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Healthiness, naturalness and sustainability perception of adolescents toward chocolate snack bars

Femke Damen
Food Quality and Design, Wageningen University, Wageningen, The Netherlands and Isi GmbH, Göttingen, Germany, and
Ruud Verkerk and Bea Steenbekkers
Food Quality and Design, Wageningen University, Wageningen, The Netherlands

Abstract

Purpose – Adolescence is a period in which autonomy grows and where children develop into independent and active consumers and a period in which their food choices are also becoming more autonomous. Snacking is known to increase during the period of adolescence and the snack choice of adolescents is often unhealthy. Therefore, the purpose of this study is to know when adolescents perceive a snack as healthy. As healthiness perception could be linked to the perception of naturalness and sustainability of a snack, these are interesting product characteristics to study as well.

Design/methodology/approach – Semi-structured interviews with 20 adolescents were conducted to characterize their perception of healthiness, naturalness and sustainability. Chocolate snack bars were used as a stimulus product.

Findings – All participants mentioned consuming snacks because they like them. Healthiness was seen as important but was not always a priority in adolescents' snack choices. Naturalness and sustainability were concepts which the adolescents were not aware of or did not perceive as important during snack choice. The adolescents mentioned experiencing natural products to be healthier compared to not natural products. The consequences of the discerned dimensions time, impact and effect of choices were rather limited for this target group.

Originality/value – Understanding the healthiness, naturalness and sustainability perception of chocolate snack bars by adolescents may help to better understand drivers for adolescents' snack choices.

Keywords Snack bar, Chocolate, Natural, Sustainability, Health, Adolescents, Qualitative, Interview, Food choice

Paper type Research paper

1. Introduction

The consumption of energy-dense snacks is one of the factors contributing to adolescents' overweight (Daniels, 2009; Piernas and Popkin, 2010). In 2018, approximately 340 million children and adolescents (5–19 years) worldwide were overweight or obese (WHO, 2020). This is a serious problem as it increases the risks of health problems such as type 2 diabetes (Eckel *et al.*, 2011), cardiovascular diseases (Burke *et al.*, 2008) and liver problems (Lobstein and Jackson-Leach, 2006) also later in life (Flodmark, 2018; Tyson and Frank, 2018).

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Adolescence is a period in which autonomy grows and where children develop into independent and active consumers (McKeown and Nelson, 2018). Consequently, adolescents' food choices are also becoming more autonomous (Bassett *et al.*, 2008; Hermans *et al.*, 2017; Stok *et al.*, 2010), meaning that adolescents get increasing independence concerning food choices. For main meals, this autonomy is often less, because these are often planned, bought and prepared by their caregivers (Green *et al.*, 2021; Watts *et al.*, 2018). The study of Bassett *et al.* (2008) found that parents enabled the upcoming autonomy of their teenage children, but that they ensured that the food choices available at home were those they considered healthy. For snack choices, especially out of the home, adolescents have much more autonomy (Ryan *et al.*, 2020; Velazquez *et al.*, 2015). Autonomy is considered as a factor for increasing poor dietary habits (Stok *et al.*, 2010; Videon and Manning, 2003). Most of the adolescents do not follow a diet that meets their dietary guidelines, which might have implications for their health (Thana *et al.*, 2019). However, the data of Bassett *et al.* (2008) showed that increasing autonomy in adolescents' food choices does not necessarily result in less healthy food choices.

Snacking is known to increase during the period of adolescence (Dunford and Popkin, 2018; Geurts *et al.*, 2017; Larson and Story, 2013) and the snack choice of adolescents is often unhealthy (Larson and Story, 2013; Stevenson *et al.*, 2007). Studies by Brennan *et al.* (2020) and Molenaar *et al.* (2020) showed that healthy eating is important to adolescents, but that it is difficult for them to make it a priority. This may be explained by the research of Bissonnette and Contento (2001) in which it is found that adolescents understand the healthiness of foods at an abstract level, but that they have limited concerns about their health in the future and therefore make healthiness no priority. A study by McKeown and Nelson (2018) revealed that when adolescents had a free choice they tended to follow an unhealthy diet with foods high in fat and carbohydrates and low in fruit and vegetables. This study also revealed that prior knowledge had no effect on these choices. Another study among adolescents showed that the price of a snack was the most important snack characteristic for this target group, followed by nutritiousness, taste and convenience. Also, the social surroundings were of influence on the snack choice of adolescents (Rusmevichientong *et al.*, 2021). It is proven that dietary behavior in childhood and adolescence tracks into adulthood (Craigie *et al.*, 2011; Videon and Manning, 2003). Therefore, promoting healthy eating during childhood and adolescence is important, because this may have the potential to positively influence dietary behavior throughout the life course. As adolescents are becoming more autonomous in their snack choices, it is of relevance to know what they perceive as a healthy snack.

