



UNIVERSITY OF HELSINKI

# **Social media use is associated with food consumption in Finnish adults**

Master's Programme in  
Human Nutrition and Food-related behaviour

Master's thesis

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20.3.2025

Helsinki

**Faculty:** Faculty of Agriculture and Forestry

**Degree programme:** Human Nutrition and Food-related Behaviour

**Study track:** Food-related Behaviour

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**Title:** Social media use is associated with food consumption in Finnish adults

**Level:** Master's thesis

**Month and year:** March 2025

**Number of pages:** 75

**Keywords:** social media, digital food environment, food-related behaviour, food consumption, unhealthy food, healthy food, susceptibility to social media influence

**Supervisor or supervisors:** Docent Henna Vepsäläinen

**Where deposited:** Helsinki University Library – Helda/E-thesis (theses)

**Abstract:**

*Objectives.* One key aspect of digital food environments is social media, which has become a major source of food-related content. Studies have found that exposure to social media content depicting unhealthy foods is associated with increased consumption of unhealthy foods, especially among adolescents and young adults. However, there are notably fewer studies investigating how social media use is associated with consumption of healthy foods, and research on older adults remains limited. Therefore, this study aims to investigate how social media use and self-perceived susceptibility to social media influence are associated with consumption of both unhealthy and healthy foods in adults.

*Methods.* A cross-sectional study using an anonymous online questionnaire was conducted in Finland between June and October 2024. In the online questionnaire, participants (n=160, aged 18–79, 76% female) were asked to report their socio-demographic characteristics, social media use, self-perceived susceptibility to social media influence, and food consumption with a food frequency questionnaire. Binary logistic regression analysis adjusted for age, gender, and education level was used to examine the associations.

*Results and conclusions.* More frequent social media use was associated with a less healthy diet, specifically less frequent consumption of nuts and seeds (OR=0.69, 95% CI=0.54-0.88) and fish (OR=0.80, 95% CI=0.65-0.99). Contrary to the hypothesis, more frequent social media use was associated with higher likelihood of consuming foods high in fat, salt and/or sugar in moderation (OR=1.32, 95% CI=1.07-1.63). Additionally, participants who perceived being more susceptible to social media influence were more likely to consume nuts and seeds frequently (OR=1.10, 95% CI=1.04-1.17). In the light of the present study, digital food environments seem to shape our diet. Increasing the visibility of healthy foods on social media could be beneficial, as lack of exposure may contribute to reduced consumption of these foods. Additionally, previous research shows that foods marketed on social media are mostly unhealthy. Therefore, both public and private sector organizations play a key role in promoting the visibility of healthy foods on social media.

## **Tiivistelmä:**

*Tavoitteet.* Yksi digitaalisen ruokaympäristön keskeinen osa-alue on sosiaalinen media, josta on tullut merkittävä ruokaan liittyvän sisällön lähde. Sosiaalisessa mediassa epäterveelliselle ruokasisällölle altistumisen on löydetty olevan yhteydessä lisääntyneeseen epäterveellisen ruoankulutukseen, erityisesti lapsilla ja nuorilla aikuisilla. Tutkimuksia, jotka tarkastelevat sosiaalisen media käytön ja terveellisen ruokien kulutuksen välistä yhteyttä, on kuitenkin huomattavasti vähemmän ja tutkimus vanhemmilla aikuisilla on edelleen rajallista. Tämän takia tämän tutkimuksen tavoitteena on selvittää, miten sosiaalisen media käyttö ja koettu alttius sen vaikutuksille ovat yhteydessä sekä epäterveellisten että terveellisten ruokien kulutukseen aikuisilla.

*Menetelmät.* Poikkileikkaustutkimus toteutettiin Suomessa anonyymien verkkokyselyn avulla kesä-lokakuussa 2024. Verkkokyselyssä osallistujia (n=160, 18–79 vuotta, 76 % naisia) pyydettiin raportoimaan sosioekonomiset taustatiedot, sosiaalisen median käyttö, koettu alttius sosiaalisen median vaikutuksille sekä ruoankulutus ruoankäytön frekvenssikyselyn avulla. Yhteyksiä analysoitiin binäärisellä logistisella regressioanalyysillä ja vakioitiin iän, sukupuolen ja koulutustason mukaan.

*Tulokset ja johtopäätökset.* Tulokset osoittavat, että sosiaalisen median tiheämpi käyttö oli yhteydessä epäterveellisempään ruokavalioon, mikä näkyi erityisesti pähkinöiden ja siementen (sekä kalan harvempaan kulutuksena. Hypoteesin vastaisesti sosiaalisen media tiheämpi käyttö oli yhteydessä myös epäterveellisen ruokien (ruokien, jotka sisältävät runsaasti rasvaa, suolaa ja/tai sokeria) harvempaan kulutukseen. Lisäksi osallistujat, jotka kokivat olevansa alttiimpia sosiaalisen median vaikutukselle, söivät pähkinöitä ja siemeniä useammin. Tämän tutkimuksen perusteella digitaalisella ruokaympäristöllä näyttäisi olevan vaikutus ruokavalioon. Terveellisten ruokien näkyvyyden lisääminen sosiaalisessa mediassa voisi olla hyödyllistä, sillä niiden vähäinen näkyvyys voi osaltaan vähentää niiden kulutusta. Lisäksi aiempi tutkimus osoittaa, että sosiaalisessa mediassa markkinoidut ruoat ovat enimmäkseen epäterveellisiä. Tämän takia sekä julkisilla että yksityisillä toimijoilla on keskeinen rooli terveellisen ruokien näkyvyyden lisäämisessä sosiaalisessa mediassa.

## **Table of contents**

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Digital food environments</b>	<b>3</b>
<b>3</b>	<b>Social media and food-related behaviour</b>	<b>6</b>
<b>3.1</b>	<b>Social media as a source of information</b>	<b>8</b>
3.1.1	Marketing	8
3.1.2	Social media influencers	11
3.1.3	Health promotion	15
3.1.4	Motivation	16
<b>3.2</b>	<b>Social media as a platform for social interaction</b>	<b>20</b>
<b>3.3</b>	<b>Social media as a distributor of food cues</b>	<b>24</b>
<b>4</b>	<b>Research objective and research questions</b>	<b>27</b>
<b>5</b>	<b>Data and methods</b>	<b>29</b>
<b>5.1</b>	<b>Study design and study population</b>	<b>29</b>
<b>5.2</b>	<b>Variables</b>	<b>29</b>
5.2.1	Sociodemographic characteristics	29
5.2.2	Social media use	30
5.2.3	Food consumption	31
5.2.4	Self-perceived susceptibility to social media influence	32
<b>5.3</b>	<b>Statistical analysis</b>	<b>33</b>
<b>5.4</b>	<b>Ethical review</b>	<b>34</b>
<b>6</b>	<b>Results</b>	<b>35</b>
<b>6.1</b>	<b>Participant characteristics</b>	<b>35</b>
<b>6.2</b>	<b>Social media use</b>	<b>36</b>
<b>6.3</b>	<b>Food consumption</b>	<b>38</b>
<b>6.4</b>	<b>Susceptibility to social media influence</b>	<b>38</b>
<b>6.5</b>	<b>Associations between social media use, susceptibility to social media influence and food consumption</b>	<b>41</b>
<b>7</b>	<b>Discussion</b>	<b>47</b>

<b>7.1</b>	<b>Social media use, susceptibility to social media influence, and food consumption</b>	<b>47</b>
<b>7.2</b>	<b>Limitations</b>	<b>49</b>
<b>7.3</b>	<b>Strengths</b>	<b>51</b>
<b>7.4</b>	<b>Future studies</b>	<b>51</b>
<b>8</b>	<b>Conclusions</b>	<b>53</b>
	<b>References</b>	<b>54</b>
	<b>Appendices</b>	<b>65</b>
	<b>Appendix 1 The use of AI</b>	<b>65</b>
	<b>Appendix 2 Sociodemographic characteristics and social media use</b>	<b>65</b>
	<b>Appendix 3 Food frequency questionnaire</b>	<b>69</b>
	<b>Appendix 4 Statements for assessing self-perceived susceptibility to social media influence</b>	<b>74</b>

## 1 Introduction

The global burden of obesity is rapidly increasing due to unhealthy diets and physical inactivity (World Health Organization (WHO), 2003). In Finland, there are 2.5 million adults with overweight (BMI at least 25) and every fourth adult has obesity (BMI at least 30) (Koponen et al., 2018). A report by the World Health Organization (2003) highlights that global changes, such as industrialization, urbanization, market globalization, and economic development are reflected in shifting dietary patterns and decreased physical activity. The report states that diets are shifting, for example, towards more energy-dense diets high in fat and low in unrefined carbohydrates. Because of these changes, obesity and chronic noncommunicable diseases, including diabetes, cardiovascular diseases, and cancer, are becoming increasingly important causes of morbidity and mortality (WHO, 2003).

Studies have shown that fruit and vegetable consumption have been associated with health outcomes, such as reduced risk of type 2 diabetes (Ley et al., 2014), many cancers (World Cancer Research Fund (WCRF) & American Institute for Cancer Research (AICR), 2018), and coronary heart disease (Afshin et al., 2019). The consumption of red meat has been, on the contrary, associated with an increased risk of cancer (WCRF & AICR, 2018), and the consumption of processed meat has been associated with an increased risk of coronary heart disease (Micha et al., 2010) and type 2 diabetes (Uusitupa et al., 2019). Despite these related health outcomes, only 14 % of the Finnish men and 22 % of the Finnish women meet the recommended daily amount, 500 grams per day, for vegetables, fruits and berries, while 79 % of the Finnish men exceed the recommended weekly amount of 500 grams of red and processed meat (Valsta et al., 2018). From the end of 2024 onwards, the recommended weekly amount of red and processed meat has been even lower — 350 grams for red meat and as little as possible for processed meat (Valtion ravitsemusneuvottelukunta (VRN) & Terveyden ja hyvinvoinnin laitos (THL), 2024)

Essentially, overweight and obesity are caused by an energy imbalance, where energy intake exceeds energy expenditure (Hofbauer, 2002). Energy imbalance can be caused by multiple different factors, which is why, ultimately, overweight and obesity are complex conditions. An unhealthy food environment, which promotes an inadequate diet, has been identified to be one possible cause of overweight and obesity (Granheim,

2019). In fact, many health practitioners and researchers have argued that the environment, rather than individual-level factors, may drive the current obesity epidemic (Giskes et al., 2011). Food environments include a range of physical, economic, policy, and socio-cultural influences, which shape people's food and beverage choices and overall nutrition (Swinburn et al., 2013). Factors in food environments promoting overweight and obesity are, for example, easy access to a wide range of tasty, inexpensive, energy-dense foods in large portions (Hill et al., 2003), limited access to affordable and nutritious foods (Chen et al., 2016), marketing of unhealthy foods and beverages (Zeeni et al., 2024), and lack of social support (Ali & Lindström, 2006).

The development of digital technologies from social networking sites to food delivery applications has contributed to a reshaping of food environments. This transformation has been so extensive that the concept of a "digital food environment" has been recognized. (Granheim, 2019). These digital food environments provide both barriers and opportunities for food choices, for example, through online food marketing, social media content, and virtual communities. Social media platforms, in particular, have become powerful spaces influencing diet-related outcomes (Granheim, 2019). However, the influence of digitalization on food consumption is not yet well understood. Thus, this Master's thesis aims to investigate the associations between social media use and food consumption.

For this Master's thesis, I prepared material for the ethical review, including the research plan, and the handout and agreement form for the participants. I also developed and translated the study questionnaire, constructed the study questionnaire using REDCap software, conducted participant recruitment, and carried out data processing and analysis. This study has not received any funding.

## 2 Digital food environments

Food environments are directly connected to diets and health outcomes, including overweight, obesity and noncommunicable diseases (Granheim et al., 2022). Swinburn et al. (2013) define food environments as “collective physical, economic, policy and socio-cultural surroundings, opportunities and conditions that influence people’s food and beverage choices and nutritional status”. Story et al. (2008) take an ecological approach to conceptualize food environments and conditions that influence food choices. They divide food environments into social, physical, and macro-level environments, while also taking individual factors into account. The *social environment* involves, for example, interactions with family, peers, and friends which can influence food choices through mechanisms, such as role modelling, social support, and social norms. The *physical environment* refers to, for example, the settings where people eat or produce food, such as home, work sites, schools, restaurants, and supermarkets, and it influences which foods are available. The *macro-level environment* includes, for example, food production and distribution systems, as well as food marketing, which have a more indirect but powerful effect on what people eat. *Individual factors* influencing food choices include, for example, cognitions, such as attitudes, preferences and knowledge, skills and behaviours, lifestyle, and biological and demographic factors. (Story et al., 2008)

As Granheim et al. (2022) note, all food environment dimensions are subject to digital transformation. In fact, digital technologies have become ubiquitous and an inseparable part of everyday life. Societies are becoming increasingly dependent on digital technologies and infrastructure, which are already entangled in the structures of society in many different and complex ways (Dufva & Dufva, 2019). Technologies and systems not only shape how we understand and experience the world, but they also shape our every day practices and the world around us (Ash et al., 2018). As a result, the concept of a digital food environment has been recognized (Granheim, 2019).

World Health Organization (2021) describes digital food environments as “the online settings through which flows of services and information that influence people’s food and nutrition choices, and behaviour are directed”. However, it should be noted that digital food environments are not separate but interconnected with and influence all

food environments (Granheim et al., 2022). Figure 1 describes digitalization-driven factors influencing food consumption through different food environments.

Digital food environment			
macro-level environment	physical environment	social environment	individual factors
<ul style="list-style-type: none"> <li>• widespread and more personalized marketing e.g. personalized price promotions</li> <li>• influencer marketing, which is seen authentic and trustworthy</li> </ul>	<ul style="list-style-type: none"> <li>• new forms of buying and selling food products and services               <ul style="list-style-type: none"> <li>◦ online grocery shopping and food delivery services</li> </ul> </li> <li>• increased access to and availability of food products</li> </ul>	<ul style="list-style-type: none"> <li>• increased interactions through online communities and networks</li> <li>• opportunity to share information, experiences and build connections</li> </ul>	<ul style="list-style-type: none"> <li>• increased access to and availability of food and nutrition-related information</li> </ul>

Figure 1. Digitalization-driven factors influencing food consumption.

As Story et al. (2008) describe, marketing is a part of the macro-level food environment. Digitalization has changed food marketing, which has become widespread and uses multiple techniques from advertising to other forms of online brand-consumer engagement (Granheim et al., 2022). In particular, digitalization allows more personalized marketing directed to specific groups by harvesting personal data from digital platforms (Granheim et al., 2022). This leads, for example, to the use of personalized price promotions, which have been found to boost purchasing behaviour of consumers compared to non-personalized price promotions (Nguyen et al., 2019). Digitalization has also created space for influencer marketing, which is becoming increasingly important in brands' marketing and promotion strategies (Ki & Kim, 2019). Social media influencers (SMIs) can be described as people with large social media audiences, that they have established with their knowledge and expertise on a particular topic (Ki & Kim, 2019). Messages portrayed by SMIs are seen as authentic and trustworthy (Willemsen et al., 2011), allowing brands to easily communicate their messages with a large audience of target consumers (Ki & Kim, 2019).

The physical food environment influences which foods are available and impacts barriers and opportunities, such as access, that facilitate or hinder healthy eating (Story et al., 2008). Digitalization expands the physical food environment by enabling new forms of buying and selling food products and services, including online grocery shopping and food delivery services using websites or smartphone applications (Granheim et al., 2022). These digital grocery shopping and food delivery services can increase the availability of and access to food products, and the convenience of buying food products, which can potentially help mitigate food deserts, defined as locations with limited access to affordable and nutritious food (e.g., supermarkets) (Pitts et al., 2018). Especially, online forms of buying can decrease the time used to buy groceries, prepare and cook food, as well as the transportation needed to access food (Granheim et al., 2022). On the other hand, they can also increase the availability of and access to unhealthy food products (Pitts et al., 2018).

Digitalization has changed the way people interact and engage with each other, thus influencing also the social food environment. With digitalization, people can interact with each other both privately and through online communities and networks, creating opportunities to share knowledge and experiences, and build social connections across geographical boundaries.

Furthermore, digitalization has influenced the individual factors affecting food choices, including preferences, knowledge, and attitudes. The development of digital platforms has provided consumers an opportunity to gain more information of, for example, recipes for cooking, comparing food products, or evaluating restaurants, which can eventually lead to selecting, purchasing, and/or eating certain foods (Rini et al., 2024) through increased knowledge or changed preferences. Additionally, marketing by SMIs has been shown to positively influence consumers' attitudes, which are closely linked to purchase intentions (Ki & Kim, 2019).

### 3 Social media and food-related behaviour

Social media has become a significant part of modern life, with billions of users (Horan, 2024). Social media can be defined in multiple ways, but in a practical sense, it is applications and websites that provide users a digital environment in which digital content can be sent or received (Appel et al., 2020). In Finland, the use of social network services, which are part of social media, has been increasing notably during the last ten years. In 2013, 47% of 18–89-year-olds had used one or more social network services within the last three months and 34% had used them every day or almost every day. In 2023, the corresponding numbers were 73% and 62%. (Statistics Finland, 2023c) In 2023, the most active social network service users were 25–34-year-olds, of which 85% used them every day or almost every day (Statistics Finland, 2023c).

