and the #healthy hashtag, 95 million posts (Instagram, 2017b, 2017c), indicating the popularity of the topic and activity of its community.

### Measurement

The five variables were measured using existing Likert scales, with a total of 25 items. Online community engagement and identification both used scales from Algesheimer *et al.*, 2005, the health environment sensitivity and physical fitness adopt the scale of Kraft and Goodell, (1993) and healthy food choices is adopted from the health consciousness scale of Dutta-Bergman (2004). All items used seven-point Likert scales. The items can be found in Appendix.

### Data collection and sampling

Survey data were collected online for a period of one month in the summer of 2016. The authors posted the link to the questionnaire on their own Instagram accounts, using fitness-

related hashtags (such as #fitness, #fitspo, #fitfam, #fitnessgirl, #fit, #fitgirl, #fitspiration, #fitgirls, #healthy, #healthyfood, #healthylife, #community, #fitstagram, #fitcouple, #fitchicks, #fitfood, #crossfit, #run, #runner, etc.) to attract users interested in health- and fitness-related topics. To augment visibility of the posts, the authors also engaged with the online community by liking posts and following health and fitness accounts. The online questionnaire was promoted in this way several times by the authors. The aim of this insider approach was to target solely Instagram users who were part of the health and fitness online community, either following fitness account on Instagram or posting about fitness on their account, in line with recent social media community methodology to identify members of an online community (Dessart *et al.*, 2015; Holmberg *et al.*, 2016). The population of an online brand community, and particularly a fluid interest community, cannot be contacted by e-mail or traditional means (Wiertz and de Ruyter, 2007), and such populations are by nature hard to reach (Preece *et al.*, 2004). This necessitated contacting them directly on the platform through community-related communication means. At the beginning of the questionnaire, the health and fitness online community of Instagram was described as “people who share or follow health- and fitness-related content, such as healthy food and exercising practices”. Pictures of smoothie bowls and yoga poses were given as examples. After reading this definition, and to make sure that the targeted sample was indeed part of the online community, people were asked to proceed with the questionnaire only if they felt that they corresponded to the definition.

### Sample characteristics

A total of 221 questionnaires were validated for analysis. Among the respondents, 68 per cent are female, 52 per cent are of 18-25 years of age, 42 per cent are employees and 42 per cent are students. This sample representation concurs with Instagram usage statistics, as the average Instagram user is female, of 18-29 years of age, and educated (Statista, 2017). In terms of platform usage, most of the respondents spend more than 10 min per day on Instagram (57.9 per cent), but they post less than once a week (55.7 per cent). They consider themselves active in the health and fitness online community and state that, within the past 10 days, they have contributed to it one-five times by posting, commenting or liking content (48 per cent). The questionnaire also enquired about the number of followers and people respondents follow. In terms of followers, the sample shows varied profiles, as there is a

well-balanced split between people with very few followers (less than 50) and those with larger numbers of followers (over 500). It was important to have this variety to make sure that the study did not capture only responses of influential people with large networks, which could have biased the results. Finally, most of the respondents followed 100-500 accounts on Instagram (46.6 per cent). The full detail of sample characteristics is presented in Table I.