Nowadays, major trends with regard to food and food choice are visible in our society. In this study, we focus next to healthiness also on the relevance of naturalness (Devia *et al.*, 2021; Hagen, 2020; Rozin *et al.*, 2012) and sustainability (Ditlevsen *et al.*, 2019; Sireix *et al.*, 2011; Rose *et al.*, 2019) of food products in relation to food choices adolescents make. We assume that in assessing the importance of these three concepts for their final food choice, consumers take different dimensions for the consequences of their choices into account, either consciously or unconsciously. First of all a *time* dimension: whether the consequence of a food choice can be experienced in the short term or in the long term. Next to that is an *impact* dimension, whether consequences of a food choice are on a personal level or on a societal level and third, the *effect* dimension, which refers to product attributes related to credence or experience.

Healthiness of food is deemed important and consumers take this into account when choosing food products (Grunert, 2006; Cunha *et al.*, 2018). Several factors influence the perceived healthiness of food: personal factors, type of food, food characteristics and socio-economic influences (Pinto *et al.*, 2021). With regard to the personal factors, gender and age are influencing the healthiness perception of foods. With respect to the food product itself, it depends on which food category the product belongs, and for processed products, the type of ingredients are influencing the healthiness perception too. Especially regarding healthiness of products, this is a relative concept. A food product is seen as more or less healthy compared

to another product in the same food category or in another category (Adams and Savage, 2017; Damen *et al.*, 2019; Sulistyawati *et al.*, 2019). Socio-economic influences refer to the influence of other persons and the amount of money available to buy food. In general, one could argue that for the healthiness perception of food choices the dimensions are more long term, personal and based on experienced attributes.

The term "natural" is a commonly used claim on food packaging; however, it is not a single concept and thus difficult to define (Chambers *et al.*, 2019; Hemmerling *et al.*, 2016). Several studies have shown that the naturalness of food products is a complex concept and is defined in different ways (Battacchi *et al.*, 2020; Román *et al.*, 2017). The perceived naturalness depends on factors like the way the food is grown and processed, what ingredients are used and the final product itself (Román *et al.*, 2017). Consumers find food naturalness very important and at the same time encounter difficulties in defining what naturalness is for them (Battacchi *et al.*, 2020). Regarding the naturalness perception of food, the dimensions will depend on the specific focus the consumer takes. Generally speaking, they are supposed to be short term, personal and related to credence.

Sustainability is the last concept studied here and appears to be important for a lot of adolescents (Larson *et al.*, 2019; Pelletier *et al.*, 2013). The study of Pelletier *et al.* (2013) suggests that messages about sustainability on the packaging of food products would be important to adolescents. Perceived sustainability related to food includes many different aspects (Peano *et al.*, 2019) and is – like naturalness-related to the origin of the product, the way the food is produced – reflected in the ingredients used, but it is also related to the packaging of the product and the origin of the food or its ingredients. With respect to the different dimensions discerned here the effects of food choice will depend on the sustainability aspects taken into account. For now, we assume they are long term, societal and credence related.

Within convenience foods, snack bars are gaining increased market popularity. Especially adolescents see them as a way of sustaining energy throughout the day, as well as indulgent treats (Saint Pol and Hébel, 2021), while in particular chocolate bars are generally known to be high in saturated fat and sugar and are perceived as highly processed, high in artificial additives and thus unnatural (Perkovic *et al.*, 2021).

In this study, we assess to what extent the concepts healthiness, naturalness and sustainability and the different dimensions (*time*, *impact* and *effect*) are relevant for adolescents when choosing snack bars. Semi-structured in-depth interviews with adolescents using chocolate snack bars as a stimulus product were conducted. The findings in this study may help to better understand the drivers for snack choice of adolescents and bring some new insights or perspectives that can be used as input for policy and health programs to improve adolescents' diets.