The social media landscape has expanded to include multiple different platforms for various purposes. Table 1 presents brief descriptions of selected social media platforms adapted from Vaterlaus et al. (2015).

Table 1. Descriptions of selected social media platforms. Adapted from Vaterlaus et al. (2015).

<b>Name of platform</b>	<b>Publication year</b>	<b>Brief description</b>	<b>Number of weekly active users in Finland (DNA, 2024)</b>
Facebook	2004	Allows users to create a personal profile to share selected personal information, interests, texts, photos or videos. Users can find and accept friends with whom they wish to connect. Facebook allows for status updates, instant messaging, and creating public or private groups, where content can be shared.	3.67 million
YouTube	2005	A video sharing platform. Users can share short videos, known as Shorts, or longer videos, subscribe to others' channels and leave comments on videos. Allows users to live stream.	3.57 million
Instagram	2010	Allows users to share pictures or videos with a caption. Users develop their own profile and can select to follow specific people/organizations to get photo/video updates.	2.86 million

TikTok	2016	A video sharing platform. Users usually share short (15 sec – 3 min) videos, but videos can be up to 60 minutes long. Allows users to live stream.	1.52 million
Snapchat	2011	A photo and video sharing app that allows users to share photos and videos with a specified group of recipients. Senders can decide how long the receiver(s) can view the Snap before it is erased.	1.28 million
X (previously Twitter)	2006	Allows users to create a brief profile with a photo. X allows users to share photos, videos, and texts. X users can follow people or organizations to stay connected.	1.24 million
Pinterest	2010	This platform is an electronic pin board. Users create a profile and “pin” (i.e., post) content from the internet to their board. It is a form of social bookmarking where users can organize information on their own board and follow other Pinterest users to share information.	1.09 million
LinkedIn	2003	A business and employment-focused platform, where users can share texts, pictures or videos and connect with other users. Users can describe e.g., their education, work experience and skills on their own personal page.	0.9 million

Social media has multiple food-related roles. First, it is a source of information. Due to the arise of social media the way people consume information has changed (Granheim, 2019). The consumption of information has become more planned as people actively search for and purposively visit sources of information (Granheim, 2019). Compared to traditional media social media offers information from various sources, ranging from journalistic media to producers and sellers of food (Ruggeri & Samoggia, 2018). In fact, people are increasingly searching for information about food on social media (Rutsaert et al., 2014). On the other hand, as Jervelycke Belfrage (2018) describes it seems that many consume information in an incidental matter, as a result of other internet or social media activities. For example, a person could be exposed to food advertising while visiting a social media platform to view recent friend activity (Granheim, 2019). Consequently, social media has changed the way people are exposed to, use, and engage with information (Granheim, 2019).

Second, social media is a platform for social interaction. By using social media people can connect with others, offer support, and share information and experiences regardless of time and place. For example, food-related or chronic disease-related online support networks, such as Facebook groups, are shown to be useful tools to share information and offer support (Zhang et al., 2013). The extensive reach and scale of social media interactions allow them to shape beliefs, attitudes, and norms around food-related behaviours (Chung et al., 2021).

Third, social media acts as a distributor of food cues. Food cues are sensory signals, such as looking and smelling food as well as remote signals, such as pictures or videos, in the environment that represent food or eating opportunities (Boswell & Kober, 2016). These cues can trigger cravings and motivate eating behaviours (Polivy et al., 2008). On social media, a high proportion of content features food and beverage cues (Coates et al., 2019a; Holmberg et al., 2016), which can, as mentioned, influence food-related behaviour. The following chapters will describe how different roles of social media are associated with food-related behaviour based on previous research.

### **3.1 Social media as a source of information**

#### **3.1.1 Marketing**

Social media offers multiple ways for food companies to reach and engage with consumers, thus information sharing in a form of marketing has become more widespread. Brands especially utilise the interactive and social aspects of social media to advertise their products (Freeman et al., 2014). For example, companies increasingly launch hashtag campaigns or challenges to encourage consumers to create branded content on their behalf (Laestadius & Wahl, 2017; Montgomery & Chester, 2009). This user-generated content makes social media users advertisers for products, such as food, which can further influence their peers. Additionally, companies utilize digital analytics, including analysis of emotions, responses, preferences, behaviour, and location, to target specific groups or individuals (WHO, 2016).

Studies have shown that exposure to food marketing on social media is associated with food-related behaviour (Aljefree & Alhothali, 2022; Gascoyne et al., 2021; Qutteina et al., 2022). Gascoyne et al. (2021) concluded that exposure to food and drink advertisements on social media was associated with high consumption of unhealthy

drinks, such as soft drinks, fruit juice, and sports drinks, in adolescents (aged 12–17). Additionally, engagement, including liking and sharing, with food and drink advertisements was associated with high consumption of both unhealthy foods, such as sweets, fast foods and salty snacks, and unhealthy drinks (Gascoyne et al., 2021). Exposure to advertisements, engagement with posts, and consumption of unhealthy foods and drinks were obtained from self-reported frequencies. Similarly, Baldwin et al. (2018) found that higher online engagement with food brands and content was associated with a higher likelihood of consuming unhealthy foods and drinks in children (aged 10–16). Similarly, engagement and food consumption were obtained from self-reported frequencies in this study.

Aljefree and Alhothali (2022) investigated the associations between unhealthy food and drink consumption with marketing exposure on social media by utilizing self-reported data from 316 university students aged 18–29 years. They found that almost half of the university student participants had purchased foods or drinks after seeing related advertisements on social media. Moreover, those who had purchased advertised foods or drinks more frequently consumed higher amounts of potato chips and fast foods compared to those with infrequent purchases (Aljefree & Alhothali, 2022). This could indicate that advertisements influenced students' purchase behaviour, which then influenced their food consumption.

Table 2. Descriptions of studies related to marketing and food-related behaviour.

Authors	Study setting	Participants	Social media assessment	Food-related behaviour assessment	Main results
<b>Aljefree &amp; Alhothali (2022), Saudi Arabia</b>	cross-sectional	18–29 years (n=316), 72% female	Self-reported frequency of Snapchat, Facebook, Instagram, YouTube, Twitter, and TikTok usage. Self-reported frequency of viewing food/drink advertisements, whether the participant had purchased foods/drinks after exposure to related advertising and how many times the participant had purchased foods/drinks after exposure to such advertisements on social media.	Self-reported consumption frequency of fast foods, potato chips, sweets, and sugary drinks.	Those who purchased foods/drinks more frequently after watching related advertisements consumed higher amounts of potato chips and fast foods.
<b>Baldwin et al. (2018), Australia</b>	cross-sectional	10–16 years (n=417), 53% female	Self-reported Internet and social media use, including engagement with social media websites, particularly Facebook and YouTube, and interactions with food and beverage brand content.	Self-reported consumption frequency of unhealthy foods (e.g., biscuits, cakes, fast food, ice cream, chips, pre-sugared breakfast cereal, and fried potato) and unhealthy drinks (e.g., fruit juice, flavoured milk, diet drinks, and energy drinks)	Watching food brand video content on YouTube, purchasing food online and seeing favourite food brands advertised online were significantly associated with higher frequency of consumption of unhealthy foods and drinks after adjustment for age, sex and socio-economic status.
<b>Gascoyne et al. (2021), Australia</b>	cross-sectional	12–17 years (n=8708), 53% female	Self-reported exposure to advertisements for a food or drink product on social media (e.g., Facebook and Instagram) and engagement (liking and sharing) posts related to a food or drink product or brand (e.g., soft drinks and fast food)	Self-reported consumption frequency of unhealthy foods (e.g., sweet biscuits, cakes, muffins, burgers, pizza, chicken, chips, lollies and chocolates, ice cream, potato crisps/chips, French fries) and unhealthy beverages (e.g., fruit juice, cola, lemonade, cordials or sports drinks, diet drinks)	Exposure to a food or drink advertisement on social media at least once in the last week was associated with a high consumption of unhealthy drinks, while liking or sharing a food or a drink post at least once in the last month was associated with a high consumption of unhealthy foods and drinks.

### 3.1.2 Social media influencers

Food companies can share information and promote their products through social media influencers, which are becoming increasingly important in brand marketing and promotion strategies (Ki & Kim, 2019). Through influencers brands aim to endorse their products and build up their image among influencers' followers (De Veirman et al., 2017). Social media influencers (SMIs) can be described as people with large social media audiences, that they have established with their knowledge and expertise on a particular topic (Ki & Kim, 2019). SMIs also share details of their personal lives, experiences, and opinions through pictures, videos, and texts (De Veirman et al., 2017).

SMIs have become important part of marketing because compared to mainstream celebrities consumers view SMIs as more accessible and credible (De Veirman et al., 2017). SMIs promote brands or products in the context of their own personal lives, which can make brands or products seem more relevant to consumers (Audrezet et al., 2020). Willemsen et al. (2011) describe that the messages SMIs portray are also seen as more authentic and trustworthy than similar messages from celebrities, which may be due to consumers seeing SMIs more as friends rather than advertisers. Moreover, by collaborating with SMIs, brands can easily communicate their messages with a large audience of their target consumers (Ki & Kim, 2019).

SMIs can act as role models, taste leaders as well as opinion leaders to consumers (Ki & Kim, 2019). According to Ki and Kim (2019), SMIs' engaging content positively influences consumers' attitudes. This positive attitude can lead to a desire to mimic SMIs and further influence consumers' behavioural outcomes of word-of-mouth and purchase intentions (Ki & Kim, 2019). In addition, consumers and influencers can have parasocial relationships, where a consumer feels a strong emotional bond with an influencer despite having no direct interaction, and the influencer does not reciprocate those feelings (Hoffner & Bond, 2022). Consumers who express stronger parasocial relationships are more susceptible to influencers' opinions and behaviour (Su et al., 2021), thus influencers promoting food may be able to shape followers' eating habits. For example, according to Shabahang et al. (2024), parasocial relationships appear to be associated with followers' craving for food when the influencer was their favourite food influencer.

Influencer marketing on social media has been associated with food consumption (Coates et al., 2019c, 2019b; Folkvord & de Bruijne, 2020). Studies show that influencer marketing is especially associated with increased consumption of unhealthy foods, but not with healthy foods. In a study by Coates et al. (2019b), children (aged 9–11) were offered four types of snacks (jelly candy, chocolate buttons, carrot batons, and white grapes) after viewing an influencer's Instagram profile for one minute. The results showed that exposure to the marketing of unhealthy snacks significantly increased the consumption of unhealthy snacks compared to children who viewed influencers with non-food products. In contrast, exposure to the marketing of healthy snacks did not affect the consumption of healthy snacks compared to exposure to the marketing of unhealthy snacks and non-food products (Coates et al., 2019b). In addition, results by Coates et al. (2019c) showed that children who were exposed to influencer marketing of a branded unhealthy snack (chocolate digestives) on YouTube consumed more of the marketed snack relative to the perceived alternative brand. Additionally, there was no difference between marketed snack consumption relative to alternative snack consumption in children exposed to non-food marketing (Coates et al., 2019c).

Smit et al. (2020) studied the impact of video blogs (vlogs) of SMIs on children's unhealthy dietary behaviour. Their longitudinal study revealed that children's (initially aged 8-15) self-reported frequency of watching vlogs was associated with consumption of sugar-sweetened beverages two years later. In contrast, watching vlogs was not significantly related to SSB consumption over a one-year period, nor to unhealthy snack consumption over a one-year or 2-year period. The authors expected to find a stronger association and explain that the weak associations might be related to, for example, the great number of influencers and vlogs, and the large variety of products the influencers promote. In addition, food consumption is influenced by many different factors, making it challenging to determine whether participants' food consumption was specifically affected by watching vlogs. Furthermore, children's digital behaviour and diet might have changed during the study period, since their autonomy for choices most likely increases with age. For younger children in the study, their ability to recall their food consumption or vlog watching may have also improved during the study period, affecting their ability to report them.

Folkvord and de Bruijne (2020) researched in their experimental pilot study if promoting red peppers by a popular social media influencer on Instagram would increase subsequent actual vegetable consumption among adolescents (aged 13-16) compared to adolescents who were exposed to the promotion of energy-dense snack and non-food products. Researchers measured vegetable consumption by coding which and how many vegetable snacks the participant took, when offered to take as many as they liked, after being exposed to the red pepper promoting Instagram post (Folkvord & de Bruijne, 2020). The results showed that there was no effect on the vegetable consumption.

The marketing of healthy foods by SMIs is significantly less studied than the marketing of unhealthy foods. Moreover, mostly experimental studies indicate that SMI marketing is associated with increased consumption of unhealthy foods, particularly among children. More observational studies, especially in adults, are needed to better understand how SMIs can influence real-life food choices. A summary of the studies mentioned in the text can be found in table 3.

Table 3. Descriptions of studies related to social media influencers and food-related behaviour.

Authors	Study setting	Participants	Social media assessment	Food-related behaviour assessment	Main results
<b>Coates et al. (2019b), United Kingdom</b>	randomized trial	9–11 years (n=176), 60% female	Participants were randomly assigned to view mock Instagram profiles of two popular YouTube video bloggers (influencers). Profiles featured images of the influencers with unhealthy snacks, healthy snacks or non-food products.	Participants' ad libitum consumption of unhealthy snacks, healthy snacks, and overall consumption (combined consumption of healthy and unhealthy snacks) were measured after exposure to the Instagram profiles.	Children who viewed influencers with unhealthy snacks had significantly increased overall intake, and significantly increased consumption of unhealthy snacks specifically, compared with children who viewed influencers with non-food products. Viewing influencers with healthy snacks did not significantly affect consumption.
<b>Coates et al. (2019c), United Kingdom</b>	randomized trial	9–11 years (n=151), 53% female	Participants were exposed to influencer marketing of a non-food product (smartphone), or an unhealthy snack (chocolate digestives) with a YouTube video.	Participants' ad libitum consumption of the marketed snack and an alternative brand of the same snack was measured after the exposure to influencer marketing.	Children who were exposed to influencer marketing of a branded unhealthy snack consumed more of the marketed snack relative to the perceived alternative brand. There was no difference between marketed snack consumption relative to alternative snack consumption in children exposed to non-food marketing.
<b>Folkvord &amp; de Bruijne (2020), the Netherlands</b>	randomized trial, a pilot study	13–16 years (n=132), 46% female	Participants were exposed to an Instagram post by a highly popular social influencer with vegetables, energy-dense snacks, or a control condition.	Actual consumption of vegetables was assessed by counting the type and amount of vegetables that were consumed as a snack after the exposure to an Instagram post.	Results showed no effect of the popular social influencer promoting vegetables on the consumption of vegetables.
<b>Smit et al. (2020), the Netherlands</b>	longitudinal	8–15 years (n=953), 53% female	Self-reported frequency of watching vlogs.	Self-reported consumption frequency of unhealthy beverages (e.g., sweetened fruit juice, soda, energy-, and sports drinks) and unhealthy snacks (e.g., cookies, chocolates, sweets or liquorice, potato chips, and nuts).	Watching vlogs was associated with consumption of unhealthy beverages two years later. The analyses did not yield significant relations for unhealthy snack consumption.

### 3.1.3 Health promotion

Information can be shared with an aim to influence consumers' food-related behaviour and promote health. In fact, digital technologies are increasingly being used as platforms for health promotion both by private and public actors (Granheim, 2019). Especially social media is a promising mechanism to promote healthy behaviours, since it may lower any physical barriers to spread health messages and increase the ability to connect with a broader audience (Luo et al., 2024). In health promotion interventions, social media is used to facilitate communication, relationship building, and social support among peers. It also supports sharing tracking activities, such as diet logs, with peers, as well as sharing educational information and multimedia content, such as images, videos, and podcasts (Chau et al., 2018).

Although research has indicated that social media could be a feasible platform for nutrition interventions, results for dietary outcomes have been mixed. Klassen et al. (2018) conducted a systematic review, and one aim was to understand whether engagement with social media in nutrition-related interventions improves nutrition-related outcomes, including BMI, weight, energy intake, fruit and/or vegetable consumption, and sugar-sweetened beverage consumption. Some of the included studies used, for example, private Facebook groups to provide health information and tips, post events, and other interactive and engagement content (Klassen et al., 2018). Their review concluded that fruit, vegetable, and SSB consumptions did not differ between the intervention group, where participants used social media, and the control group, where participants did not use social media, in any studies they evaluated. On the contrary, Chung et al. (2016) found that an intervention utilizing Fitbit to track physical activity and dietary intake, and Twitter to receive messages, that focused on increasing physical activity and fruit/vegetable consumption and decreasing SSB consumption, increased fruit and vegetable consumption and decreased SSB consumption. This study was, however, a pilot study with no control group.

The effectiveness of social media use in interventions may be influenced by engagement and overall use of social media (Klassen et al., 2018). Chung et al. (2016) stated that the overall engagement with Fitbit and Twitter was high and sustained over the study period. On the other hand, Klassen et al. (2018) stated that the engagement

with the social media components of interventions varied from 3–69%. Thus, it seems that higher engagement results in better outcomes.