Table I Sample characteristics

Instagram usage	Frequency	(%)
<i>On average, how much time per day do you spend on Instagram?</i>		
1. Less than 5 min	29	13.1
2. 5 to 10 min	64	29
3. More than 10 min	128	57.9
<i>On average, how often do you post on Instagram?</i>		
1. Less than once a week	123	55, 0.7
2. More than once a week	64	29
3. Every day	21	9,5
4. Several times a day	13	5.9
<i>Roughly how many followers do you have on Instagram?</i>		
1. Less than 50	49	22.2
2. Between 51 and 100	41	18.6
3. Between 100 and 500	85	38.5
4. More than 500	46	20.8
<i>Roughly how many accounts do you follow on Instagram?</i>		
1. Less than 50	36	16.3
2. Between 51 and 100	49	22.2
3. Between 100 and 500	103	46.6
4. More than 500	33	14.9
<i>How often did you participate in activities of the fit community within the past 10 days?</i>		
1. I do not know	58	26.2
2. 1-5 times	106	48
3. 6-10 times	34	15.4
4. More than 10 times	23	10.4
<b>Demographics</b>		
	Frequency	(%)
<i>What is your gender?</i>		
1. Male	70	31.7
2. Female	151	68.3
<i>How old are you?</i>		
1. Less than 18	1	0.5
2. 18-25	116	52.5
3. 26-35	74	33.5
4. 35-50	27	12.2
5. 50 +	3	1.4
<i>What is your occupation?</i>		
1. Employed for wages	93	42.1
2. Self-employed	23	10.4
3. Retired	0	0
4. Unemployed	6	2.7
5. Student	93	42.1
6. Other	6	2.7

Data analysis

The hypotheses are tested using structural equation modelling (SEM). Confirmatory factor analysis (CFA) and SEM were run using the AMOS program (Byrne 2010), testing their goodness-of-fit with a range of adequate statistics (Bagozzi and Yi, 2012), and reporting parameter estimates and standard errors.

Internal consistency

The measurement model is run using CFA (instead of exploratory factor analysis) to evaluate the psychometric properties of the scales because established measurement scales were adopted (Kelloway, 1995). The CFA model resulted in good model fit, with a chi-square = 434.5 (df: 257) and chi-square/df ratio = 1.69, Comparative Fit Index (CFI) = 0.93, Tucker-Lewis Index (TLI) = 0.92, Root Mean Square Error of Approximation (RMSEA) = 0.05. Each factor loading of the reflective indicators in the model is significant at 0.001 level, and all loadings exceeded the recommended level of 0.50 (Hair et al., 2010). The procedure also exhibited good reliability figures, with all Cronbach's alpha ≥ 0.70, all coefficients of reliability above 0.80, and high inter-items correlations (above 0.50) for the 25 items representing each variable of the model. Internal consistency was also measured because of the average variance extracted (AVE), as this indicator measures the amount of variance captured by a construct's measure relative to random estimation errors (Fornell and Larcker, 1981). All AVE values are above 0.50, so they are supportive of the internal consistency of the variables (Bagozzi and Yi, 1988).

Discriminant validity

In addition to the model fitting the data well, as a first evidence of discriminant validity, the correlations between the latent constructs are measured. Additionally, the AVE of each construct is compared with all the squared correlations involving this construct, as suggested by Fornell and Larcker (1981). Further evidence of discriminant validity is shown by the fact that all AVEs are greater than all the paired-squared correlations related to it. Table II exhibits the AVEs in the diagonal, the paired construct correlations below the diagonal and their squared values above the diagonal.

Structural model estimation

The structural model analysis was then run to test the hypotheses. The structural model exhibits similar fit values as the CFA model, and thus a good fit with the empirical data, with a chi-square = 453.8 (df: 257) and chi-square/df ratio = 1.76, CFI = 0.93, TLI = 0.91, RMSEA = 0.05. These values

Table II Validity

	Comm. eng.	Comm. id.	Health env. sensitivity	Health cons.	Physical fitness
Comm. eng.	0.61	0.53	0.24	0.18	0.40
Comm. ident.	0.73	0.6	0.14	0.12	0.31
Health env. sens.	0.49	0.37	0.5	0.50	0.44
Health cons.	0.42	0.35	0.71	0.54	0.31
Physical fitness	0.63	0.56	0.66	0.56	0.53

are within good ranges for the model, indicating a good fit of the data. As expected, online community identification is a strong predictor of online community engagement ( $\beta = 0.83$ , S.E. = 0.06,  $p$ -value < 0.01) in support of *H1*, with online community engagement exhibiting an  $R^2$  of 0.69. While online community identification does not have an impact on health environment sensitivity ( $\beta = -0.04$ , S.E. = 0.08,  $p$ -value = 0.79), online community engagement does ( $\beta = 0.62$ , S.E. = 0.13,  $p$ -value < 0.05), which shows support of *H2b* but not *H2a*, suggesting that online community engagement fully mediates the relationship between online community identification and health environment sensitivity. With an  $R^2$  equal to 0.34, health environment sensitivity is only partially explained by its antecedents, suggesting that other factors could explain it to a further extent.