2. Method

2.1 Study design

Semi-structured interviews with 20 adolescents aged 15–18 years were conducted to characterize their perception of healthiness, naturalness and sustainability of chocolate snack bars. The number of 20 participants is a suitable number for explorative qualitative research and used in many previous studies (e.g. Berner-Rodorede *et al.*, 2021; Gram *et al.*, 2017; Jacquier *et al.*, 2017; Moore *et al.*, 2021; Tang *et al.*, 2020). Selected snack bars containing chocolate and nuts were presented as a stimulus product to the adolescents and their properties for healthiness, naturalness and sustainability were discussed. A qualitative approach was applied to explore this complex phenomenon and detangle possible cross-links between the studied product characteristics. For data collection and analysis, a grounded theory approach was used (Charmaz, 2014). Since the term snack has different definitions

(Johnson and Anderson, 2010; Pries *et al.*, 2019), we explained to the participants what was meant by the term snacks in the current study before the interview started. This definition was: "all foods, excluding beverages, healthy and unhealthy, consumed in between regular meals" based on definitions used in previous studies (Damen *et al.*, 2020b; Duffey *et al.*, 2013; Hartmann *et al.*, 2013; Xue *et al.*, 2019).

An interview guide (Table 1) was developed and used to ensure as much consistency as possible between the different interviewers. Interviews were held by three different interviewers in October 2020 by video-call, at a time convenient for the participants, and lasted about 1 h. The research was piloted with three adolescents of the target group, who were not involved in the main study. This pilot was done to check the flow of the interview guide as well as to align the way of interviewing between the three researchers (Malmqvist *et al.*, 2019). Minor changes to the interview guide were made based on the results of the pilot study.

General snack behaviour
Could you tell me something about snacks you consume?
What type of snacks do you consume?

- How often do you consume snacks?
- Do you have habits in snack consumption?
- Why do you consume snacks?
- Are there special moments to consume snacks?
- Which considerations do you have to consume snacks?

Product characteristics
What is important to you when choosing a snack? What is not important?
When do you think a food product is healthy?

- Is healthiness important to you?
- What properties do you think healthy food products have?
- What about snacks?
- Do you think it is important your snack is healthy?

When do you think a food product is natural?

- Is naturalness important to you?
- What properties do you think natural food products have?
- What about snacks?
- Do you think it is important your snack is natural?

When do you think a food product is sustainable?

- Is sustainability important to you?
- What properties do you think sustainable food products have?
- What about snacks?
- Do you think it is important your snack is sustainable?

Presenting the snack bars
Do you already know this snack bar?

- What is your first impression?

Do you think this snack bar is healthy/sustainable/natural/tasty?

- Why do you think so?
- What about the claims and the statements on the snack bar?

Do you know the ingredients of the snack bar?

- What impression do these ingredients give?

Which of the snack bars do you prefer? Why?
Which of the snack bars is most healthy/sustainable/natural/tasty? Why?
Which of the snack bars is least healthy/sustainable/natural/tasty? Why?

Table 1.
Interview guide

The interviews have been executed by video call, realizing safety for both the respondent and the interviewer during the COVID-19 pandemic. The interviews started with questions on the general snacking behavior followed by questions about healthiness, naturalness and sustainability perception. Next, three different types of chocolate snack bars were presented and discussed with a focus on healthiness, naturalness and sustainability perception of the adolescents. The exact questions are presented in Table 1. All selected snack bars in the study contained chocolate and nuts to keep them as comparable as possible on their ingredients. As the interviews were conducted by video call, these snack bars were sent to the participants beforehand. They were instructed to open the received package with the snack bars during the interview. Chocolate snack bars were chosen because this type of calorie-dense snack is commonly found in vending machines at schools and is easily consumed between meals (Geurts *et al.*, 2017). The details of the chocolate snack bars are presented in Table 2.

2.2 Recruitment and selection of participants

Social media and snowball sampling (Barros da Silva *et al.*, 2018; Zarantonello and Luomala, 2011) were used to recruit participants. Criteria to belong to the target group were that the participants were aged between 15 and 18 years, lived together with their parents, had no dietary restrictions or suffering from food allergies and consumed a snack at least once a day. The age category 15–18 years old was chosen because their snack consumption and daily energy intake from snacks are high (Geurts *et al.*, 2017). Besides, adolescents aged 15–18 often purchase their own snacks (Velazquez *et al.*, 2015).

2.3 Ethical procedure

Ethical approval for the study was obtained from the Social Science Ethics Committee of Wageningen University (The Netherlands). All participants provided informed consent before starting the interviews. The informed consent form explained that the study was about their perception of chocolate snack bars; however, the exact goal on the healthiness, naturalness and sustainability perception was not explained to not influence the answers. Besides, it was explained to the participants that they could stop at any moment with the interview without giving a reason and that all results would only be used for scientific research. To ensure anonymity while analyzing and reporting the data, each participant was given a unique number, so no names were displayed. After finalizing the interview, each participant received a gift voucher as compensation.