Social media has multiple benefits for behaviour change, including increased interaction; more available, shared, and tailored information; increased accessibility to health information; and peer support (Goodyear et al., 2021). Therefore, social media might be a potentially effective platform for nutrition interventions, but more research is needed. A summary of the studies mentioned in the text can be found in Table 4.

### 3.1.4 Motivation

Information seen on social media can be a source of inspiration and motivation for specific food choices. One emerging trend is clean eating, which has become increasingly popular, and it is broadly defined as an approach to eating which promotes the exclusion of processed foods (Allen et al., 2018). Allen et al. (2018) discovered in their cross-sectional self-reported survey that women (n=762, aged 17–55) who adhered to dietary advice from clean eating sites (e.g., social media platforms, blogs, or personal web pages) were more likely to consume adequate amounts of fruits than those who never or rarely adhered to clean eating advice from social media. However, a possible confounding factor in the study is that women who are already interested in healthy diet may consume adequate amounts of fruits, while also searching information from clean eating sites. Therefore, it may not be the clean eating sites that cause them to eat more fruits but their own pre-existing interest in healthy eating.

Wang et al. (2022) studied how TikTok use influences adolescents' (aged 13–19) food practices and eating habits with a survey (n=186) and 5 follow-up interviews. They discovered that TikTok use encouraged adolescents to try new foods and recipes, use different ingredients, engage in trending food practices as well as take a different attitude towards food. They describe that TikTok pushed adolescents to take immediate food-related action, such as cooking a recipe or trying a challenge, but also to make slower decisions related to eating, such as adopting a diet regimen (e.g., intermittent fasting or acid-base balance) or forming certain food preferences. These slower decisions could potentially be harmful for adolescents if the diet regimen they adopt prevents them from getting proper nutrition.

Food-related content on social media can motivate to try new foods or make healthier choices. However, while social media can encourage adopting healthy diet practices, it can also spread diet trends, such as low-carbohydrate diets (Jauho et al., 2023), and more extreme diets, such as thinness or fitness idealizing diets (Griffiths et al., 2018), which may carry potential risk to proper nutrition, especially among adolescents. A summary of the studies mentioned in the text can be found in table 4.

Table 4. Descriptions of studies related to health promotion and motivation and food-related behaviour.

Authors	Study setting	Participants	Social media assessment	Food-related behaviour assessment	Main results
<b>Allen et al. (2018), Australia</b>	cross-sectional	17–55 years (n=762), 100% female	Questionnaire with ten items relating to Internet and social media use, the frequency with which respondents used the Internet during a typical week, and time spent on individual social media platforms.	Participants were asked to indicate how frequently they adhered to the dietary advice from one or more clean eating sites on a five-point Likert scale of 'never' to 'very often'. Consumption frequencies of core and non-core foods were assessed using ten short food questions.	A significantly higher proportion of women who had adhered to dietary advice from clean eating sites met dietary guidelines for the consumption of fruit, meats and alternatives compared to women who had seldom or never adhered dietary advice from clean eating sites.
<b>Chung et al. (2016),</b>	intervention, a pilot study	19–20 years (n=12), 67% female	All participants received Twitter messages (Tweets) from the study team that focused on increasing physical activity, increasing fruit/vegetable consumption, and decreasing sugar-sweetened beverage (SSB) consumption. Participants also received photo-based Twitter messages that were pictures of healthy food options, infographics and website links related to healthy lifestyle tips.	Self-reported changes in fruit/vegetable and SSB consumption over the intervention period compared to baseline self-reported values were examined.	92% of the participants increased fruit and vegetable consumption and 67% of the participants decreased SSB consumption.
<b>Klassen et al. (2018)</b>	mixed-methods systematic review	young adults (usually 18–35)	Studies were included if they used social media as a component of an intervention or explored social media as an exposure or phenomena of interest.	Outcome measures relating to nutrition-related outcomes were included: body composition (weight, BMI, waist circumference or other body composition measures) or dietary intake (foods or nutrients).	21 studies were included although their use of social media was highly variable. The main purpose of social media was to provide information and social support to participants. In the 9 randomized controlled trials, social media was used as one aspect of a multi-faceted intervention. Interventions had a positive statistically significant impact on nutritional outcomes in 1/9 trials. Engagement with the social media

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					component of interventions varied, from 3 to 69%.
<b>Wang et al. (2022), USA</b>	cross-sectional	13–19 years (n=186), 62% female	Participants were asked with a survey why, how, and how often they use TikTok for food content.	Participants were asked with a survey to define what they think is healthy eating, what their healthy eating goals are, and what they learned and acted on based on TikTok's food content. Researchers also conducted semi-structured interviews and asked participants further questions regarding what they watched on TikTok and what actions they took in response to videos.	Participants reported using TikTok to explore new food choices and discover recipes. Food-related videos also inspired teenagers to partake in cooking or baking or try dietary trends. Participants also reported learning about healthy eating tips and described how this influenced their short- and long-term eating habits.

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### 3.2 Social media as a platform for social interaction

A large portion of all food images on social media is created by users. In fact, according to Qutteina et al. (2019), user-generated food content was more prevalent on social media than intentionally marketed foods. User-generated food content may influence users' perceptions about eating norms and influence their food-related behaviour by indicating what is socially accepted and expected. People follow social eating norms because it enhances their belonging in a social group and being liked, and it results in eating correctly. Norms also provide information about what is appropriate behaviour in certain situations. (Deutsch & Gerard, 1955) Furthermore, following or not following norms is associated with social judgments, which is why norms have a powerful influence on behaviour (Higgs, 2015).

Hawkins et al. (2020) studied with a cross-sectional survey whether perceived norms about Facebook users' eating habits and preferences predicted university students (n=369) own food consumption. They found that the more participants thought other Facebook users consumed fruits and vegetables (descriptive norm), the more they consumed them themselves. A similar positive association was observed for frequency norms (how often fruits and vegetables were consumed). Conversely, participants who consumed more energy-dense snacks and sugar-sweetened beverages (SSB) were more likely to believe that others approved of or thought they should eat these types of foods (injunctive norm) (Hawkins et al., 2020). However, since the study is cross-sectional, the association may be bidirectional or a case of reverse causality, meaning that participants' own consumption "predicts" their perceptions of the norms.

Similarly, Gleaves et al. (2024) found that participants who viewed a Facebook post containing a healthy descriptive social norm ordered more likely a healthy food item in a campus café compared to those who viewed an unhealthy norm. The participants were shown a Facebook post where either a student from their own university (in-group member) or someone from outside of their university (out-group member) described a visit to a new café in campus and what food item (healthy or unhealthy) they ordered (Gleaves et al., 2024). The unhealthy food item was described to be a beef cheeseburger with French fries, and a double-fudge brownie (unhealthy norm condition) and the healthy food item was a grilled chicken-breast wrap with sweet potato fries, and a peanut and cacao protein ball (healthy norm condition).

In contrast to Hawkins et al. (2020), Gleaves et al. (2024) also found that unhealthy descriptive norms were associated with participants ordering fewer healthy items. However, this finding was only for participants in an in-group condition indicating that the eating behaviour displayed by a perceived in-group member was more appropriate and relevant guide than the behaviour of an out-group member, thus leading to modelling behaviour (Gleaves et al., 2024).

Social norms can be transmitted by socially endorsed posts and pictures on social media (Hawkins et al., 2021). A study by Hawkins et al. (2021) revealed that viewing socially endorsed images, meaning images with substantially more likes than other images, of low energy-dense foods compared to high energy-dense foods, in a style of Instagram, led to consuming a higher proportion of grapes (low energy-dense foods) than cookies (high energy-dense foods) immediately after viewing the images in healthy women students (n=169). Grapes and cookies were offered to the participants as a reward for taking part and as a break in the study and additionally, they were part of the study. In contrast, exposure to socially endorsed high energy-dense food images was not associated with consuming a larger proportion of cookies (versus grapes) compared to the control condition (Hawkins et al., 2021). These results indicate that exposure to socially endorsed images on social media may contribute to choosing healthy foods by following social norms (Hawkins et al., 2021).

Digital platforms facilitate quicker and more convenient peer-to-peer interactions compared to traditional in-person networks. Friedman et al. (2022) applied a digital ethnography approach to explore the influence of social media on young adults' (aged 18-24) dietary behaviours. They collected data from web-based conversations from different forums, where participants responded to different health-themed questions. The results suggest that peer influence, including both direct communication and exposure to the content peers post, on social media can drive both positive and negative health behaviours. Content posted by peers can encourage users to make healthier choices but also to buy, for example, fast food (Friedman et al., 2022).

Vaterlaus et al. (2015) conducted a study with a similar aim to Friedman et al. (2022), but they used a different method. They focused on the perceived influences of social media on young adults (aged 18–25) health behaviours. Data was collected with eight focus groups and four individual interviews (n=34). Similar to Friedman et al. (2022),

they found that food content posted by participants' friends was perceived to influence them to eat when they were not hungry or have the desire to prepare the food in the post.

Research shows that perceived social norms and peer interaction on social media can influence food choices both positively towards healthy foods and negatively towards unhealthy foods. There are a lot of studies conducted on students and young adults, thus more research is needed on older adults. A summary of the studies mentioned in the text can be found in table 5.

Table 5. Descriptions of studies related to norms and peer interaction and food-related behaviour.

Authors	Study setting	Participants	Norm assessment	Food-related behaviour assessment	Main results
<b>Gleaves et al. (2024), Australia</b>	randomized trial	18–32 years (n=179), 100% female	Participants viewed a Facebook page pertaining to either their university (in-group) or a rival university (out-group). They were presented with either a healthy norm (healthy food items) or an unhealthy norm (unhealthy food items) via a post in which a student discussed their order at a café on the relevant campus.	Food choice was assessed through an online menu where participants were asked to order one main, side, and dessert dish.	Participants who viewed the healthy norm ordered a higher percentage of healthy items (especially in the desserts category) relative to those who viewed the unhealthy norm. However, this effect was significant only for those in the in-group condition; there was no such pattern for participants in the out-group condition.
<b>Hawkins et al. (2020), United Kingdom</b>	cross-sectional	mean age 22,1 (n=369), 87% female	Participants were asked to report their perceptions of Facebook users' consumption of, and preferences for, fruit, vegetables, high-energy dense (HED) snacks and sugar-sweetened beverages (SSB).	Self-reported consumption frequency of fruits, vegetables, HED snacks and SSBs.	Perceived descriptive norms and perceived frequency norms about Facebook users' fruit and vegetable consumption were significant positive predictors of participants' own fruit and vegetable consumption. Conversely, perceived injunctive norms about Facebook users' energy-dense snack and SSB consumption were significant positive predictors of participants' own snack and SSB consumption.
<b>Hawkins et al. (2021), United Kingdom</b>	randomized trial	mean age 23,2 (n=169), 100% female	Participants were assigned to either a HED (high-energy dense), LED (low-energy dense) or control condition, where they viewed three types of images (HED foods, LED foods and interior design as control), but only one type was socially endorsed (e.g., in the control condition, only interior design images were socially endorsed).	Participants were offered grapes or cookies as a snack and consumption of each snack were measured after viewing the images.	Participants consumed a larger proportion of grapes (grams and calories) in the LED condition vs HED condition (all $p < 0.05$ ), and a larger proportion of calories from grapes in the LED compared to control condition ( $p < 0.05$ ).

### 3.3 Social media as a distributor of food cues

Food cues signal not only when to eat but also what to eat (Weingarten, 1985). Passamonti et al. (2009) mention that external food cues, such as pictures of appetizing foods, can stimulate a desire to eat, even in the absence of hunger. In the digital age, social media has become a source of endless food cues. These visual cues have the potential to influence food consumption, highlighting the impact of social media on food-related behaviour.

Frequent use of social media has been associated with an increased likelihood of consuming unhealthy foods in university students (aged 18–29) (Aljefree & Alhothali, 2022). Aljefree and Alhothali (2022) found that frequent TikTok users were more likely to consume fast foods compared to infrequent users. Similarly, less frequent Snapchat users were less likely to consume potato chips, sweets, and sugary drinks compared to daily users (Aljefree & Alhothali, 2022). This could indicate that frequent use of social media may be linked to increased exposure to food cues presenting unhealthy foods leading to a higher likelihood of consuming unhealthy foods. However, social media use and food consumption were self-reported and therefore susceptible to recall bias and misreporting.

Research has shown that exposure to food-related content (e.g., fast-food advertisements) on social media is associated with increased consumption or willingness to consume the foods seen in the content (Wu et al., 2024). For example, Zeeni et al. (2024) assessed the effects of fast food-related Instagram content exposure on cravings in young adults (n=63, aged 18–24) in a randomized controlled trial. The participants were asked to browse either a control Instagram account feed or an account rich in fast food images for 15 min. They found that exposure to fast food content on Instagram increased the feeling of hunger as well as cravings for salty, savoury, and fatty foods. In addition, participants who were exposed to fast food content chose more likely healthier options from a virtual meal tray compared to participants who were exposed to the control content (Zeeni et al., 2024). Although actual food choices were not measured, the results indicate that cravings can subsequently influence them.

Similarly, Qutteina et al. (2022) assessed the relationship between exposure to social media food messages and adolescent food consumption. Adolescents reported their

exposure to food messages by answering 35 items, while food consumption was measured with a food frequency questionnaire. Their cross-sectional survey with 1,002 participants (aged 11–19) revealed that adolescents who were frequently exposed to non-core food (i.e., foods that are high in energy and low in nutrients) content on social media were more likely to prefer and consume non-core foods, such as fried food, chips, and sweets (Qutteina et al., 2022). However, these results were based on self-reported exposure to food messages, and therefore they are susceptible to recall bias. Moreover, the exposure to core and non-core food messages on social media was measured quite comprehensively (with 35 items), however since the content of the items was not provided, it is difficult to interpret what the results actually tell.

Studies show that food cues depicting unhealthy foods on social media are associated with increased consumption of unhealthy foods, especially in adolescents and young adults. There is still a need to investigate the association among older adults, since older adults may be susceptible to social media influence in different ways compared to adolescents and young adults. In addition, there is a limited number of studies investigating the association between healthy food cues and food consumption, thus more studies are needed. A summary of the studies mentioned in the text can be found in table 6.

Table 6. Studies related to food cues on social media and food-related behaviour.

Authors	Study setting	Participants	Social media assessment	Food-related behaviour assessment	Main results
<b>Aljefree &amp; Alhothali (2022), Saudi Arabia</b>	cross-sectional	18–29 years (n=316), 72% female	Self-reported frequency of Snapchat, Facebook, Instagram, YouTube, Twitter, and TikTok usage.	Self-reported consumption frequency of fast foods (e.g., burgers, pizza, McDonalds, shawarma, fried chicken), potato chips (including salty snacks and corn chips), sweets (e.g., chocolate, cakes, donuts, ice cream), and sugary drinks (soft drinks, sports drinks).	Frequent Snapchat, TikTok, and Instagram users tended to have higher consumption rates for potato chips, fast foods, sweets, and sugary drinks.
<b>Qutteina et al. (2022), Belgium</b>	cross-sectional	11–19 years (n=1002), 58% female	The exposure outcome was measured via thirty-five self-reported items that inquired about the extent to which the participant saw core and non-core food messages on their social media.	Consumption of core food items, such as water, vegetables and fruits, and non-core food items. such as soft drinks, fried food, chips and candy was measured with a food frequency questionnaire. Participants were also asked about their intention to eat, food attitudes, perceived norms, and food literacy.	Self-reported exposure to food marketing and overall food messages on social media was positively associated with eating attitudes, behaviours (increased consumption of non-core foods), perceived norms and food literacy among adolescents.
<b>Zeeni et al. (2024). Lebanon</b>	randomized trial	18–24 years (n=63), 68% female	Participants were randomly assigned to browse through one of two pre-set Instagram accounts during 15 min: the control account which follows neutral content or the fast food account which mostly follows fast food-related content.	After the exposure to the Instagram content, the participants were asked to fill-out a short survey containing questions about state body image, mood, and state cravings. At the end of that survey participants were asked to build a hypothetic meal tray choosing from a selection of healthy items (i.e. chicken salad, granola bar, fresh fruit, dried fruit and nut mix) and unhealthy items (i.e. shawarma, French fries, mozzarella sticks, and soft drinks).	Results showed that exposure to fast food content was associated with increased feelings of hunger, stress, sadness, and exhaustion, in addition to higher salty, savoury, and fatty food cravings. Moreover, participants showed higher desire for fast food and lower desire for healthy food items from a virtual food tray after fast food content exposure.

## 4 Research objective and research questions

Research shows that social media use is associated with food-related behaviour through marketing, social norms, peer interaction, and exposure to food-related information. Previous studies, mostly conducted in children and adolescents, have also found that food-related content seen on social media is associated with actual food consumption. Several studies indicate that content picturing unhealthy foods is associated with increased consumption of unhealthy foods, especially among adolescents and young adults (aged 18–29). While both children and adults notice unhealthy food, adults have better self-regulation skills to shift their visual attention away from it (Junghans et al., 2015). Therefore, it could be assumed that the association might be different between children and adults, as adults have a more developed ability to resist unhealthy food cues in the environment. However, susceptibility to social media influence may also vary among adults, with some being more easily guided or influenced than others. Research on adults remains limited, making it important to investigate this relationship further. In addition, there are much fewer studies investigating how food-related content on social media is associated with the consumption of healthy foods. To address these gaps in the literature, this study aims to investigate how social media use, and self-perceived susceptibility to social media influence are associated with the consumption of both unhealthy and healthy foods in adults.