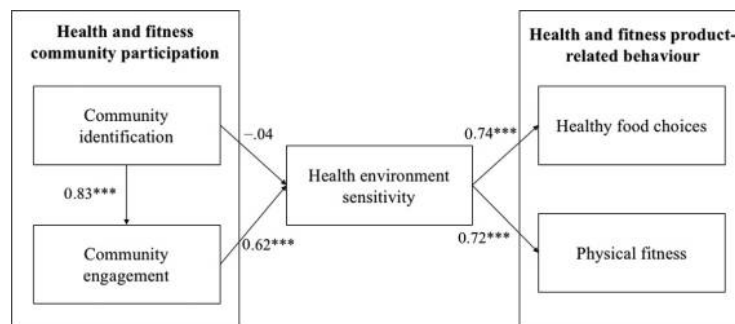
Considering the behavioural outcomes of health environment sensitivity, healthy food choices, is positively influenced by health environment sensitivity ( $\beta = 0.74$ , S.E. = 0.25,  $p$ -value < 0.01) with a good  $R^2$  of 0.55, in support of *H3*. A test of mediation was also performed to verify the mediating effect of health environment sensitivity on the relationship between online community participation factors and health outcomes. Given that online community engagement has no significant direct influence on healthy food choices ( $\beta = -0.03$ , S.E. = 0.19,  $p$ -value = 0.63), and neither does online community identification ( $\beta = 0.14$ , S.E. = 0.12,  $p$ -value = 0.53), there is a full mediation of health environment sensitivity on healthy food choices. The same applies to physical fitness: the direct impact of online community identification ( $\beta = 0.23$ , S.E. = 0.12,  $p$ -value = 0.13) and online community engagement ( $\beta = 0.18$ , S.E. = 0.19,  $p$ -value = 0.28) on physical fitness is non-significant. Health environment sensitivity is thus a full mediator of the impact of community participation on health and fitness product-related outcomes. Further, healthy

food choices also have a significant positive impact on physical fitness ( $\beta = 0.72$ , S.E. = 0.30,  $p$ -value < 0.01), with an  $R^2$  equal to 0.57 with which acts in support of *H4*. Figure 2 and Table III represent these results visually.

**Alternative model**

To further validate the results of the model, another model is tested using the same variables. Because it could be argued that physical activity and healthy food choices could be motivations to participate in a health and fitness online community, rather than significant outcomes, these relationships are tested. Specifically, the alternative model proposes that health environment sensitivity is still an antecedent of physical fitness and healthy food choices, but that physical fitness and healthy food choices are antecedents to online community identification and engagement rather than outcomes. The test of this model achieves worse fit indices than the original model with a chi-square = 453.8 (df: 257) and chi-square/df ratio = 1.76, CFI = 0.91, TLI = 0.88, RMSEA = 0.07. The link between health environment sensitivity and physical fitness ( $\beta = 0.56$ , S.E. = 0.21,  $p$ -value < 0.01) and healthy food choices ( $\beta = 0.71$ , S.E. = 0.25,  $p$ -value < 0.01) is maintained as expected. Online community engagement is not significantly predicted by any of the health-related variables, and online community identification is neither predicted by healthy food choices nor health environment sensitivity. The only significant antecedent of online community identification is physical fitness ( $\beta = 0.55$ , S.E. = 0.15,  $p$ -value < 0.01) with an  $R^2$  of 0.32. Despite this significant result, none of the other relationships being supported, and the model overall showing poorer fit, it can be concluded that the research model is a better depiction of reality than the alternative model.