2.4 Data analysis

A grounded theory approach was used for analyzing the qualitative data. Interviews were transcribed and data were qualitatively analyzed with help of the software program MAXQDA (version 20). This program was used to organize, code and assist in analyzing the qualitative data. Two researchers, including the first author, coded the interviews. Assigned codes were compared and discussed until consensus on the used codes was reached. Codes with comparable meanings were grouped, and after consensus merged into one code. The four main categories, reasons to consume a snack, healthiness perception, naturalness perception and sustainability perception with their related codes are displayed in Table 3. Data saturation was reached as after analyzing 17 interviews, no new codes had to be added to the interviews.

3. Results

3.1 Participant characteristics

All participants (n = 20) were high school students of Dutch origin and lived in the Netherlands, together with their parents. The average age of the participating students was

Brand	Eat natural	Nákd	Snickers
Description	Crunchy nut bars, protein-packed, with peanuts, coconut, chocolate chunks and soy crisps	Nákd cocoa delight, raw fruit and nut wholefood bars	Milk chocolate bar with an airy filling, caramel, nougat and crunchy, roasted peanuts
Product name	Crunchy nut bars protein-packed	Wholefoods bars cocoa delight	Snickers
Information/ claims on the front of the snack bar	10 g of protein per bar Gluten-free Simple is not? OK for veggies	100% natural ingredients 100% vegan No added sugar Planeat Wheat, dairy and gluten-free 1 of 5 a day Simply delicious Simply yummy Love your body Cold-pressed, never baked Gleefully made in Britain	1 bar is 50 g (1009 kJ, 241 kcal)
Portion size	1 bar, 45 g	1 bar, 35 g	1 bar, 50 g
Ingredients	Peanuts 45%, glucose syrup, dark chocolate 11% (cocoa mass, sugar, dextrose, emulsifier: Soya lecithin), Soya protein crispies 8% (Soya protein isolate, tapioca starch, salt), shredded coconut 7%, honey 7%, crisped rice (rice, sugar), cocoa powder, salt	Dates (48%), Cashews (29%), raisins (17%), cocoa (6%), a hint of natural flavouring	Sugar, peanuts, glucose syrup, skimmed milk powder, cocoa butter, cocoa mass, sunflower oil, palm fat, lactose and protein from whey (from milk), whey powder (from milk), milk fat, emulsifier (soya lecithin), salt, coconut oil, egg white powder, natural vanilla extract, milk protein, milk chocolate contains milk solids 14% minimum, milk chocolate contains vegetable fats in addition to cocoa butter
Nutrition table (per 100 g)			
Energy	510 kcal	386 kcal	481 kcal
Fat	30.5 g	15.g	23.0 g
Saturated fat	9.1 g	3.1 g	7.9 g
Carbs	32.4 g	49.4gg	61.0 g
Of which sugar	18.8 g	45.3 g	52.0 g
Fiber	7.3 g	6.8 g	1.9 g
Protein	22.8 g	9.4 g	8.6 g
Salt	0.32 g	<0.1 g	0.63 g

Table 2. Details of the chocolate snack bars discussed with the respondents

16.2 years (SD 1.1 years), ranging from 15 to 18 years. Almost two-thirds of the participants ($n = 13$) were girls, one-third ($n = 7$) were boys.

The reasons for adolescents to consume a snack, and their perceptions on healthiness, naturalness and sustainability for food products and specifically chocolate snack bars are presented in Table 3. All participants mentioned consuming snacks because they like them ($n = 20$). Other often mentioned considerations to consume snacks were satisfying their

	n
Reasons to consume a snack	
Because they like it	20
Satisfying hunger	16
Getting energy	9
Healthiness perception	
Healthy is low in sugar	18
Chocolate is unhealthy	16
Fruits are healthy	15
Nuts are healthy	14
Healthiness is important	12
Protein is healthy	10
Not too much fat is healthy	8
Snacks are not for being healthy	6
The importance of healthiness depends on the moment	5
Vitamins are healthy	5
No palm fat is healthy	5
Nutrients are healthy	4
Healthiness is not that important	3
Naturalness perception	
Natural products are healthier	16
Natural is when it is not processed	12
Natural is with no additives	11
Natural is when it comes from a natural source	8
Natural is when it is not made in a factory	6
Natural is organic	3
Sustainability perception	
Sustainability is when it is stated on the packaging	15
Sustainability is related to packaging material	13
Sustainability is not important for food products	13
Sustainable is good for the environment	6
Sustainable is produced in the own country	5

Table 3.
Adolescents' reasons to consume a snack, and their healthiness, naturalness and sustainability perceptions

hunger ($n = 16$) and getting energy ($n = 9$). Most participants ($n = 18$) said that the snacks they consume at home, or the snacks they take with them to school were bought and made available at home by their parents. Respondents reported buying sometimes snacks at school ($n = 14$) from the vending machine or the school canteen. Almost one-third ($n = 6$) of the respondents mentioned they never buy snacks themselves.