Research questions:

1. How is social media use associated with food consumption in adults?

Hypothesis 1: Based on previous literature it is hypothesized that more frequent social media use is associated with unhealthier diet.

2. How is self-perceived susceptibility to social media influence associated with food consumption in adults?

Hypothesis 2: There is no previous literature investigating the association, thus this question is explorative. However, it can be hypothesized that higher perceived susceptibility to social media influence is associated with unhealthier diet, as food-related content on social media often depicts unhealthy foods, and individuals who are

more susceptible to social media influence are likely to consume more of the foods they see on social media.

## **5 Data and methods**

### **5.1 Study design and study population**

A quantitative cross-sectional study using an online questionnaire was conducted in Finland between June and October 2024. Eligible participants were over 18 years old adults, fluent Finnish speakers with access to the Internet and the capacity to provide informed consent, and with no past or current disordered eating. Disordered eating could confound dietary measures (FFQ) and having participants with disordered eating assess their food consumption may trigger distress or worsen their symptoms. Thus, those participants were not eligible for the study.

A convenience sample of eligible participants was recruited through the researchers' own personal channels, for example through social media, including Facebook, Instagram, and LinkedIn, and via email. The study sample was invited using a link to the questionnaire, which included an informed consent. Of the 315 participants who opened the link to the study questionnaire, 160 (51%) completed to questionnaire and were included in the study. Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Helsinki.

### **5.2 Variables**

#### **5.2.1 Sociodemographic characteristics**

The first part of the questionnaire included questions related to sociodemographic characteristics, including age, gender, highest completed degree, household income (the sum of household members' gross incomes), residential area, number of people living in the household (at least half of the time) and children living in the same household (at least half of the time) (see appendix 2).

Participants reported their highest completed education on a seven-point scale: primary school, vocational school, high school, lower level tertiary, higher level tertiary, licentiate or doctoral degree, or other. Completed degrees were reclassified into three categories: high school/vocational school or lower, Bachelor's degree (university or university of applied sciences), and Master's degree (university or university of applied sciences) or higher. In addition, participants were classified into four family structure categories: single-adult households, two adults, one or two adults

and a child or children, and other (households with three or more adults and households with unknown family structure).

Moreover, monthly gross household income was reported on a seven-point scale ranging from less than 1 500 € to 9 000 € or more. Scaled monthly household income was then calculated as the mean income in each of the categories divided by the square root of household size (OECD square root scale) and classified into five categories (less than 1 999, 2 000–2 999, 3 000–3 999, 4 000–4 999, and 5 000 €/month or more). Finally, the residential area was dichotomized into Uusimaa (the most populous region in southern Finland, including the capital and the surrounding metropolitan area) and elsewhere in Finland.

### 5.2.2 Social media use

The second part of the questionnaire targeted the use of social media platforms, including Facebook, Instagram, LinkedIn, Snapchat, YouTube, X, TikTok, and Pinterest (see appendix 2). Participants were asked to report how many hours and minutes they had used these platforms during the past week by checking their activity from their mobile phones. Participants were also given an opportunity not to answer the question and report why they did not answer the question with answer options: I did not find or was unable to see last week's information; I did not want to report the information; and other reason, where the participant could describe the reason themselves. In addition, participants were asked to report whether they followed any social media influencer or celebrity on social media with answer options "yes", "no", and "I do not know".

If the participant reported that they had used at least one social media platform at least once during the previous week or they reported using a specific social media platform for 0 minutes, other missing usage values were recoded as 0 minutes. However, if the participant did not report any values for any social media platform use, values were considered missing.

The total social media use was calculated by converting hours and minutes into total minutes and then summing the use across different platforms. Since it would be practically negligible to investigate how a one-minute change in social media use is

associated with food consumption, the total social media use was recoded into 30-minute intervals by dividing the total use by 30.

### 5.2.3 Food consumption

The third part of the questionnaire included a food frequency questionnaire (FFQ), where participants reported how many times they had eaten specific foods during the past week (see appendix 3). The FFQ rows were based on a previously validated FFQ used to assess food consumption among preschoolers (Korkalo et al., 2019). Additional rows were added to take the current food environment and food items typically consumed by adults into consideration. The FFQ included 66 food items and seven answer options (not at all, once a week, 2–3 times a week, 4–5 times a week, 6–7 times a week, 2 times a day, and 3 times a day or more).

For the analysis, the answer options of the FFQ were assigned numeric values: not at all = 0, once a week = 1, 2–3 times a week = 2.5, 4–5 times a week = 4.5, 6–7 times a week = 6.5, 2 times a day = 14, and 3 times a day or more = 21. The consumption frequencies of selected food items were then summarized to create larger groups: vegetables, fruits and berries, nuts and seeds, fish, whole grain products, legumes, processed meat, foods high in fat, sugar and/or salt (HFSS), sugar-sweetened beverages (SSB), and fast food (see table 7). Vegetables, fruits and berries, nuts and seeds, fish, whole grain products, and legumes were chosen for the analysis because of their health promoting nature while processed meat, HFSSs, SSBs, and fast food were chosen because of their health inhibiting nature (VRN & THL, 2024).

Based on their consumption of vegetables, fruits and berries, whole grain products, and HFSSs, the participants were dichotomized into consumption below median and consumption above median. Due to the large number of non-consumers, the participants were dichotomized into does not consume and consumers based on their consumption of processed meat, fast food, SSBs, nuts and seeds, fish, and legumes.

Table 7. Summing of the food items (FFQ rows) to produce food groups.

<b>Food items (rows) in the FFQ</b>	<b>Group used in the analysis</b>
Fresh vegetables Cooked side dish and preserved vegetables Fruits Berries	Vegetables, fruits and berries
Unflavoured nuts, almonds, and seeds	Nuts and seeds
Fish and fish products	Fish
Dark rice, pasta, noodles, and other fibre rich side dishes Whole grain bread Rye bread, crispbread and rye crispbread Porridges	Whole grain products
Legumes (peas, beans, and lentils) as a side dish	Legumes
Sausage foods Meat- and sausage cold cuts	Processed meat
Sweet biscuits Doughnuts, Danish pastries, cakes, muffins, sweet buns, pies, and other sweet pastries Chocolate Sweets Ice cream, sorbet and popsicle Chips and popcorn	Foods high in fat, sugar and /or salt (HFSS)
Sugar-sweetened juices Sugar-sweetened soft drinks	Sugar-sweetened beverages (SSB)
Pizza, hamburgers, hot dogs, and kebab Staffed sandwiches, tacos, and tortillas Fried foods	Fast food

#### 5.2.4 Self-perceived susceptibility to social media influence

The fourth part of the questionnaire assessed self-perceived susceptibility to social media influence. Eighteen statements were adapted and translated from a previously validated questionnaire (Keser et al., 2020) (see appendix 4). The original questionnaire was assessed for content and construct validity using a confirmatory factor analysis, and reliability using a Cronbach's alpha coefficient (Keser et al., 2020). Participants answered the statements with a five-point Likert scale ranging from completely agree to completely disagree. Each item was then scored with the same

scale that ranged from one point (completely disagree) to five points (completely agree) and all 18 statements were summed to describe self-perceived susceptibility to social media influence. The total possible score ranged from 18–90.

### **5.3 Statistical analysis**

Data was analysed using Statistical Package for Social Science (SPSS) software, version 28 (IBM Corp, Armonk, NY, USA). Spearman's correlations, T-tests, and ANOVAs were conducted to assess whether social media use and susceptibility to social media influence significantly differed by age, gender, and education level. Chi-squared test was used to analyse whether food consumption significantly differed between participants who reported their social media use and those who did not.

A binary logistic regression analysis was used to analyse the association between social media use, susceptibility to social media influence and food consumption. The models estimate the odds of belonging to a healthier food consumption group, defined as follows: consumption frequency above median for vegetables, fruits and berries and whole grain products, consumption frequency above 0 for nuts and seeds, fish and legumes, consumption frequency below median for HFSS, and non-consumption for processed meat, SSB, and fast food. A confidence interval of 95% was applied to represent the statistical significance of the results.

Altogether four models are presented with the abovementioned food consumption groups separately as the outcomes. In model 1, the exposure variable is total social media use, whereas model 2 has susceptibility to social media influence as the exposure. In model 3, both total social media use and susceptibility to social media influence are included as the exposures. Model 4 is an adjusted model with age (as continuous variable), gender (categorical variable), and education (categorical variable) as confounding factors and total social media use and susceptibility to social media influence as the exposures. According to FinRavinto 2017 study (Valsta et al., 2018), food consumption varies by age, gender and education level, which is why they were chosen as confounding factors to the model. In addition, moderation analyses were conducted to examine whether the associations between social media use and food consumption differed by perceived susceptibility to social media influence. In

these analyses, susceptibility to social media influence was dichotomized based on the median. However, no statistically significant interaction was observed (all p values >0.08), thus it is not reported in the results.

#### **5.4 Ethical review**

The study was reviewed by the University of Helsinki Ethical Review Board in Humanities and Social and Behavioural Sciences (29/2024). Participants were informed of the purpose of the study, and that the study is voluntary and free of charge. No incentive was offered for taking part to the study. The participants had the right to refuse to participate or to withdraw from the study at any time without having to provide a reason for their decision. The participants were also informed that there would be no negative consequences for them if they chose not to participate or decided to discontinue their participation. All participants reported being adults, and informed consent was collected from them. The research data was collected anonymously, ensuring that individuals cannot be identified from the data. The data was stored in electronic form in the University of Helsinki secured database and only the members of the research team had access to the data.

## 6 Results

### 6.1 Participant characteristics

The final sample consisted of 160 participants whose sociodemographic characteristics are described in table 8. The age distribution of the participants was fairly even, with 25–34-year-olds being the largest group with 38 participants. The youngest participant was 19 years old, and the oldest participant was 79 years old. About three-quarters of the participants were women, and almost half of the participants had a Master’s degree or higher degree. Most of the participants lived in a two-adult household and over half of the participants lived in Uusimaa. Three quarters followed a social media influencer or a celebrity on social media.

Table 8. Sociodemographic characteristics of the study participants (N=160).

Variable	N	%
Age		
18-24	31	19
25-34	38	24
35-44	31	19
45-54	36	23
55 and over	24	15
Gender		
woman	122	76
man	38	24
Highest completed degree		
high school/vocational school or lower	34	21
Bachelor’s degree (university or university of applied sciences)	45	28
Master’s degree (university or university of applied sciences) or higher	79	49
missing	2	0
Scaled household income <sup>1</sup>		
Less than 1 999€	35	22
2 000-2 999 €	20	13
3 000-3 999 €	34	21
4 000-4 999 €	35	22
5 000 € or more	32	20
I don’t know/ don’t want to say	4	3
Family structure		
single-adult household	43	27

two adults	67	42
one/two adults and a child/children	35	22
other <sup>2</sup>	15	9
<hr/>		
Living area		
Uusimaa	93	58
elsewhere in Finland	67	42
<hr/>		
Do you follow any social media influencer or celebrity on social media?		
yes	120	75
no	36	23
I don't know	4	3

<sup>1</sup> Mean household monthly income divided by square root of household size reported by participants.

<sup>2</sup> Households with three or more adults and households with unknown family structure.

## 6.2 Social media use

Table 9 describes the average time used in different social media platforms per day among the 133 participants who reported their social media use. The most used social media platform was Instagram (32 minutes per day) followed by Facebook (20 minutes per day) and TikTok (13 minutes per day). Pinterest was the least used platform. The use of social media did not seem to notably differ between weekdays and weekends in any platform. In total, these social media platforms were used on average one hour 30 minutes per day both during weekdays and weekends.

Out of the 27 participants who did not report their social media use, most were women (n=19), older than 45 years (n=18), and had a Master's degree or higher (n=15). Twelve participants (7.5%) reported that they did not find or were unable to find the information, 6 participants (3.8%) did not want to report the information, 8 participants (5%) had other reasons not to report social media use, and one participant (0.6%) did not provide a reason for not reporting frequencies.

Table 9. Average use of different social media platforms (n=133).

	per day on weekdays		per day on weekends		per day during entire week	
	mean	SD	mean	SD	mean	SD
<i>Social media</i>						
Facebook	21 min	1 h 12 min	16 min	25 min	20 min	57 min
Instagram	32 min	35 min	34 min	42 min	32 min	36 min
LinkedIn	1 min	2 min	1 min	4 min	1 min	2 min
Snapchat	9 min	24 min	8 min	20 min	9 min	22 min
YouTube	10 min	24 min	11 min	31 min	11 min	25 min
X	4 min	17 min	5 min	21 min	4 min	18 min
TikTok	13 min	40 min	14 min	43 min	13 min	40 min
Pinterest	0 min	2 min	0 min	2 min	0 min	2 min
total	1 h 31 min	1 h 36 min	1 h 29 min	1 h 15 min	1 h 30 min	1 h 24 min

Table 10 describes the average social media use between the age groups, genders, and education levels. The youngest age group (18–24) used more social media than older age groups ( $p < 0.001$ ). There was no difference between genders or education levels in average social media use.

Table 10. Average social media use between age groups, genders, and education levels (n=131).

	per day during entire week	
	mean	SD
<i>Age</i>		
18-24	2 h 19 min	1 h 27 min
25-34	1 h 41 min	1 h 1 min
35-44	51 min	36 min
45-54	1 h 3 min	48 min
55+	51 min	29 min
<i>Gender</i>		
woman	1 h 25 min	1 h 1 min
man	1 h 30 min	1 h 28 min
<i>Education</i>		
high school/vocational school or lower	1 h 52 min	1 h 31 min
Bachelor's degree	1 h 36 min	1 h 7 min
Master 's degree or higher	1 h 9 min	52 min

### 6.3 Food consumption

Table 11 describes the number of participants who consumed or did not consume nuts and seeds, fish, legumes, processed meat, SSBs, and fast food. The table also describes the median consumption of vegetables, fruits and berries (22 times per week), whole grain products (11.5 times per week), and HFSSs (6 times per week). Most of the participants consumed nuts and seeds, fish, legumes, processed meat, and fast food. Conversely, most of the participants did not consume SSBs. In terms of food consumption, the 27 participants who did not report their social media use did not differ statistically significantly from those who reported their social media use.

Table 11. Dichotomized food consumption groups (N=160).

	Does not consume		Consumes		Mean
	N	%	N	%	times per week
Nuts and seeds	53	33	107	67	2.5
Fish	40	25	120	75	1.5
Legumes	41	26	119	74	2.3
Processed meat	53	33	107	67	3.6
SSB	100	63	60	37	1.1
Fast food	64	40	96	60	1.4

	Consumption below median		Consumption above median		Median
	N	%	N	%	times per week
Vegetables, fruits and berries	81	51	79	49	22
Whole grain products	79	49	81	51	11.5
HFSS	83	52	77	48	6

### 6.4 Susceptibility to social media influence

Figure 2 presents the 18 statements that were used to assess the self-perceived susceptibility to social media influence and the answer frequencies. The agreement with the statements was measured originally with a 5-point Likert scale but they were reclassified into three classes (agree, not agree not disagree, and disagree) in order to clarify the figure. The figure shows that most of the participants disagreed with most of the statements, indicating that they do not perceive themselves to be very susceptible

to social media influence. However, four statements were agreed by approximately 50 percent of the participants. These statements were “I follow content related to nutrition on social media”, “I buy food products or prepare meals that I see on social media”, “Seeing food on social media influences my opinion of that food”, and “The foods I see on social media stimulate my appetite”.

Table 12 describes the average scores for susceptibility to social media influence between the age groups, genders, and education levels. There were statistically significant differences between the age groups and genders (p values <0.001 and <0.001, respectively), whereas no differences were found between the education levels (p=0.110). The median score was 38 (SD 9.6) out of 90 among the whole study sample.

Table 12. Average scores for susceptibility to social media influence between age groups, genders, and education levels (n=158).

	scores for susceptibility <sup>1</sup>	
	mean	SD <sup>2</sup>
Age		
18-24	43	10
25-34	39	9
35-44	37	9
45-54	36	9
55+	33	9
Gender		
woman	40	9
man	34	9
Education		
high school/vocational school or lower	40	8
Bachelor's degree	40	10
Master 's degree or higher	37	10

<sup>1</sup> Calculated as a sum of the 18 statements assessing self-perceived susceptibility to social media influence based on agreement with the statements (from completely agree=5 points to completely disagree=1 point), possible scores 18–90 points.