**Figure 2** Results



**Table III** Summary of SEM results

Hypotheses	Causal path	Std. reg. weights	C.R.	Sig.	Support
<i>H1</i>	Community identification → Community engagement	0.83	9.52	***	Supported
<i>H2a</i>	Community identification → Health environment sensitivity	-0.04	-0.26	0.79	Not supported
<i>H2b</i>	Community engagement → Health environment sensitivity	0.62	3.03	***	Supported
<i>H3</i>	Health environment sensitivity → Healthy food choices	0.74	5.07	***	Supported
<i>H4</i>	Health environment sensitivity → Physical fitness	0.72	4.16	***	Supported

Note: \*\*\*Significant at the 0.001 level



## Discussion

The results of this study show that participating in a social media community of interest in health and fitness has significant impacts on individuals' health and fitness attitudes and product-related behaviours. The study evidences that participating in a health and fitness online community increases member's health environment sensitivity and one's general concern and interest for personal health and health-related matters, because of the impact of online community identification mediated through online community engagement. The results further demonstrate that once this health interest has been triggered, members are more likely to engage in health- and fitness-related behaviours, such as effort to control one's food type intake (healthy food choices) and active physical fitness activity. These findings constitute an important contribution to the field of social media and consumer behaviour as they demonstrate the role of online social identity and engagement factors on pro-health attitudes and behaviour, evidencing the power of informal online groupings of interest on young adults' health habits formation.

The study supports traditional notions of online community participation, evidencing the strong predictive power of health and fitness online community identification on engagement (Bergami and Bagozzi, 2000; Algesheimer *et al.*, 2005). When people construe themselves as part of a group of people interested in health and fitness, it reinforces their motivation to actively participate in the group (by liking, sharing and commenting on content). Community engagement not only reflects an effort to support others but also members' own goals and objectives. Given how instrumental group support and positive reinforcement can be to one's health endeavours (Brennan *et al.*, 2010; Bevelander *et al.*, 2013; Bevelander *et al.*, 2012), the link between identification and engagement in the group is crucial. This is further evidenced by the fact that the direct link between community identification and health environment sensitivity is not significant: the impact of identification on health environment sensitivity is mediated by engagement. Whereas many studies show that members of online groups tend to be apathetic and only lurking on others' content (Preece *et al.*, 2004), the dynamics of a health community are collaborative and supportive (Brodie *et al.*, 2013; Vaterlaus *et al.*, 2015). Such active engagement is important because remaining involved with pro-health behaviour is a harder and more demanding path than simply consuming a product or brand, as it is conditioned by one's perceived self-efficacy and motivation (Mai and Hoffmann, 2012). Therefore, ensuring that the online community performs its stated function to initiate active engagement is a significant contribution, which supports the notion that social capital transfers between online and offline networks (Vergeer and Pelzer, 2009). By offering a supportive environment in which they can identify and freely engage, online health and fitness communities provide a fertile ground to the development of health sensitivity and health and fitness product-related choices.

The findings further support the notion that online community participation is conducive of health-related attitudes and behaviours. Group participation helps increase a concern and care for the quality of one's health. As a result of being in the group, individuals are driven to seek more information about health, read articles and content on the