3.2 Healthiness perception

More than half of the adolescents mentioned healthiness of foods is important to them ($n = 12$). Some respondents ($n = 5$) mentioned that health is important, but that it depends on the moment. At some moments, health was not that important to them.

> During the weekends, the healthiness of a snack is less important to me [ID02];
>
> Whether I choose a healthy snack also depends on the moment of the day and what I am doing at that moment [ID03].

A few respondents ($n = 3$) mentioned that they never take healthiness into account when choosing food products.

When the adolescents talked about healthy snacks, they often mentioned fruits ($n = 15$) and nuts ($n = 14$) to be healthy.

> This bar contains nuts and fruits which are both healthy snacks, so that makes the snack bar healthy [ID11].

When describing healthy products, also the characteristics of the foods were mentioned. The characteristic of a healthy product that was mentioned by almost all respondents was low in sugar ($n = 18$).

> A product is healthy when it contains not too much sugar [ID12].

Chocolate was another often-mentioned unhealthy ingredient of foods ($n = 16$). This was mostly mentioned after showing the chocolate snack bars which all contained chocolate.

> This snack bar is the unhealthiest one, because of its caramel and of course because of the chocolate [ID05].

When a chocolate snack bar contained added proteins, the snack bar was perceived as more healthy by half of the adolescents ($n = 10$).

> This is a healthy snack bar because it contains a lot of protein [ID10];
>
> This bar is healthier compared to the other two snack bars because it says 'protein packed' [ID12].

Other characteristics mentioned to be healthy were not too much fat ($n = 8$), the presence of vitamins ($n = 5$), no palm fat ($n = 5$) and containing nutrients ($n = 4$).

> For me, a healthy food product contains not too much fat and has a lot of nutrients [ID08].

Six of the respondents mentioned that snacks were not meant to be healthy, they mentioned eating healthy only during the main meals.

> Dinner is for eating healthy, then I eat my veggies. For snacks, healthiness is not important [ID09].

3.3 Naturalness perception

When asking for the naturalness of food products in general, more than half of the adolescents ($n = 11$) participating in this study said that they were not aware of the concept of natural food products. They mentioned they had no clear idea what the term meant and never thought about it.

> Uhmm . . . Naturalness . . . Ehmm . . . I do not know, I think I never eat that . . . I do not know what is meant with natural [ID01];
>
> I do not pay attention to it . . . so I do not know . . . I do not know what I think about naturalness [ID05].

After presenting the chocolate snack bars, more respondents were able to discuss naturalness. When asked for a description of the term natural, the most mentioned description by the adolescents was that a food product is natural when it is not processed ($n = 12$). Some respondents explained that with not-processed they mean that the product is not made in a factory ($n = 6$).

> This snack bar contains natural ingredients; however, it is highly processed, so I do not perceive it as a natural product [ID03];
>
> If it is made in a factory, it can never be natural [ID18].

Another often mentioned description of naturalness is that natural food products have no additives ($n = 11$).

> Natural food products have no unnecessary additives like coloring agents [ID16];
>
> I never do the shopping myself. But I know that my mother tries not to buy food products with artificial sweeteners or with too many E-numbers or other chemicals because that is not natural [ID02].

If a food product comes from a natural source, this is also perceived as natural by the participants ($n = 8$).

> Ehm . . . I think vegetables, fruits and nuts are natural [ID14];
>
> Natural is when you pick your fruit right from the garden [ID17].

Being organic is only mentioned a few times as a requirement for a natural product ($n = 3$).

The adolescents in the current study experienced natural products to be healthier compared to products that are not natural ($n = 16$). However, most of them admitted that they do not take naturalness into account when choosing a snack ($n = 15$), because tastiness is for them the most important reason.

> Do you take naturalness into account when choosing a snack? No, mostly not [ID20].

3.4 Sustainability perception

Like naturalness, also the sustainability of food products was difficult to describe initially for more than half of these adolescents ($n = 12$). More than half of them spontaneously mentioned sustainable food products are of no importance to them ($n = 13$). When they received the chocolate snack bars, respondents could tell better about their sustainability perception. Often, they related the sustainability of food products to its packaging material ($n = 13$).

> If a food product has recycled packaging it is sustainable. I think that sustainability mainly has to do with the things in the packaging material [ID04].