<sup>2</sup> Standard deviation

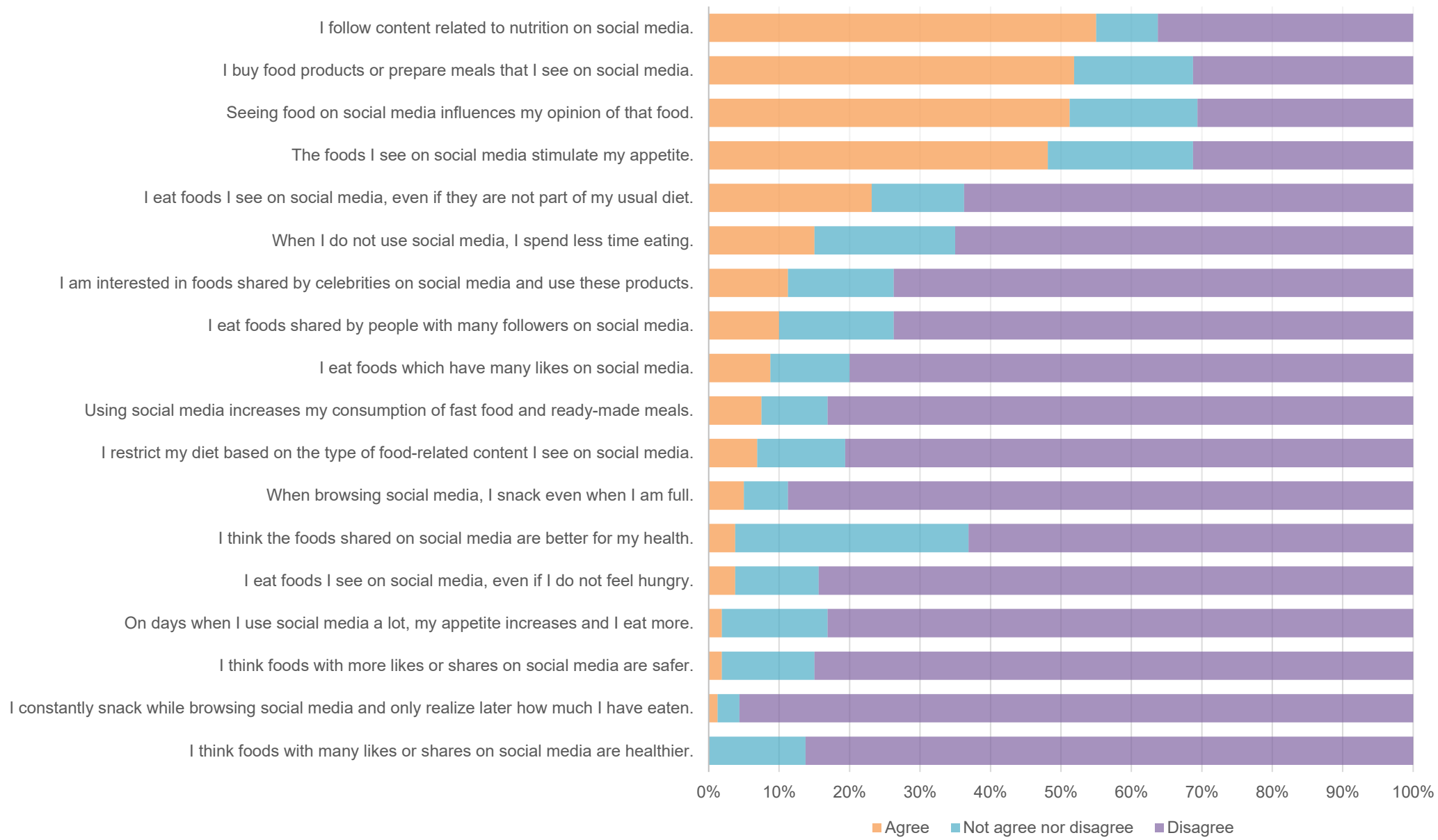


Figure 2. Participants' responses to the statements assessing susceptibility to social media influence.

## 6.5 Associations between social media use, susceptibility to social media influence and food consumption

The analysis revealed statistically significant associations between total social media use and consumption of healthy and unhealthy foods (see tables 13 & 14). In model 1, every 30-minute increase in social media use was associated with a 24% decrease in the odds of consuming nuts and seeds (OR=0.76, 95% CI=0.64-0.90). This means that participants who used more social media were less likely to consume nuts and seeds. This association strengthened in model 3, where susceptibility to social media influence was also included as an exposure (OR=0.65, 95% CI 0.52-0.81) and remained statistically significant in the fully adjusted model 4 (OR=0.69, 95% CI 0.54-0.88). Social media use was also associated with fish consumption. In model 1, participants who used more social media were less likely to consume fish (OR=0.78, 95% CI=0.66-0.93). The association remained unchanged both in models 3 (OR=0.76, 95% CI=0.93-0.92) and 4 (OR=0.80, 95% CI=0.65-0.99). In addition, social media use was associated with decreased odds of consuming whole grain products in model 1 (OR=0.85, 96% CI=0.72-1.00), but not in the other models. Moreover, model 1 showed a borderline significant association between the use of social media and decreased odds of consuming vegetables, fruits and berries frequently (OR=0.86, 95%CI 0.73-1.00).

There was also an association between social media use and HFSSs consumption. In model 1, every 30-minute increase in social media use was associated with a 24% increase in the odds of belonging to the below median consumption group (OR=1.24, 95 % CI=1.05-1.46). In other words, participants who used more social media were more likely to consume HFSSs in moderation. The association strengthened in model 3, where susceptibility to social media influence was also included as an exposure (OR=1.31, 95% CI=1.08-1.59) and in model 4, which also included age, gender, and education as confounders (OR=1.32, 95 % CI=1.07-1.63). There were no significant associations between social media use and the other food groups.

Only one statistically significant association was found between the susceptibility to social media influence and food consumption (see tables 13 & 14). The analysis revealed that the participants who scored higher and thus perceived being more susceptible to social media influence were more likely to consume nuts and seeds frequently (model 2, OR=1.04, 95 % CI=1.01-1.08). The association slightly strengthened in

model 3, where social media use was also included as an exposure (OR=1.08, 95% CI=1.03-1.13) and in model 4, which was further adjusted for age, gender, and education (OR=1.10, 95% CI=1.04-1.17).

Of the confounders in model 4, age was associated with increased likelihood to consume fast food in moderation (OR=1.05, 95 % CI=1.01-1.08). Men were less likely to consume vegetables, fruits, and berries frequently (OR=0.08, 95 % CI=0.02-0.29) and processed meat in moderation (OR= 0.17, 95 % CI=0.04-0.65) compared to women. Moreover, education level was associated with legume consumption. Participants with lower education were less likely to consume legumes compared to participants who had a Master's degree or higher (OR=0.25, 95 % CI=0.07-0.87).

Table 13. Binary logistic regression models explaining the likelihood of belonging to the healthier food consumption group (consumption frequency above median for vegetables, fruits and berries and whole grain products, and above 0 for nuts and seeds, fish and legumes) (n=133). Statistically significant results are bolded.

	Vegetables, fruits and berries <sup>3</sup>		Nuts and seeds <sup>4</sup>		Fish <sup>5</sup>		Whole grain products <sup>6</sup>		Legumes <sup>7</sup>	
	OR <sup>1</sup>	95% CI <sup>2</sup>	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<i>Model 1</i>										
total social media use (1 unit=30 min)	0.86	0.73-1.00	0.76	<b>0.64-0.90</b>	0.78	<b>0.66-0.93</b>	0.85	<b>0.72-1.00</b>	1.11	0.92-1.35
<i>Model 2</i>										
susceptibility to social media influence (1 unit=1 point)	0.99	0.96-1.03	1.04	<b>1.01-1.08</b>	0.99	0.95-1.03	0.99	0.96-1.02	1.03	0.99-1.07
<i>Model 3</i>										
total social media use	0.87	0.73-1.03	0.65	<b>0.52-0.81</b>	0.76	<b>0.63-0.92</b>	0.84	0.70-1.00	1.07	0.87-1.31
susceptibility to social media influence	0.99	0.96-1.03	1.08	<b>1.03-1.13</b>	1.02	0.97-1.07	1.01	0.97-1.05	1.02	0.98-1.07
<i>Model 4</i>										
total social media use	0.95	0.77-1.19	0.69	<b>0.54-0.88</b>	0.80	<b>0.65-0.99</b>	0.84	0.70-1.02	1.10	0.86-1.40
susceptibility to social media influence	0.96	0.91-1.01	1.10	<b>1.04-1.17</b>	1.05	0.99-1.10	1.01	0.96-1.05	1.03	0.97-1.08
age	1.03	1.00-1.07	1.04	1.00-1.09	1.04	1.00-1.09	1.01	0.98-1.04	1.00	0.96-1.04
gender (woman)	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
man	0.08	<b>0.02-0.29</b>	1.23	0.40-3.75	2.26	0.68-7.51	0.87	0.33-2.28	1.19	0.37-3.80
education (Master's degree or higher)	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
high school/vocational school or lower	1.53	0.47-4.91	0.44	0.12-1.57	0.85	0.26-2.82	0.76	0.27-2.10	0.25	<b>0.07-0.87</b>
Bachelor's degree	0.70	0.23-2.16	0.81	0.23-2.89	0.99	0.29-3.33	0.60	0.23-1.61	1.15	0.30-4.35

<sup>1</sup> OR=odds ratio

<sup>2</sup> CI=confidence interval

<sup>3</sup> Fresh vegetables, cooked side dish and preserved vegetables, fruits, and berries.

<sup>4</sup> Unflavoured nuts, almonds, and seeds.

<sup>5</sup> Fish and fish products.

<sup>6</sup> Dark rice, pasta, noodles, and other fibre rich side dishes, whole grain bread, rye bread, crispbread and rye crispbread, and porridges.

<sup>7</sup> Legumes as a side dish: peas, beans, and lentils.

Table 14. Binary logistic regression models explaining the likelihood of belonging to the healthier food consumption group (consumption frequency below median for HFSS (foods high in fat, salt and/or sugar), and non-consumption for processed meat, SSB (sugar-sweetened beverages), and fast food) (n=133). Statistically significant results are bolded.

	Processed meat <sup>3</sup>		HFSS <sup>4</sup>		SSB <sup>5</sup>		Fast food <sup>6</sup>	
	OR <sup>1</sup>	95% CI <sup>2</sup>	OR	95% CI	OR	95% CI	OR	95% CI
<i>Model 1</i>								
total social media use (1 unit=30 min)	1.05	0.90-1.23	1.24	<b>1.05-1.46</b>	0.95	0.82-1.11	0.88	0.74-1.04
<i>Model 2</i>								
susceptibility to social media influence (1 unit=1 point)	1.03	0.99-1.06	1.00	0.97-1.04	0.98	0.95-1.01	0.98	0.95-1.01
<i>Model 3</i>								
total social media use	1.01	0.85-1.20	1.31	<b>1.08-1.59</b>	0.98	0.83-1.16	0.89	0.74-1.07
susceptibility to social media influence	1.03	0.99-1.07	0.97	0.93-1.01	0.98	0.94-1.02	0.99	0.95-1.03
<i>Model 4</i>								
total social media use	1.05	0.85-1.30	1.32	<b>1.07-1.63</b>	1.02	0.85-1.23	0.99	0.81-1.22
susceptibility to social media influence	1.00	0.96-1.05	0.98	0.94-1.02	0.99	0.95-1.03	1.00	0.95-1.05
age	0.98	0.95-1.02	1.01	0.98-1.04	1.02	0.99-1.06	1.05	<b>1.01-1.08</b>
gender (woman)	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
man	0.17	<b>0.04-0.65</b>	1.30	0.49-3.46	1.38	0.51-3.74	0.71	0.25-2.06
education (Master's degree or higher)	<i>ref</i>		<i>ref</i>		<i>ref</i>		<i>ref</i>	
high school/vocational school or lower	1.08	0.33-3.52	0.90	0.32-2.53	0.43	0.15-1.21	0.65	0.21-1.99

Bachelor's degree	1.92	0.65-5.72	0.83	0.31-2.21	0.86	0.31-2.39	0.81	0.29-2.32
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<sup>1</sup> OR=odds ratio

<sup>2</sup> CI=confidence interval

<sup>3</sup> Sausage foods, meat- and sausage cold cuts.

<sup>4</sup> Sweet biscuits, doughnuts, Danish pastries, cakes, muffins, sweet buns, pies, and other sweet pastries, chocolate, sweets, ice cream, sorbet and popsicle, chips and popcorn.

<sup>5</sup> Sugar-sweetened juices and sugar-sweetened soft drinks.

<sup>6</sup> Pizza, hamburgers, hot dogs, kebab, staffed sandwiches, tacos, and tortillas, and fried foods.

## 7 Discussion

This study examined how social media use and self-perceived susceptibility to social media influence are associated with food consumption. The results revealed that social media use was associated with an unhealthier diet, supporting previous research. However, in contrast to previous studies, which have mostly assessed the association between social media use and consumption of unhealthy foods, the present study revealed that social media use was associated with a lower likelihood of consuming healthy foods. To the best of my knowledge, this is the first study to investigate the associations between social media use and consumption of both unhealthy and healthy foods in adults.

### 7.1 Social media use, susceptibility to social media influence, and food consumption

In line with the hypothesis, the present study found that more frequent social media use was associated with a less healthy diet, specifically less frequent consumption of nuts and seeds and fish. One possible explanation for this may be the presence social media algorithms, which define what the users see on their feed by curating content it thinks the user is interested in. It is possible that the study participants are not interested in content featuring healthy foods, leading the algorithm to present such content less frequently. Additionally, social media algorithms often tailor content based on user engagement, such as views, likes, or comments (Ciampaglia et al., 2018). Foods presented in popular posts might not frequently include healthy foods, making them less visible on social media feeds. As Hawkins et al. (2021) describe social media can influence eating behaviour also by communicating social norms. The lack of visibility of healthy foods could result in fewer users perceiving the consumption of healthy foods as a norm, as they are rarely encountering them in their feeds. Moreover, unhealthy foods, such as fast food, may be more appealing for food companies to market, creating competition for the promotion of healthier options. A study conducted in the United States found that 68% of food marketing on social media promoted unhealthy foods (Bragg et al., 2020) supporting this conclusion. As a result, this finding indicates that not only what is seen in the food environment (e.g., unhealthy food content) influences what is consumed but also the lack of exposure (e.g., healthy food content) may result in consuming less of those foods.

Most comparably to the present study Aljefree and Alhothali (2022) found that frequent social media users were more likely to consume fast foods compared to infrequent users.

Somewhat unexpectedly and contrary to the hypothesis, the results of the present study are not consistent with Aljefree and Alhothali (2022), since higher social media use was associated with less frequent HFSS consumption. One possible explanation is the difference between study samples. While Aljefree and Alhothali (2022) included young adults aged 18–29 years, the present study had also older participants (18–79 years). Younger individuals may be more susceptible to social media influence, particularly when exposed to content depicting unhealthy foods, which can lead to higher consumption of these foods. Another explanation may relate to differences in platform use, with younger and older users engaging with different platforms. For example, in the present study, which included wider age range, the participants used Facebook (20 min on average) notably more frequently than X (4 min on average) (see table 9), whereas in the study by Aljefree and Alhothali (2022), which included younger adults, 89% of the participants reported never using Facebook and over half the participants reported daily use of X. The type of food-related content users are exposed to may vary by platform, potentially influencing how much unhealthy food content they see and, consequently, their consumption of these foods. However, the present study did not measure exposure to different types of content, and the amount of time spent on social media may not accurately reflect the extent of exposure to food-related content. As a result, it is challenging to determine the specific content to which the participants were actually exposed to.

When susceptibility to social media influence was added to the model 3 (see tables 13 & 14), the association between social media use and food consumption did not change notably for any food group. This indicates that social media use seems to have an independent association with diet. In contrast to social media use being associated with less frequent consumption of nuts and seeds, higher self-perceived susceptibility to social media influence was associated with more frequent consumption of nuts and seeds. One possible explanation is that content picturing healthy foods, such as nuts and seeds, on social media may have a targeted impact on health-conscious individuals who perceive themselves as being more impressionable to such content. Another possible explanation is that the association between susceptibility to social media influence and food consumption may be influenced by other confounding factors that were not considered in the models. For example, attitudes, preferences, and knowledge are known to influence food choices (Story et al., 2008). Therefore, these factors may have confounded the association, which could explain why the association was not found in other food groups. However, the association remained stable

in adjusted model, suggesting an independent association between susceptibility to social media influence and consumption of nuts and seeds when the most common confounders were included. The statements assessing susceptibility to social media influence may not have been valid, meaning that they did not accurately measure susceptibility. It is also possible that this was a chance result, which was found due to convenience sampling and relatively small sample size. Consequently, the findings do not provide strong evidence of a consistent association between susceptibility to social media influence and food consumption.

## **7.2 Limitations**

Like all studies also this study has limitations. First, since the study design was cross-sectional, it cannot be confirmed that the exposure (social media use and self-perceived susceptibility to social media influence) preceded the outcome (food consumption), thus the direction of the associations cannot be detected. It is possible that the association is bidirectional, or the association is confounded by a third variable creating confounding bias. Individual who is interested in nutrition may seek nutrition-related information from social media and eat differently than individual who is not interested in nutrition. Thus, interest in nutrition may influence both exposure and outcome variables.