topic, which they are likely to receive through the group (Liang and Scammon, 2011). Groups tend to generate this feeling of wanting to stay up to date with the latest news, not only for the personal benefit of informational value (Wiertz and de Ruyter, 2007; Lowe *et al.*, 2015) but also to be a valuable member of the group. Similar to previous studies on online health-support group, the findings evidence an impact of the group on members' real-life activity (Maloney-Krichmar and Preece, 2005). The study shows that participants exhibit higher healthy food choices because of this attitudinal interest, and an increased propensity to engage in physical activity. While an obvious link between pro-health attitudes and health behaviours can be assumed, it is often far harder to walk the talk when it comes to one's health. A lot of barriers can oppose the enactment of health and fitness behaviours such as poor nutrition self-efficacy (Mai and Hoffmann, 2012), low perceived control or neuroticism (Yap and Lee, 2013) or lack of time and resources. Ensuring that health interest promoted by community participation also results in behaviours bears important impact, because they are directly related to the use of specific health and fitness products – food, equipment, apparel, infrastructure, digital products (Lockie *et al.*, 2002), which are actors of the health and fitness communities.

## Managerial recommendations

From a managerial standpoint, marketers and policymakers need to understand how they can benefit from consumer health community participation to better inform them. A first approach to do so is to understand the dynamics of these groups and observe users and the content they share, as well as their concerns and struggles. Fluid communities created through usage of hashtags are public, thus giving policymakers and health product managers first-hand information on what matters to consumers (Liang and Scammon, 2011) and it is crucial for product managers to stay engaged in these groups (Pitta and Fowler, 2005). A first way to influence health and fitness product and brand usage on social media is to identify and observe the relevant hashtag-based communities, and the influencers with high number of followers in these communities. After gathering this insight, they can move on to create their own groups and share their content. The efforts of marketers and policymakers should be concentrated on making better use of social media technologies and the influencing power of online communities to promote healthy diets and behaviours, as well as health consciousness, particularly among the younger members of the platforms (Holmberg *et al.*, 2016).

Effective social media strategies involve, for instance, capitalising on the power of influencers in the health and fitness communities to convey messages to a wider network. Adopting the codes of the community by making use of hashtags would also allow users to find the branded accounts of marketers and policymakers and their content in relation to health and fitness. Managers need to continuously facilitate the community and animate the discussion to keep the population interested and engaged. To enhance the feelings of identification to a community and promote engagement and usage of health-related products, managers can use techniques such as photo contests, promotional actions or live content, and associate them with trending and product- or feeling-specific hashtags. The study shows that triggering health sensitivity through

the community is first necessary before reaching stages of product consumption. When building a community around a specific product or topic, managers should be careful to combine general health-related information and, afterwards, once the community has been built, more product-specific content. These approaches are particularly useful and important to adopt from the very early stages of building a social media presence and go hand in hand with the creation of internal social media management guidelines (Guidry *et al.*, 2015). To foster engagement with their content, product managers should also pay attention to favour rich content such as photos and videos. Social media such as Instagram or Snapchat focus on this kind of content and are as a result more likely to attract greater numbers of followers because of the richer symbolic meaning that visual content bears (Cavusoglu and Demirbag-Kaplan, 2017). The choice of the platform itself is therefore of importance and to be aligned with strategic product management objective.

## Conclusion

Health and fitness online communities on social media are large and influential networks that bear important implications on personal, social and product-related behaviours. Understanding the factors that lead to more active and healthy lifestyles is not only important from a managerial and consumption perspective but also from the standpoint of individuals' well-being and societal efficiency. Past research on the influence of media on health-related behaviour has tended to emphasise traditional media and marketing techniques such as advertisement or food packaging (Chandon, 2013; Cavaliere *et al.*, 2017). Similarly, research on social media communities does not place much attention on health-related topics, and studies bridging social media communities and health-related behaviours are still limited (Vaterlaus *et al.*, 2015). The findings thus contribute to the online social media community literature by extending the field of application of community participation outcomes. Traditional studies have tended to focus on how online communities could foster brand-related intentions and outcomes (Stokburger-Sauer, 2010; Marzocchi *et al.*, 2013) and issues of individual well-being and health have received little attention. This study gives insights that start bridging the gap between consumer behaviour regarding and health and health products, and social media consumer behaviours, yet more research is necessary to advance their complex interplay.