When the packaging of the food product mentioned the word "sustainable," adolescents said they perceived the product as being sustainable ($n = 15$).

> This snack bar is sustainable because they join the 'Plastic Bank' and that wants to reduce the amount of plastic in the oceans" [ID08];
>
> I think that if the snack bar is sustainable that they will place this on its packaging. At this snack bar nothing is mentioned, so it will not be sustainable at all [ID03].

Some of the adolescents mentioned food products to be sustainable when it is good for the environment ($n = 6$), specified as good for the planet and the climate. Others explicitly mentioned that a product is less sustainable when it comes from abroad; when a product is produced in their own country, it is perceived as more sustainable ($n = 5$).

> For me, a product is sustainable when it comes from the Netherlands, so when it is not imported [ID10].

4. Discussion

This study described adolescents' perception of healthiness, naturalness and sustainability of snack products. Chocolate snack bars were used as a stimulus product. Liking was the main reason to consume a snack. All participants in the current study mentioned they only

consume a snack when it is liked by them, liking is therefore found to be very important in adolescents' snack choice. This is also found in many other studies, if a snack is not liked, it is not consumed (Damen *et al.*, 2019, 2020c; Murimi *et al.*, 2016; Sick *et al.*, 2019).

4.1 Healthiness perception

The healthiness of foods was mentioned to be important by more than half of the adolescents, some of them mentioned that the moment of consumption was of influence on the priority they gave on healthiness. This is also found by Molenaar *et al.* (2020) who report that eating healthy was important to young adults, but that it was difficult to make it a priority. In a study done by Brennan *et al.* (2020), most of the adolescents wanted to eat healthily, but also, in this case, it was difficult for the adolescents to make healthy eating a priority all the time.

Fruits and nuts were often mentioned by the participants as healthy snacks. That fruits and nuts are perceived as healthy, is also found in many other studies (Bisogni *et al.*, 2012; Damen *et al.*, 2020a; Lake *et al.*, 2007). The intrinsic product properties of the snack product were also mentioned by the adolescents to influence healthiness perception. Low sugar content was mentioned by almost all respondents as essential for being a healthy food. Low in fat, presence of vitamins and containing nutrients were also mentioned. Studies by Bisogni *et al.* (2012), Bucher *et al.* (2016) and Falk *et al.* (2001) also found that consumers describe the healthiness of a product in terms of the nutrients of the food. When a snack bar contained a high amount of proteins, this was positive for the health perception as reported by Asp and Bryngelsson (2008) and Banovic *et al.* (2018). The presence of the ingredient chocolate in the snack bars was perceived as unhealthy, which is also found by Bucher *et al.* (2016).

Some respondents told, without being asked for by the interviewer, that snacks were not meant to be healthy, as healthy eating was for the main meals. Bower and Whitten (2000) found in their study that healthiness was less important in the judgment of snack bars by consumers, while taste, cost, texture and appearance were more important to them. In a study by Damen *et al.* (2021), it was found that some mothers of children aged 2–3 years do not care about the healthiness of snack products because healthy foods are consumed during the main meals.

4.2 Naturalness perception

According to Román *et al.* (2017), consumers instinctively prefer natural food products; however, the adolescents in the current study were not aware of the concept of naturalness, so, therefore, mentioned to not take it into consideration in their snack choice.

The concept of naturalness is complicated for the adolescents in this study. Many other studies refer to this difficulty of consumers with the definition of naturalness (Abrams *et al.*, 2010; Amos *et al.*, 2014; Battacchi *et al.*, 2020). The high-school students mentioned perceiving a food product as natural when it is not processed. This is also found as a conclusion in the review of Román *et al.* (2017), where consumers perceive a food product to be more natural when it is less processed. Ambwami *et al.* (2020) also found that foods were perceived as more natural when they were non-processed.

Another often mentioned description of naturalness is that natural food products have no additives as reported by Moscato and Machin (2018) and Scott and Rozin (2017). Food additives are perceived as unnatural (Bearth *et al.*, 2014; Shim *et al.*, 2011). Sanchez-Siles *et al.* (2019) use the number of additives in a food product as a measure for naturalness in their Food Naturalness Index; the more additives, the less natural the food product is ranked. Being organic was not often related to naturalness by the adolescents in the current study, this is in contradiction with the study of Bäckström *et al.* (2014) in which organic foods were linked with naturalness by consumers from 15 years of age.

In the current study, naturalness is positively associated with the perceived healthiness of a snack, this association between healthiness and naturalness in foods is found in several other studies too (Devia *et al.*, 2021; Hagen, 2020; Rozin *et al.*, 2004, 2012; Siegrist and Sütterlin, 2017).