Second, food consumption was measured with an FFQ, which only measures the frequency of consumption but not the portion sizes. Therefore, the same value is given to, for example, 50 grams of chocolate and 200 grams of chocolate if they are both eaten at one sitting. This can cause misclassification bias, where individuals with very different consumption amounts may be categorized similarly. It can also lead to overestimation or underestimation of food consumption patterns in relation to social media use. The food consumption was also self-reported, thus it is susceptible to over- or underreporting due to recall bias or pressure of following social norms. Consumption of unhealthy foods may not be perceived as socially accepted, resulting in reporting less frequent consumption of unhealthy foods (Hebert et al., 1995). Similarly, frequent consumption of healthy foods may be perceived as socially desirable, resulting in overreporting, for example, vegetable, fruit and berry consumption (Miller et al., 2008). As a result, misreporting may lead to inaccuracies in estimating the association between social media and food consumption. On the other hand, the FFQ allows more accurate measurement of typical food consumption compared to methods like food diaries, which typically only measure consumption over a few days. In addition, although

the FFQ cannot measure food consumption precisely, the participants can be arranged according to their consumption amounts, and therefore the associations are usually not compromised. However, they may seem to be weaker than they truly are, due to a lack of variation.

Third, social media use was assessed by asking the participants to check the activity from their mobile phones. While this method is more accurate than just self-reported estimates, it does not take into account time spent on platforms like Facebook or YouTube when used from a computer. Additionally, Reddit usage was not measured, which may have led to an underestimation of total social media use particularly among men, since there are more male users on Reddit (Ceci, 2025). Moreover, social media use does not directly measure exposure to food-related content, which may have confounded the associations. Fourth, the statements in the questionnaire assessing self-perceived susceptibility to social media influence were modified and translated to fit the Finnish language, which may have influenced the internal validity of the questionnaire. Additionally, social desirability bias may have led the participants to present themselves as more independent thinkers rather than easily influenced individuals, resulting in an underreporting of their susceptibility to social media influence.

Fifth, convenience sampling was used to recruit the participants, thus the results are susceptible to selection bias. In Finland, 10% of the population has a Master's degree or higher (Statistics Finland, 2023a), compared to 49% in the present study. Additionally, 50.5% of the population are women (Statistics Finland, 2023b), while 76% of the present study were women. Therefore, participants with lower education, and men were underrepresented in the study, which is common in health-related studies (Nummela et al., 2011). This influences the generalizability of the results and can potentially cause bias, since the study results may reflect more the behaviours of higher educated and women. Moreover, the study questionnaire was only in Finnish, thus a part of Finnish people or people living in Finland were automatically excluded. There are around 560,000 people living in Finland, who do not speak Finnish, Swedish, or Sámi, meaning that every 10<sup>th</sup> person living in Finland is a non-native speaker (Statistics Finland, 2024). Therefore, the results are not generalizable to a broader population.

Finally, when analysing the associations, it is not possible to control all confounding factors because some are either unknown or have not been measured, thus leaving room for error

in the analysis. As mentioned earlier, attitudes, preferences, and knowledge may confound the association between susceptibility to social media influence and food consumption. Additionally, income level may influence access to social media and nutritious food, and behavioural factors, such as physical activity may influence screen time and dietary habits, thus confounding the association between social media use and food consumption. However, the most typical confounding factors, age, gender, and education level, were adjusted for in the analysis.

### **7.3 Strengths**

One key strength of this study is its novelty. To the best of my knowledge there are no similar studies conducted in Finland nor internationally, making this study a valuable contribution to the existing literature on social media and food-related behaviour. Another strength is the objectivity of the social media usage data. Unlike many studies that rely on self-reported estimates, this study collected the data according to the participant's smartphone. This decreases the risk of underestimation or overestimation, which has been found to be an issue with self-reported data (Parry et al., 2021). Compared to other similar studies, comprehensive FFQ including both unhealthy and healthy foods was also a strength of this study. Additionally, while there are a lot of studies conducted on adolescents and young adults, studies focusing on older adults are limited. By including a broader age range, this study provides a more comprehensive understanding of how social media is associated with food-related behaviour across different life stages.

### **7.4 Future studies**

Although the findings of the present study add to our understanding of how social media use is associated with food consumption in adults, more research is still needed. For example, it could be beneficial to examine the association in larger observational studies that would include typically underrepresented groups, such as individuals with low education levels and men. In the present study, the type of content (e.g., advertisement, peer's or influencer's post) the participants saw on social media was not measured nor analysed. Future studies should include the type of content seen on social media since it could help to understand the mechanisms through which social media influences food-related behaviour. One potential approach for assessing content exposure would be the use of screen recordings, where participants would record their screens each time they use any social media platform. This method would objectively measure the content viewed. However, due to its high participant

burden and potential ethical issues, if sensitive information is shown on the screen, there is a need to develop reliable, ethical and less burdensome methods to assess social media content exposure.

The association found between social media use and consumption of healthy foods indicates that social media use may have a negative impact on diet, meaning that frequent social media users eat less healthy foods. Future studies should investigate if this association is also found in other populations and what type of content these individuals see on social media. Finally, the findings of the present study do not provide strong evidence of a consistent association between susceptibility to social media influence and food consumption, at least when assessed using the questionnaire employed in this study. Therefore, future studies should seek to develop better methods to assess susceptibility to social media influence.

## 8 Conclusions

Digital technologies are deeply embedded in the structures of modern society, influencing various aspects of life, such as our food environments. These technologies have shaped our food environments to the extent that a concept of a digital food environment has been recognized (Granheim, 2019). One key aspect of digital food environments is social media, which has become a major source of food-related content. Based on both the present and previous studies it can be determined that social media use is associated with food consumption, indicating that digital food environments can shape our diet. It seems that more frequent social media use may lead to an unhealthier diet by reducing the consumption of healthy foods or increasing the consumption of unhealthy foods. The present study also found an association between self-perceived susceptibility to social media influence and food consumption; participants who perceived being more susceptible to social media influence were more likely to consume nuts and seeds frequently. Although this association was consistent in different models, there were no similar findings for other food groups. Therefore, it remains unclear what kind of role susceptibility to social media influence has on diet. In addition, the relationship between social media use and food consumption remained consistent, even after accounting for susceptibility to social media influence in the models, indicating that social media use has an independent relationship with diet.

Social media use, susceptibility to social media influence, as well as food consumption are influenced by multiple different factors. Research on how social media use and food-related content seen on social media influence diet remains limited, which is why further research using reliable methods and extensive data with representative samples is needed to fully understand the phenomenon. In the light of the present study, social media holds potential as an effective platform for nutrition-related interventions by providing a wide-reaching, personalised, and engaging approach. Increasing the visibility of healthy foods on social media could be beneficial, as lack of exposure may contribute to reduced consumption of these foods. Additionally, previous research shows that foods marketed on social media are mostly unhealthy (Bragg et al., 2020). Therefore, both public and private sector organizations play a key role in promoting the visibility of healthy foods on social media.

## References

- Afshin, A., Sur, P. J., Fay, K. A., Cornaby, L., Ferrara, G., Salama, J. S., Mullany, E. C., Abate, K. H., Abbafati, C., Abebe, Z., Afarideh, M., Aggarwal, A., Agrawal, S., Akinyemiju, T., Alahdab, F., Bacha, U., Bachman, V. F., Badali, H., Badawi, A., ... Murray, C. J. L. (2019). Health effects of dietary risks in 195 countries, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, 393(10184), 1958–1972. [https://doi.org/10.1016/S0140-6736\(19\)30041-8](https://doi.org/10.1016/S0140-6736(19)30041-8)
- Ali, S. M., & Lindström, M. (2006). Socioeconomic, psychosocial, behavioural, and psychological determinants of BMI among young women: Differing patterns for underweight and overweight/obesity. *European Journal of Public Health*, 16(3), 324–330. <https://doi.org/10.1093/eurpub/cki187>
- Aljefree, N. M., & Alhothali, G. T. (2022). Exposure to Food Marketing via Social Media and Obesity among University Students in Saudi Arabia. *International Journal of Environmental Research and Public Health*, 19(10), 5851. <https://doi.org/10.3390/ijerph19105851>
- Allen, M., Dickinson, K. M., & Prichard, I. (2018). The Dirt on Clean Eating: A Cross Sectional Analysis of Dietary Intake, Restrained Eating and Opinions about Clean Eating among Women. *Nutrients*, 10(9), 1266. <https://doi.org/10.3390/nu10091266>
- Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. *Journal of the Academy of Marketing Science*, 48(1), 79–95. <https://doi.org/10.1007/s11747-019-00695-1>
- Ash, J., Kitchin, R., & Leszczynski, A. (2018). Digital turn, digital geographies? *Progress in Human Geography*, 42(1), 25–43. <https://doi.org/10.1177/0309132516664800>
- Audrezet, A., de Kerviler, G., & Guidry Moulard, J. (2020). Authenticity under threat: When social media influencers need to go beyond self-presentation. *Journal of Business Research*, 117, 557–569. <https://doi.org/10.1016/j.jbusres.2018.07.008>

- Baldwin, H. J., Freeman, B., & Kelly, B. (2018). Like and share: Associations between social media engagement and dietary choices in children. *Public Health Nutrition*, *21*(17), 3210–3215. <https://doi.org/10.1017/S1368980018001866>
- Boswell, R. G., & Kober, H. (2016). Food cue reactivity and craving predict eating and weight gain: A meta-analytic review. *Obesity Reviews*, *17*(2), 159–177. <https://doi.org/10.1111/obr.12354>
- Bragg, M. A., Pageot, Y. K., Amico, A., Miller, A. N., Gasbarre, A., Rummo, P. E., & Elbel, B. (2020). Fast food, beverage, and snack brands on social media in the United States: An examination of marketing techniques utilized in 2000 brand posts. *Pediatric Obesity*, *15*(5), e12606. <https://doi.org/10.1111/ijpo.12606>
- Ceci, L. (2025, February 13). *Distribution of Reddit users worldwide as of 3rd quarter 2024, by gender*. Statista. <https://www.statista.com/statistics/1255182/distribution-of-users-on-reddit-worldwide-gender/>
- Chau, M. M., Burgermaster, M., & Mamykina, L. (2018). The use of social media in nutrition interventions for adolescents and young adults—A systematic review. *International Journal of Medical Informatics*, *120*, 77–91. <https://doi.org/10.1016/j.ijmedinf.2018.10.001>
- Chen, D., Jaenicke, E. C., & Volpe, R. J. (2016). Food Environments and Obesity: Household Diet Expenditure Versus Food Deserts. *American Journal of Public Health*, *106*(5), 881–888. <https://doi.org/10.2105/AJPH.2016.303048>
- Chung, A. E., Skinner, A. C., Hasty, S. E., & Perrin, E. M. (2016). Tweeting to Health: A Novel mHealth Intervention Using Fitbits and Twitter to Foster Healthy Lifestyles. *Clinical Pediatrics*, *56*(1), 26–32. <https://doi.org/10.1177/0009922816653385>
- Chung, A., Vieira, D., Donley, T., Tan, N., Jean-Louis, G., Gouley, K. K., & Seixas, A. (2021). Adolescent Peer Influence on Eating Behaviors via Social Media: Scoping Review. *Journal of Medical Internet Research*, *23*(6), e19697. <https://doi.org/10.2196/19697>
- Ciampaglia, G. L., Nematzadeh, A., Menczer, F., & Flammini, A. (2018). How algorithmic popularity bias hinders or promotes quality. *Scientific Reports*, *8*(1), 15951. <https://doi.org/10.1038/s41598-018-34203-2>

- Coates, A. E., Hardman, C. A., Halford, J. C. G., Christiansen, P., & Boyland, E. J. (2019a). Food and Beverage Cues Featured in YouTube Videos of Social Media Influencers Popular With Children: An Exploratory Study. *Frontiers in Psychology, 10*.  
<https://doi.org/10.3389/fpsyg.2019.02142>
- Coates, A. E., Hardman, C. A., Halford, J. C. G., Christiansen, P., & Boyland, E. J. (2019b). Social Media Influencer Marketing and Children's Food Intake: A Randomized Trial. *Pediatrics, 143*(4), e20182554. <https://doi.org/10.1542/peds.2018-2554>
- Coates, A. E., Hardman, C. A., Halford, J. C. G., Christiansen, P., & Boyland, E. J. (2019c). The effect of influencer marketing of food and a "protective" advertising disclosure on children's food intake. *Pediatric Obesity, 14*(10), e12540. <https://doi.org/10.1111/ijpo.12540>
- De Veirman, M., Cauberghe, V., & Hudders, L. (2017). Marketing through Instagram influencers: The impact of number of followers and product divergence on brand attitude. *International Journal of Advertising, 36*(5), 798–828. <https://doi.org/10.1080/02650487.2017.1348035>
- Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *The Journal of Abnormal and Social Psychology, 51*(3), 629–636.  
<https://doi.org/10.1037/h0046408>
- DNA. (2024). *Digitaalinen elämä*. <https://corporate.dna.fi/digitaalinen-el%C3%A4m%C3%A4-2024>
- Dufva, T., & Dufva, M. (2019). Grasping the future of the digital society. *Futures, 107*, 17–28.  
<https://doi.org/10.1016/j.futures.2018.11.001>
- Folkvord, F., & de Bruijne, M. (2020). The Effect of the Promotion of Vegetables by a Social Influencer on Adolescents' Subsequent Vegetable Intake: A Pilot Study. *International Journal of Environmental Research and Public Health, 17*(7), 2243.  
<https://doi.org/10.3390/ijerph17072243>
- Freeman, B., Kelly, B., Baur, L., Chapman, K., Chapman, S., Gill, T., & King, L. (2014). Digital Junk: Food and Beverage Marketing on Facebook. *American Journal of Public Health, 104*(12), e56–e64. <https://doi.org/10.2105/AJPH.2014.302167>

- Friedman, V. J., Wright, C. J. C., Molenaar, A., McCaffrey, T., Brennan, L., & Lim, M. S. C. (2022). The Use of Social Media as a Persuasive Platform to Facilitate Nutrition and Health Behavior Change in Young Adults: Web-Based Conversation Study. *Journal of Medical Internet Research*, *24*(5), e28063. <https://doi.org/10.2196/28063>
- Gascoyne, C., Scully, M., Wakefield, M., & Morley, B. (2021). Food and drink marketing on social media and dietary intake in Australian adolescents: Findings from a cross-sectional survey. *Appetite*, *166*, 105431. <https://doi.org/10.1016/j.appet.2021.105431>
- Giskes, K., van Lenthe, F., Avendano-Pabon, M., & Brug, J. (2011). A systematic review of environmental factors and obesogenic dietary intakes among adults: Are we getting closer to understanding obesogenic environments? *Obesity Reviews*, *12*(5), e95–e106. <https://doi.org/10.1111/j.1467-789X.2010.00769.x>
- Gleaves, J. M., Kemps, E., Prichard, I., & Tiggemann, M. (2024). I'll have what She's having (but not what They're having): The moderating role of group membership in the effect of social norms on food choice in an online environment. *Appetite*, *198*, 107374. <https://doi.org/10.1016/j.appet.2024.107374>
- Goodyear, V. A., Wood, G., Skinner, B., & Thompson, J. L. (2021). The effect of social media interventions on physical activity and dietary behaviours in young people and adults: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *18*(1), 72. <https://doi.org/10.1186/s12966-021-01138-3>
- Granheim, S. I. (2019). The digital food environment. *United Nations System Standing Committee on Nutrition*, *44*, 115–121.
- Granheim, S. I., Løvhaug, A. L., Terragni, L., Torheim, L. E., & Thurston, M. (2022). Mapping the digital food environment: A systematic scoping review. *Obesity Reviews*, *23*(1), e13356. <https://doi.org/10.1111/obr.13356>
- Griffiths, S., Castle, D., Cunningham, M., Murray, S. B., Bastian, B., & Barlow, F. K. (2018). How does exposure to thinspiration and fitspiration relate to symptom severity among individuals with eating disorders? Evaluation of a proposed model. *Body Image*, *27*, 187–195. <https://doi.org/10.1016/j.bodyim.2018.10.002>

- Hawkins, L., Farrow, C., & Thomas, J. M. (2020). Do perceived norms of social media users' eating habits and preferences predict our own food consumption and BMI? *Appetite, 149*, 104611. <https://doi.org/10.1016/j.appet.2020.104611>
- Hawkins, L., Farrow, C., & Thomas, J. M. (2021). Does exposure to socially endorsed food images on social media influence food intake? *Appetite, 165*, 105424. <https://doi.org/10.1016/j.appet.2021.105424>
- Hebert, J. R., Clemow, L., Pbert, L., Ockene, I. S., & Ockene, J. K. (1995). Social desirability bias in dietary self-report may compromise the validity of dietary intake measures. *International Journal of Epidemiology, 24*(2), 389–398. <https://doi.org/10.1093/ije/24.2.389>
- Higgs, S. (2015). Social norms and their influence on eating behaviours. *Appetite, 86*, 38–44. <https://doi.org/10.1016/j.appet.2014.10.021>
- Hill, J. O., Wyatt, H. R., Reed, G. W., & Peters, J. C. (2003). Obesity and the Environment: Where Do We Go from Here? *Science, 299*(5608), 853–855. <https://doi.org/10.1126/science.1079857>
- Hofbauer, K. G. (2002). Molecular pathways to obesity. *International Journal of Obesity & Related Metabolic Disorders, 26*, S18. <https://doi.org/10.1038/sj.ijo.0802124>
- Hoffner, C. A., & Bond, B. J. (2022). Parasocial relationships, social media, & well-being. *Current Opinion in Psychology, 45*, 101306. <https://doi.org/10.1016/j.copsyc.2022.101306>
- Holmberg, C., E. Chaplin, J., Hillman, T., & Berg, C. (2016). Adolescents' presentation of food in social media: An explorative study. *Appetite, 99*, 121–129. <https://doi.org/10.1016/j.appet.2016.01.009>
- Horan, T. J. (2024). The effects of urbanization and social media use on individuals' perceived social isolation. *Online Journal of Communication and Media Technologies, 14*(1), e202411. <https://doi.org/10.30935/ojcm/14171>
- Jauho, M., Pääkkönen, J., Isotalo, V., Pöyry, E., & Laaksonen, S.-M. (2023). How do trendy diets emerge? An exploratory social media study on the low-carbohydrate diet in Finland. *Food, Culture & Society, 26*(2), 344–369. <https://doi.org/10.1080/15528014.2021.1971436>