Further, studies should aim to extend the findings of this work by identifying other social mechanisms beyond online community engagement and identification, whereby the community could impact health-related behaviours and product consumption. Other mechanisms at play in the online health and fitness online community could impact consumer's attitudes and behaviours, as suggested by the extent online community literature such as knowledge sharing or social support (Chiu *et al.*, 2006; Brodie *et al.*, 2013). Recent findings also indicate that e-word of mouth on social networks provide information and emotional support systems for individuals seeking to solve health-related problems (Liang and Scammon, 2011). Evaluating how support is created in the health and fitness online community, which forms it takes and how individuals derive value from it would contribute to understanding the appropriate content techniques to deploy to influence pro-health product consumption (Korda and Itani,

2013). Focusing on the nuances of engagement and different ways to engage on social media would also provide more depth to the findings. Methodological choices of the present study also call for future studies using experimental or longitudinal design, for instance, to extend the scope of applicability.

Taking into account personal characteristics, demographics and psychological variables also represents a promising avenue. The population surveyed was heavily biased towards women, which is a limitation pertaining to the platform of investigation, as Instagram counts a majority of women (Statista, 2017) and women report more health and food sensitivity than men (Warde *et al.*, 2004). Further, health environment sensitivity could also be explained by personality factors, as suggested by Yap and Lee (2013). Extending the results of this survey to more gender-neutral platforms could help generalise the findings of the study. Further, verifying the applicability of the model in social media skewed towards older populations, such as Facebook, could also offer avenue for further studies on the broad topic of health and include older populations.

Another domain of possible contribution lies in addressing the overlap of participating in a health and fitness community with the usage of digital health technology (DHT) to monitor health behaviour such as exercising and food intake. Recent advances show the rise of these technologies (Lowe *et al.*, 2015), which often integrate social platforms embedding users' communities. Although these DHT branded communities are not organic, the rise of the quantified self, enabled by DHT, is a further field of exploration to understand the impact of online health communities.

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## Appendix. Items and reliability

Online community engagement (Algesheimer et al., 2005)  $\alpha = 0.82$ :

- ENG1 I benefit from following the fit community rules;
- ENG2 I am motivated to participate in the fit community's activities (by liking, sharing, commenting [ . . . ]) because I am able to support other members; and
- ENG3 I am motivated to participate in the fit community's activities because I am able to reach my personal goals.

Online community identification (Algesheimer et al., 2005)  $\alpha = 0.89$ :

- ID1 I am very attached to the fit community;
- ID2 Other fit community members and I share the same objectives;
- ID3 The friendships I have with other fit community members mean a lot to me;
- ID4 If fit community members planned something I'd think of it as something we would do rather than they would do; and
- ID5 I see myself as part of the fit community.

Health environment sensitivity (Kraft and Goodell, 1993)  $\alpha = 0.70$ :

- HES1 I worry about that there are chemicals in my food;
- HES2 I read more health-related articles than I did three years ago;
- HES3 I'm interested in information about my health;
- HES4 I'm concerned about my health all the time;
- Healthy food choices (Dutta-Bergman, 2006)  $\alpha = 0.86$ ;
- HEB1 I try to avoid foods that are high in fat;
- HEB2 I try to avoid foods that are high in cholesterol;
- HEB3 Nutrition information determines what I buy;
- HEB4 I make a special effort to get enough fibre;
- HEB5 I am concerned about how much sugar I eat;
- HEB6 I try to select food fortified in vitamins;
- HEB7 I use a lot of low calories products;
- HEB8 I try to avoid foods with high additives; and
- HEB9 I am careful what I eat to keep weight in control.

Physical fitness (Kraft and Goodell, 1993)  $\alpha = 0.79$ :

- EX1 I try to exercise at least 30 min a day, three days each week;
- EX2 I exercise more than I did three years ago;
- EX3 Exercise helps me succeed in all facets of my life; and
- EX4 Good health takes active participation on my part.

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