4.3 Sustainability perception

Sustainability was another difficult concept for the adolescents in the current research, which was reported too for the adolescents in the study of Ronto *et al.* (2016). Sustainability was also mentioned to be of no importance to the adolescents, which is in line with the study of Olsson and Gericke (2016) who reported a dip in the general sustainability consciousness of Swedish youth when becoming adolescents. A study by Godfrey and Feng (2017) among university students reported that other product attributes, like convenience, taste, health and value for money often outweighed sustainability. Geng *et al.* (2017) reported that Chinese adolescents had limited knowledge about sustainable consumption, which made it less relevant for them. On the contrary, a study by Vermeir and Verbeke (2006) shows Belgian adolescents to be highly involved with sustainable food consumption. Also, the study of Núñ ez-Cacho *et al.* (2020) shows that the younger the age of the consumer, the more sustainable food purchasing decisions will be made.

When the participants read on the packaging sustainability-related claims, they mentioned they perceived the product as being sustainable because of that claim. They argued that the product must be sustainable, otherwise, the food industry would not communicate this information on its packaging. This reasoning related to the communication on the packaging is comparable to the findings in a study of Hartmann *et al.* (2018) in which consumers believed that the exclusion of certain ingredients, which was mentioned on the package, would have some kind of nutritional benefit, as otherwise, the producer would not have explicitly mentioned it.

The environmental footprint of a food product does not only depend on the product itself, but also on its package (Magnier *et al.*, 2016). In the current study, the adolescents related the sustainability of food products often only to its packaging material, which is something done by many adult consumers too as described by Licciardello (2017). Some studies showed that consumers associate the sustainability of a food product with naturalness (Tobler *et al.*, 2011; Verhoog *et al.*, 2003); however, in our study this relationship was not found.

The adolescents mentioned food products to be sustainable when it is good for the environment. This relationship of environmental effects and sustainability is also reported by Geng *et al.* (2017) and Zhao *et al.* (2014). Some high-school students explicitly mentioned that a product is less sustainable when it comes from abroad as is also found by Sirieix *et al.* (2011) and Tanner and Wölfing Kast (2003).

4.4 Dimensions in choices

In the current study, we have seen that adolescents were not very aware of the meaning of the naturalness of food, and it was thus of no importance for them. So, the previously discussed dimensions regarding *time* (short versus long term), *impact* (personal versus societal) and *effect* (credence versus experience) do not play a role in the perception of snack bars for these adolescents. Sustainability of the food product itself did not resonate with them either. They related sustainability more to the packaging material, especially when made of plastic. Also, the fact that products might come from abroad is for them to be more related to sustainability. Therefore, with respect to sustainability and regarding the dimension *impact*, the societal consequences seem to be most important.

On the contrary, eating healthy was important for most of the adolescents in our study, but this was mainly described in more general terms and related to meals. When choosing a

specific product like a snack bar to eat in-between meals taste was most important and determined the choices made by the adolescents. Here, for the *time* dimension mainly the healthiness of this type of product is overruled by the more short-term hedonic benefit of taste; the long-term consequence for health is a credence factor, whereas taste is a short-term experience.

Food choice is a very complex phenomenon influenced by several different factors (Corallo *et al.*, 2019). For the adolescents in this study, the complexity of choosing food in between meals is reduced to taking something indulgent when it is related to snack bars. In this way, the short-term personally experienced benefits determine the choice.

4.5 Methodological considerations and limitations

Some limitations regarding this study could be mentioned. Interviews were conducted by three different interviewers, which could have led to some differences in the way of interviewing the participants. These three interviewers used a structured interview guide, which was thoroughly discussed before the study started, which should minimize the differences in interviewing (Bryman, 2016). Besides, all three interviewers conducted a pilot interview which was discussed among the group to align the way of interviewing between them (Malmqvist *et al.*, 2019).

Three physical chocolate snack bars were presented to the participants. It appeared that having such stimuli helped the respondents to formulate their answers, which is also studied by Damen and Steenbekkers (2022). As snacks are a diverse product group, choosing a specific product helps to focus. When they had an actual product, they used its product characteristics, like the claims, ingredients and packaging to define concepts (naturalness and sustainability) that they experienced as more difficult without the stimuli. Focusing on a specific food group like chocolate snack bars instead of looking at snacks, in general, may give a more nuanced interpretation of the topic, which was also found in Damen *et al.* (2021). It is interesting to focus on this methodological insight in further research.