- Jervelycke Belfrage, M. (2018). Young people do consume news in social media: – With a little help from their friends! In *Youth and News in a Digital Media Environment: Nordic-Baltic Perspectives* (pp. 105–114). Nordicom, University of Gothenburg.  
<https://urn.kb.se/resolve?urn=urn:nbn:se:norden:org:diva-11876>
- Junghans, A. F., Hooge, I. T. C., Maas, J., Evers, C., & De Ridder, D. T. D. (2015). UnAdulterated—Children and adults’ visual attention to healthy and unhealthy food. *Eating Behaviors*, *17*, 90–93. <https://doi.org/10.1016/j.eatbeh.2015.01.009>
- Keser, A., Bayındır-Gümüő, A., Kutlu, H., & Öztürk, E. (2020). Development of the scale of effects of social media on eating behaviour: A study of validity and reliability. *Public Health Nutrition*, *23*(10), 1677–1683. <https://doi.org/10.1017/S1368980019004270>
- Ki, C.-W. ‘Chloe’, & Kim, Y.-K. (2019). The mechanism by which social media influencers persuade consumers: The role of consumers’ desire to mimic. *Psychology & Marketing*, *36*(10), 905–922. <https://doi.org/10.1002/mar.21244>
- Klassen, K. M., Douglass, C. H., Brennan, L., Truby, H., & Lim, M. S. C. (2018). Social media use for nutrition outcomes in young adults: A mixed-methods systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *15*(1), 70.  
<https://doi.org/10.1186/s12966-018-0696-y>
- Koponen, P., Borodulin, K., Lundqvist, A., Sääksjärvi, K., & Koskinen, S. (2018). *Terveys, toimintakyky ja hyvinvointi Suomessa – FinTerveys 2017-tutkimus* (Raportti 4/2018). Terveyden ja hyvinvoinnin laitos (THL).
- Korkalo, L., Vepsäläinen, H., Ray, C., Skaffari, E., Lehto, R., Hauta-alus, H. H., Nissinen, K., Meinilä, J., Roos, E., & Erkkola, M. (2019). Parents’ Reports of Preschoolers’ Diets: Relative Validity of a Food Frequency Questionnaire and Dietary Patterns. *Nutrients*, *11*(1), 159.  
<https://doi.org/10.3390/nu11010159>
- Laestadius, L. I., & Wahl, M. M. (2017). Mobilizing social media users to become advertisers: Corporate hashtag campaigns as a public health concern. *DIGITAL HEALTH*, *3*.  
<https://doi.org/10.1177/2055207617710802>

- Ley, S. H., Hamdy, O., Mohan, V., & Hu, F. B. (2014). Prevention and management of type 2 diabetes: Dietary components and nutritional strategies. *The Lancet*, *383*(9933), 1999–2007. [https://doi.org/10.1016/S0140-6736\(14\)60613-9](https://doi.org/10.1016/S0140-6736(14)60613-9)
- Luo, Y., Maafs-Rodríguez, A. G., & Hatfield, D. P. (2024). The individual-level effects of social media campaigns related to healthy eating, physical activity, and healthy weight: A narrative review. *Obesity Science & Practice*, *10*(1), e731. <https://doi.org/10.1002/osp4.731>
- Micha, R., Wallace, S. K., & Mozaffarian, D. (2010). Red and Processed Meat Consumption and Risk of Incident Coronary Heart Disease, Stroke, and Diabetes Mellitus: A Systematic Review and Meta-Analysis. *Circulation*, *121*(21), 2271–2283. <https://doi.org/10.1161/CIRCULATIONAHA.109.924977>
- Miller, T. M., Abdel-Maksoud, M. F., Crane, L. A., Marcus, A. C., & Byers, T. E. (2008). Effects of social approval bias on self-reported fruit and vegetable consumption: A randomized controlled trial. *Nutrition Journal*, *7*, 18. <https://doi.org/10.1186/1475-2891-7-18>
- Montgomery, K. C., & Chester, J. (2009). Interactive Food and Beverage Marketing: Targeting Adolescents in the Digital Age. *Journal of Adolescent Health*, *45*(3, Supplement), S18–S29. <https://doi.org/10.1016/j.jadohealth.2009.04.006>
- Nguyen, M. T. T., Emberger-Klein, A., & Menrad, K. (2019). A Systematic Review on the Effects of Personalized Price Promotions for Food Products. *Journal of Food Products Marketing*, *25*(3), 257–275. <https://doi.org/10.1080/10454446.2018.1529647>
- Nummela, O., Sulander, T., Helakorpi, S., Haapola, I., Uutela, A., Heinonen, H., Valve, R., & Fogelholm, M. (2011). Register-based data indicated nonparticipation bias in a health study among aging people. *Journal of Clinical Epidemiology*, *64*(12), 1418–1425. <https://doi.org/10.1016/j.jclinepi.2011.04.003>
- Parry, D. A., Davidson, B. I., Sewall, C. J. R., Fisher, J. T., Mieczkowski, H., & Quintana, D. S. (2021). A systematic review and meta-analysis of discrepancies between logged and self-reported digital media use. *Nature Human Behaviour*, *5*(11), 1535–1547. <https://doi.org/10.1038/s41562-021-01117-5>

- Passamonti, L., Rowe, J. B., Schwarzbauer, C., Ewbank, M. P., Hagen, E. von dem, & Calder, A. J. (2009). Personality Predicts the Brain's Response to Viewing Appetizing Foods: The Neural Basis of a Risk Factor for Overeating. *Journal of Neuroscience*, *29*(1), 43–51. <https://doi.org/10.1523/JNEUROSCI.4966-08.2009>
- Pitts, S. B. J., Ng, S. W., Blitstein, J. L., Gustafson, A., & Niculescu, M. (2018). Online grocery shopping: Promise and pitfalls for healthier food and beverage purchases. *Public Health Nutrition*, *21*(18), 3360–3376. <https://doi.org/10.1017/S1368980018002409>
- Polivy, J., Herman, C. P., & Coelho, J. S. (2008). Caloric restriction in the presence of attractive food cues: External cues, eating, and weight. *Physiology & Behavior*, *94*(5), 729–733. <https://doi.org/10.1016/j.physbeh.2008.04.010>
- Qutteina, Y., Hallez, L., Mennes, N., De Backer, C., & Smits, T. (2019). What Do Adolescents See on Social Media? A Diary Study of Food Marketing Images on Social Media. *Frontiers in Psychology*, *10*. <https://doi.org/10.3389/fpsyg.2019.02637>
- Qutteina, Y., Hallez, L., Raedschelders, M., Backer, C. D., & Smits, T. (2022). Food for teens: How social media is associated with adolescent eating outcomes. *Public Health Nutrition*, *25*(2), 290–302. <https://doi.org/10.1017/S1368980021003116>
- Rini, L., Schouteten, J. J., Faber, I., Bom Frøst, M., J A Perez-Cueto, F., & De Steur, H. (2024). Social media and food consumer behavior: A systematic review. *Trends in Food Science & Technology*, *143*, 104290. <https://doi.org/10.1016/j.tifs.2023.104290>
- Ruggeri, A., & Samoggia, A. (2018). Twitter communication of agri-food chain actors on palm oil environmental, socio-economic, and health sustainability. *Journal of Consumer Behaviour*, *17*(1), 75–93. <https://doi.org/10.1002/cb.1699>
- Rutsaert, P., Pieniak, Z., Regan, Á., McConnon, Á., Kuttschreuter, M., Lores, M., Lozano, N., Guzzon, A., Santare, D., & Verbeke, W. (2014). Social media as a useful tool in food risk and benefit communication? A strategic orientation approach. *Food Policy*, *46*, 84–93. <https://doi.org/10.1016/j.foodpol.2014.02.003>
- Shabahang, R., Kim, S., Chen, X., Aruguete, M. S., & Zsila, Á. (2024). Downloading appetite? Investigating the role of parasocial relationship with favorite social media food influencer in

followers' disordered eating behaviors. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, 29(1), 28. <https://doi.org/10.1007/s40519-024-01658-4>

Smit, C. R., Buijs, L., van Woudenberg, T. J., Bevelander, K. E., & Buijzen, M. (2020). The Impact of Social Media Influencers on Children's Dietary Behaviors. *Frontiers in Psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.02975>

Statistics Finland. (2023a). *15 vuotta täyttänyt väestö koulutusasteen, kunnan, sukupuolen ja ikäryhmän mukaan, 1970-2023*. [Data set]. Helsinki: Tilastokeskus.

[https://pxdata.stat.fi/PxWeb/pxweb/fi/StatFin/StatFin\\_\\_vkour/statfin\\_vkour\\_pxt\\_12bq.px/table/tableViewLayout1/](https://pxdata.stat.fi/PxWeb/pxweb/fi/StatFin/StatFin__vkour/statfin_vkour_pxt_12bq.px/table/tableViewLayout1/)

Statistics Finland. (2023b). *Väestöluku ja väestömäärän muutos sukupuolen mukaan, 1750-2023*. [Data set]. Helsinki: Tilastokeskus.

[https://pxdata.stat.fi/PxWeb/pxweb/fi/StatFin/StatFin\\_\\_vaerak/statfin\\_vaerak\\_pxt\\_11rb.px/table/tableViewLayout1/](https://pxdata.stat.fi/PxWeb/pxweb/fi/StatFin/StatFin__vaerak/statfin_vaerak_pxt_11rb.px/table/tableViewLayout1/)

Statistics Finland. (2023c). *Väestön tieto- ja viestintätekniiikan käyttö*. [Data set]. ISSN=2341-8699. Helsinki: Tilastokeskus. <https://stat.fi/tilasto/sutivi>

Statistics Finland. (2024, April 26). *Väkiluvun kasvu suurin lähes 70 vuoteen*. Tilastokeskus. <https://stat.fi/julkaisu/eln1i2dtgwkntocut9yem67se>

Story, M., Kaphingst, K. M., Robinson-O'Brien, R., & Glanz, K. (2008). Creating Healthy Food and Eating Environments: Policy and Environmental Approaches. *Annual Review of Public Health*, 29, 253–272. <https://doi.org/10.1146/annurev.publhealth.29.020907.090926>

Su, B.-C., Wu, L.-W., Chang, Y.-Y.-C., & Hong, R.-H. (2021). Influencers on Social Media as References: Understanding the Importance of Parasocial Relationships. *Sustainability*, 13(19), 10919. <https://doi.org/10.3390/su131910919>

Swinburn, B., Sacks, G., Vandevijvere, S., Kumanyika, S., Lobstein, T., Neal, B., Barquera, S., Friel, S., Hawkes, C., Kelly, B., L'Abbé, M., Lee, A., Ma, J., Macmullan, J., Mohan, S., Monteiro, C., Rayner, M., Sanders, D., Snowdon, W., ... Informas. (2013). INFORMAS (International Network for Food and Obesity/non-communicable diseases Research, Monitoring and

Action Support): Overview and key principles. *Obesity Reviews*, 14(S1), 1–12.

<https://doi.org/10.1111/obr.12087>

Uusitupa, M., Khan, T. A., Vigiouliouk, E., Kahleova, H., Rivellese, A. A., Hermansen, K., Pfeiffer, A., Thanopoulou, A., Salas-Salvadó, J., Schwab, U., & Sievenpiper, J. L. (2019). Prevention of Type 2 Diabetes by Lifestyle Changes: A Systematic Review and Meta-Analysis. *Nutrients*, 11(11), 2611. <https://doi.org/10.3390/nu11112611>

Valsta, L., Kaartinen, N., Tapanainen, H., Männistö, S., & Sääksjärvi, K. (2018). *Ravitsemus Suomessa—FinRavinto 2017 -tutkimus* (Report No. 12/2018). Terveiden ja hyvinvoinnin laitos (THL). <https://urn.fi/URN:ISBN:978-952-343-238-3>

Valtion ravitsemusneuvottelukunta (VRN), & Terveiden ja hyvinvoinnin laitos (THL). (2024). *Kestävää terveyttä ruoasta – kansalliset ravitsemussuosituksset 2024*. <https://urn.fi/URN:ISBN:978-952-408-405-5>

Vaterlaus, J. M., Patten, E. V., Roche, C., & Young, J. A. (2015). #Gettinghealthy: The perceived influence of social media on young adult health behaviors. *Computers in Human Behavior*, 45, 151–157. <https://doi.org/10.1016/j.chb.2014.12.013>

Wang, C.-H., Sher, S. T.-H., Salman, I., Janek, K., & Chung, C.-F. (2022). “TikTok Made Me Do It”: Teenagers’ Perception and Use of Food Content on TikTok. *Interaction Design and Children*, 458–463. <https://doi.org/10.1145/3501712.3535290>

Weingarten, H. P. (1985). Stimulus control of eating: Implications for a two-factor theory of hunger. *Appetite*, 6(4), 387–401. [https://doi.org/10.1016/S0195-6663\(85\)80006-4](https://doi.org/10.1016/S0195-6663(85)80006-4)

Willemsen, L. M., Neijens, P. C., Bronner, F., & de Ridder, J. A. (2011). “Highly Recommended!” The Content Characteristics and Perceived Usefulness of Online Consumer Reviews. *Journal of Computer-Mediated Communication*, 17(1), 19–38. <https://doi.org/10.1111/j.1083-6101.2011.01551.x>

World Cancer Research Fund (WCRF) & American Institute for Cancer Research (AICR). (2018). *Diet, nutrition, physical activity and cancer: A global perspective: a summary of the Third expert report*. World Cancer Research Fund International. <https://www.wcrf.org/wp-content/uploads/2024/11/Summary-of-Third-Expert-Report-2018.pdf>

- World Health Organization (WHO). (2003). *Diet, Nutrition and the Prevention of Chronic Diseases: Report of a Joint WHO/FAO Expert Consultation* (WHO technical report series;916). World Health Organization.  
<https://www.who.int/publications/i/item/924120916X>
- World Health Organization (WHO). (2016). *Tackling food marketing to children in a digital world: Trans-disciplinary perspectives: children's rights, evidence of impact, methodological challenges, regulatory options and policy implications for the WHO European Region*. World Health Organization. Regional Office for Europe.  
<https://iris.who.int/handle/10665/344003>
- World Health Organization (WHO). (2021). *Digital food environments* (WHO/EURO:2021-2755-42513-59052). <https://iris.who.int/bitstream/handle/10665/342072/WHO-EURO-2021-2755-42513-59052-eng.pdf?sequence=1>
- Wu, Y., Kemps, E., & Prichard, I. (2024). Digging into digital buffets: A systematic review of eating-related social media content and its relationship with body image and eating behaviours. *Body Image*, 48, 101650. <https://doi.org/10.1016/j.bodyim.2023.101650>
- Zeeni, N., Abi Kharma, J., Malli, D., Khoury-Malhame, M., & Mattar, L. (2024). Exposure to Instagram junk food content negatively impacts mood and cravings in young adults: A randomized controlled trial. *Appetite*, 195, 107209.  
<https://doi.org/10.1016/j.appet.2024.107209>
- Zhang, Y., He, D., & Sang, Y. (2013). Facebook as a Platform for Health Information and Communication: A Case Study of a Diabetes Group. *Journal of Medical Systems*, 37(3), 9942. <https://doi.org/10.1007/s10916-013-9942-7>

## Appendices

### Appendix 1 The use of AI

Grammarly and ChatGPT were used for language-checking and translations. Keenious was used for reference searching, and Zotero for organizing references. ChatGPT was used to help interpret the results of the statistical analyses and aiding with writing code in SPSS syntax. These tools did not influence the content, and they were not used in the abstract.

### Appendix 2 Sociodemographic characteristics and social media use

1. Ikäsi: \_\_vuotta
2. Sukupuoli
  - a. Nainen
  - b. Mies
  - c. Muunsukupuolinen
  - d. En halua kertoa
  - e. Haluan kuvailla itse (vapaa teksti)
3. Korkein suorittamasi tutkinto
  - a. Peruskoulu
  - b. Ammattikoulu
  - c. Lukio/ylioppilastutkinto
  - d. Alempi korkeakoulututkinto (esim. kandidaatin tutkinto / AMK)
  - e. Ylempi korkeakoulututkinto (esim. maisterin tutkinto / YAMK)
  - f. Lisensiaatin tai tohtorin tutkinto
  - g. Muu, mikä? (vapaa teksti)
4. Mitkä ovat kotitaloutesi (sisältäen kaikki kotitaloudessa asuvat henkilöt) yhteenlasketut bruttoansiot (tulot ennen verojen vähentämistä) kuukaudessa?
  - a. Alle 1500 euroa kuukaudessa
  - b. 1500–2999 euroa kuukaudessa
  - c. 3000–4499 euroa kuukaudessa
  - d. 4500–5999 euroa kuukaudessa
  - e. 6000–7499 euroa kuukaudessa
  - f. 7500–8999 euroa kuukaudessa
  - g. 9000 euroa tai enemmän kuukaudessa
  - h. En osaa / en halua sanoa
5. Mikä on pääasiallinen asuinmaakuntasi?

- a. Ahvenanmaa
- b. Etelä-Karjala
- c. Etelä-Pohjanmaa
- d. Etelä-Savo
- e. Kainuu
- f. Kanta-Häme
- g. Keski-Pohjanmaa
- h. Keski-Suomi
- i. Kymenlaakso
- j. Lappi
- k. Päijät-Häme
- l. Pirkanmaa
- m. Pohjanmaa
- n. Pohjois-Karjala
- o. Pohjois-Pohjanmaa
- p. Pohjois-Savo
- q. Satakunta
- r. Uusimaa
- s. Varsinais-Suomi

6. Kuinka monta henkilöä kotitalouteesi kuuluu tällä hetkellä sinut itsesi mukaan lukien? Laske mukaan henkilöt, jotka asuvat kotitaloudessa vähintään puolet ajasta.

- a. 1 henkilö
- b. 2 henkilöä
- c. 3 henkilöä
- d. 4 henkilöä
- e. 5 henkilöä
- f. 6 henkilöä tai enemmän

7. Kuinka monta alaikäistä lasta (alle 18-vuotiasta) kotitaloudessasi asuu tällä hetkellä? Laske mukaan henkilöt, jotka asuvat kotitaloudessa vähintään puolet ajasta.

- a. 1 lapsi
- b. 2 lasta
- c. 3 lasta
- d. 4 lasta tai enemmän

8. Oletko tällä hetkellä:



LinkedIn	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min
Snapchat	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min
YouTube	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min
X (aiemmin Twitter)	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min
TikTok	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min
Pinterest	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min	__ h __ min

10. En vastannut edellä olevaan kysymykseen, sillä...

- En löytänyt tai pystynyt katsomaan viime viikon tietoja
- En halunnut raportoida tietoja
- Muu syy, mikä? (vapaa teksti)

11. Arvioi vielä, kuinka paljon käytit aikaa blogien lukemiseen viime viikon aikana?

- En lainkaan
- Alle tunnin
- 1–2 tuntia
- 2–3 tuntia
- 3–4 tuntia
- 4 tuntia tai enemmän

12. Seuraatko ketään sosiaalisen median vaikuttajaa tai julkisuuden henkilöä sosiaalisessa mediassa?

- Kyllä
- En
- En osaa sanoa

## Appendix 3 Food frequency questionnaire

1. Noudatatko erityisruokavaliota? Valitse alla olevista yksi tai useampi vaihtoehto.
  - a. Ei erityisruokavaliota tai välttämisruokavaliota
  - b. Ruoka-aineallergia, jonka vuoksi vältän ruokia
  - c. Laktoositon tai vähälaktoosinen ruokavalio
  - d. Gluteeniton ruokavalio (vältän vehnää, ruista ja ohraa)
  - e. Ruokavalio, joka ei sisällä punaista lihaa
  - f. Kasvisruokavalio, joka sisältää kalaa, maitoa ja kananmunaa
  - g. Kasvisruokavalio, joka sisältää maitoa ja kananmunaa
  - h. Vegaaniruokavalio (ei eläinperäisiä tuotteita)
  - i. Muu ruokavalio, mikä? (vapaa teksti)
  
2. Ajattele edellistä viikkoa (7 vrk). Kuinka monta kertaa olet syönyt seuraavia ruokia? Valitse mielestäsi parhaiten sopiva vaihtoehto. Tutkimuksessa ollaan kiinnostuneita vain tietyistä ruoka-aineista. Niitä ruoka-aineita, joita ei erikseen kysytä, ei tarvitse merkitä mihinkään.

Vastausvaihtoehdot:

- a. ei kertaakaan
- b. kerran viikossa
- c. 2–3 kertaa viikossa
- d. 4–5 kertaa viikossa
- e. päivittäin tai lähes päivittäin (6–7 kertaa viikossa)
- f. 2 kertaa päivässä
- g. 3 kertaa päivässä tai enemmän

### 1. Kasvikset, hedelmät ja marjat

- A. Tuoreet kasvikset (esim. sekasalaatti, porkkanaraaste, tomaatti, kurkku, juurespalat)
- B. Kypsennetyt lisuke- ja säilykekasvikset (esim. uunijuurekset, höyrytetyt kasvikset, keitetty maissi)
- C. Palkokasvit lisukkeena: herneet, pavut ja linssit (sellaisenaan, esim. pakastetut ja tuoreet herneet, vihreät pavut, hummus)
- D. Peruna (esim. keitetty, paistettu tai perunamuusi, uuniperunat, pakasteranskalaiset, ei uppopaistettut ranskanperunat)
- E. Hedelmät (tuoreet ja säilykehedelmät, pakastetut hedelmät, myös osana itse tehtyjä smoothieita)
- F. Marjat (tuoreet ja pakastetut, myös osana itse tehtyjä smoothieita)
- G. Hedelmä- ja marjasoseet, valmiit smoothiet (esim. mango- tai marjasose, smoothie-pussit, marjasmoothie)

H. Marja- ja hedelmäkiisselit ja -keitot, mehukeitot

## **2. Maitovalmisteet (ei kasvipohjaiset)**

A. Rasvaton maito ja piimä sellaisenaan (juomana tai esim. murojen tai puuron kanssa, kahvissa tai teessä)

B. Ykkös- ja kevytmaito ja -piimä, täysmaito ja -piimä sellaisenaan (juomana tai esim. murojen tai puuron kanssa, kahvissa tai teessä)

C. Maustetut tai makeutetut maitopohjaiset juomat (esim. kaakao, maitokahviuomat, proteiinijuomat)

D. Maustamaton jogurtti, viili ja rahka (esim. maitorahka, luonnonjogurtti, turkkilainen jogurtti)

E. Maustettu tai makeutettu jogurtti, viili ja rahka (esim. proteiinirahka, mustikkarahka, juotava jogurtti, kefiiri)

F. Vanukkaat ja muut maitopohjaiset jälkiruoat (esim. kaakao- tai kinuskivanukas, suklaa-mansikka proteiinivanukas, riisivanukas, suklaamousse)

G. Vähärasvaiset juustot (rasvaa 17 % tai vähemmän, esim. Polar 15, Oltermanni kevyempi 17 %, raejuusto, vähärasvainen salaattijuusto)

H. Rasvaiset juustot (rasvaa yli 17 %, esim. Oltermanni, gouda, Pirkka punaleimaemmental, fetajuusto, parmesan)

## **3. Kasvipohjaiset juomat, välipalat ja juustot**

A. Maustamattomat kasvijuomat (esim. kaurajuoma, soijajuoma, mantelijuoma, barista kaurajuoma)

B. Maustetut tai makeutetut kasvijuomat (esim. suklaa- tai vaniljasojajuoma, välipalakaaurajuoma, Dumle-kaurajuoma)

C. Maustamattomat kasvipohjaiset jogurtit ja rahkat (esim. maustamaton, sokeroimaton soija- tai kaurapohjainen jogurtti)

D. Maustetut tai makeutetut kasvipohjaiset jogurtit ja rahkat (esim. soijapohjainen jogurtti, Kauragurtti, kauravälipala)

E. Kasvipohjaiset vanukkaat ja muut jälkiruoat (esim. soija- tai kaurapohjainen suklaa- tai kinuskivanukas)

F. Kasvipohjaiset (vegaaniset) juustot (esim. Violife, Oddlygood)

#### 4. Pikaruoka ravintolassa, noutoruoka

- A. Pizza, hampurilaiset, hotdogit ja kebab
- B. Täytetyt leivät, tacot ja tortillat (esim. Subway)
- C. Uppopaistetut (friteeratut) ruoat (esim. ranskalaiset, wingsit, nuggetit, lihapiirakat, falafelit)

#### 5. Pääruoat (ei pikaruoka) ja lihaleikkeleet

- A. Liharuokat (punainen liha eli naudan-, sian-, karitsan- ja lampaanliha, riista, esim. lihapullat, makaronilaatikko, jauhelihakastike)
- B. Makkararuokat (esim. makkarakeitto, nakkikastike, pekonipasta, itse tehty tai pakastesalamipizza, grillimakkara, nakit)
- C. Broileri-, kana- ja kalkkunaruokat (esim. kalkkunakastike, broileriwok, broilerinkoivet, itse tehty tai eineskanahampurilainen)
- D. Kalaruoat ja kalavalmisteet (esim. kalakeitto, paistettu kala, kalapuikot, tonnikala, sushi)
- E. Kasvisruoat (esim. pinaattiletut, kasvishernekeitto, Härkis®-lasagne, seitan- tai tofukastike, linssi- tai papupata, kasvismakkarat ja -nakit, ei uppopaistetut falafelit)
- F. Kananmunaruokat (kananmuna sellaisenaan, esim. paistettu, keitetty, munakas)
- G. Liha- ja makkaraleikkeleet (esim. keittokinkku, saunapalvi, suolaliha, kalkkunaleikkele, meetwursti, pekoni sellaisenaan)

#### 6. Viljavalmistet

- A. Tumma riisi, pasta, nuudeli ja muut kuitupitoiset aterialisäkkeet (esim. täysjyväriisi, tumma makaroni, täysjyvänuudeli, täysjyväcouscous, ohra- ja kauralisäkkeet)
- B. Vaalea riisi, pasta ja nuudeli ja muut aterialisäkkeet (esim. jasmiini- tai basmatiriisi, pitkäjyväinen riisi, spagetti, gnocchi, vehnä- tai riisinuudeli, couscous)
- C. Ruisleipä, näkkileipä ja hapankorppu
- D. Vaalea täysjyväleipä (esim. sekaleipä, grahamsämpylä, kuitupitoinen kauraleipä)
- E. Vaalea leipä (esim. ranskanleipä, vaalea paahtoleipä)
- F. Sokeroidut murot ja myslit (esim. hunaja- tai kaakaomurot, muromyslit, Kotimaista hedelmämysli, Pirkka kilomysli)
- G. Sokerittomat tai vähäsokeriset murot ja myslit (esim. Weetabix, Alpen makeuttamaton myslit, Paulúns granola)

- H. Puurot (esim. kaurapuuro, neljän viljan puuro, riisipuuro, mannapuuro)
- I. Välipala- ja keksipatukat, välipalakeksit (esim. Corny BIG, myslipatukat, proteiinipatukat, Elovena välipalakeksi, riisikakut)
- J. Makeat keksit (esim. Jaffakeksi, Domino, cookiesit)
- K. Munkit, viinerit, kakut, muffinssit, pullat, piirakat ja muut makeat leivonnaiset (myös pannukakku ja letut)
- L. Suolaiset leivonnaiset (esim. karjalanpiirakka, pasteija, kasvispiirakka, croissant)

## **7. Juomat**

- A. Sokeroidut mehut (esim. pillimehut, sekamehu, Juissi, itse tehty sokeroitu mehu)
- B. Täysmehut (ei lisättyä sokeria, esim. 100 % appelsiinimehu, tuorepuristettu mehu)
- C. Sokeroidut virvoitusjuomat (esim. Coca-Cola, Jaffa, jäätee)
- D. Vähäsokeriset mehut ja virvoitusjuomat (esim. light-juomat, stevialla makeutetut juomat, Pepsi Max, Coca-Cola Zero)
- E. Energiajuomat (sekä sokeroidut että sokerittomat, esim. Battery, NOCCO, Monster Energy)
- F. Pullotetut vedet ja kivennäisvedet (esim. lähdevesi, Novelle, kivennäisvesi, vitamiinivedet)
- G. Kahvi (suodatinkahvi, erikoiskahvit, esim. cappuccino, caffe latte)
- H. Tee (musta ja vihreä tee, rooibos, yrttiteet)
- I. Alkoholipitoiset juomat (esim. siideri, olut, viini)

## **8. Muut**

- A. Suklaa (esim. suklaapatukat, suklaarusinat, konvehdit, maitosuklaa)
- B. Makeiset (esim. salmiakki- tai hedelmäkarkit, lakritsi, toffee, irtokarkit, tikkarit)
- C. Jäätelö, sorbetit ja mehujäät (myös kasvipohjainen, esim. Pingviini, Tofuline)
- D. Lisätty sokeri, hunaja tai siirappi (esim. puuroon, kahviin, teehen, marjoihin, jogurttiin tai rahkaan)
- E. Hillot ja marmeladit
- F. Maustamattomat pähkinät, mantelit ja siemenet (myös 100 % maapähkinävoi)

G. Maustetut pähkinät, mantelit ja siemenet (esim. suolapähkinät, makeutettu ja/tai suolattu maapähkinävoi)

H. Sipsit ja popcornit (esim. perunalastut, linssisipsit, nachot tai tortillasipsit)

## **9. Ravintorasvat**

A. Kasviöljyt (esim. rypsiöljy, oliiviöljy)

B. Öljypohjaiset salaattinkastikkeet (esim. ranskalainen tai hunaja-sinappisalaattinkastike)

C. Voi ja voi-kasviöljyseos (esim. Oivariini, Rypsi-voi)

D. Margariini,  $\geq 60$  % rasvaa (esim. Keiju, Becel, Flora)

E. Margariini, rasvalevitteet,  $< 60$  % rasvaa (esim. kevyt Becel)

## Appendix 4 Statements for assessing self-perceived susceptibility to social media influence

Vastausvaihtoehdot:

- a. täysin samaa mieltä
- b. samaa mieltä
- c. en samaa enkä eri mieltä
- d. eri mieltä
- e. täysin eri mieltä

1. Ruoan näkyminen sosiaalisessa mediassa vaikuttaa mielipiteeseeni kyseisestä ruoasta. / Seeing food on social media influences my opinion of that food.
2. Syön ruokia, joita näen sosiaalisessa mediassa, vaikka ne eivät olisi osa tavallista ruokavaliotani. / I eat foods I see on social media, even if they are not part of my usual diet.
3. Syön ruokia, joita näen sosiaalisessa mediassa, vaikka en tuntisi itseäni nälkäiseksi. / I eat foods I see on social media, even if I do not feel hungry.
4. Mielestäni ruoat, joihin liittyvää sisältöä jaetaan sosiaalisessa mediassa, ovat parempia terveydelleni. / I think the foods shared on social media are better for my health.
5. Sosiaalisen median käyttö lisää pikaruoa ja valmisruokien kulutustani. / Using social media increases my consumption of fast food and ready-made meals.
6. Seuraan ravitsemukseen liittyvää sisältöä sosiaalisessa mediassa. / I follow content related to nutrition on social media.
7. Ostan elintarvikkeita tai valmistan ruokia, joita näen sosiaalisessa mediassa. / I buy food products or prepare meals that I see on social media.
8. Rajoitan ruokavaliotani sen perusteella, millaista ruokaan liittyvää sisältöä näen sosiaalisessa mediassa. / I restrict my diet based on the type of food-related content I see on social media.
9. Napostelen jatkuvasti sosiaalista mediaa selatessani, ja tajuan vasta myöhemmin, kuinka paljon söin. / I constantly snack while browsing social media and only realize later how much I have eaten.
10. Olen kiinnostunut elintarvikkeista, joita julkisuuden henkilöt jakavat sosiaalisessa mediassa, ja käytän näitä elintarvikkeita. / I am interested in foods shared by celebrities on social media and use these products.
11. Kun en käytä sosiaalista mediaa, käytän vähemmän aikaa syömiseen. / When I do not use social media, I spend less time eating.

12. Kun selaan sosiaalista mediaa, napostelen, vaikka olisin kylläinen. / When browsing social media, I snack even when I am full.
13. Syön ruokia, joita paljon seuraajia omaavat henkilöt ovat jakaneet sosiaalisessa mediassa. / I eat foods shared by people with many followers on social media.
14. Mielestäni ruoat, joilla on paljon tykkäyksiä tai jakoja sosiaalisessa mediassa, ovat terveellisempiä. / I think foods with many likes or shares on social media are healthier.
15. Sosiaalisessa mediassa näkemäni ruoat herättävät ruokahaluni. / The foods I see on social media stimulate my appetite.
16. Syön ruokia, joihin liittyvällä sisällöllä on paljon tykkäyksiä sosiaalisessa mediassa. / I eat foods which have many likes on social media.
17. Mielestäni ruoat, joilla on enemmän tykkäyksiä tai jakoja sosiaalisessa mediassa, ovat turvallisempia. / I think foods with more likes or shares on social media are safer
18. Päivinä, joina käytän paljon sosiaalista mediaa, ruokahaluni kasvaa ja syön enemmän. / On days when I use social media a lot, my appetite increases, and I eat more.