As the interviews took place during the COVID-19 pandemic, this might have influenced the snacking behavior as well as the perceptions of the participants at that time. Studies showed that the snacking behavior of adolescents and university students changed during the COVID-19 pandemic as the number of snacks consumed per day increased compared to the time before (Gallo *et al.*, 2020; Pietrobelli *et al.*, 2020). As snacking behavior might have changed, this could influence the perceptions regarding the snacks too.

Besides, the COVID-19 pandemic influenced the way the interviews were held. The interviews had to be conducted by video call, instead of in-person, due to the COVID-19 restrictions (October 2020), because the traditional in-person interviewing method became unfeasible during physical distancing (Sy *et al.*, 2020). Video calling was chosen because this technology comes closest to in-person interviewing while geographically separated (Krouwel *et al.*, 2019). Interviewing via video-call had its disadvantages, as you cannot read body language and facial cues as well during in-person interviews (Seitz, 2016). Interviewing by video call also may reduce the possibility to comfort and reassure the interviewee by the interviewer (Sedgwick and Spiers, 2009). However, interviewing by video call also has its advantages. In the current study, the ease of making appointments with adolescents was positive. A reason for this could be the time-efficiency of interviewing by video call, as both the respondent and the interviewer do not have to make a physical appointment and have no traveling time (Deakin and Wakefield, 2014; Krouwel *et al.*, 2019; Sy *et al.*, 2020). It also appeared that the participants were not very shy and were easy talking during the interviews which could be due to the fact they were comfortable at home with a screen between them and the researcher. All in all, we could conclude, like Deakin and Wakefield (2014) did in their study, that interview by video call was a good method for the current study.

5. Conclusion

The current study provides insights into the healthiness, sustainability and naturalness perception of chocolate snacks by adolescents. Snack bars were used as stimulus products. Naturalness and sustainability were hard to describe by the adolescents in the current study and were not perceived as important during snack choice. Healthiness was seen as important in general but was not always a priority in adolescents' snack choices. Making use of snack bars during interviewing was helpful for the respondents to better formulate their answers. Understanding the healthiness, naturalness and sustainability perception of snacks by adolescents may help to better understand drivers for adolescents' snack choices. The understanding of these drivers for food choice is helpful for the development of new or the improvement of existing healthy, sustainable and natural snacks targeted at adolescents. Furthermore, the results could be of help in improving interventions to promote healthier and sustainable food choices among adolescents.

Future research regarding the topic could focus on evaluating the healthiness, sustainability and naturalness perceptions of adolescents by using other types of snacks or other food products, to detect if different perceptions or ideas according to these variables occur. In addition, future research could focus on the assessment of whether the dimensions *time*, *impact* and *effect* are product specific and target group dependent.

References

Abrams, K.M., Meyers, C.A. and Irani, T.A. (2010), "Naturally confused: consumers' perceptions of all-natural and organic pork products", *Agriculture and Human Values*, Vol. 27 No. 3, pp. 365-374.

Adams, E.L. and Savage, J.S. (2017), "From the children's perspective: what are candy, snacks, and meals?", *Appetite*, Vol. 116, pp. 215-222.

Ambwani, S., Sellinger, G., Rose, K.L., Richmond, T.K. and Sonneville, K.R. (2020), "It's healthy because it's natural perceptions of 'clean' eating among U.S. Adolescents and emerging adults", *Nutrients*, Vol. 12 No. 6, pp. 1-11, doi: 10.3390/nu12061708.

Amos, C., Pentina, I., Hawkins, T.G. and Davis, N. (2014), "'Natural' labeling and consumers' sentimental pastoral notion", *Journal of Product and Brand Management*, Vol. 25 Nos 4-5, pp. 268-281, doi: 10.1108/JPBM-03-2014-0516.

Asp, N.G. and Bryngelsson, S. (2008), "Health claims in Europe: new legislation and PASSCLAIM for substantiation", *The Journal of Nutrition*, Vol. 138 No. 6, pp. 1210S-1215S.

Banovic, M., Arvola, A., Pennanen, K., Duta, D.E., Brückner-Gühmann, M., Lähteenmäki, L. and Grunert, K.G. (2018), "Foods with increased protein content: a qualitative study on European consumer preferences and perceptions", *Appetite*, Vol. 125, pp. 233-243, doi: 10.1016/j.appet.2018.01.034.

Barros da Silva, R., Barbieri-Figueiredo, M.D.C. and Van Riper, M. (2018), "Breastfeeding experiences of mothers of children with down syndrome", *Comprehensive Child and Adolescent Nursing*, Vol. 42 No. 4, doi: 10.1080/24694193.2018.1496493.

Bäckström, A., Pirttilä-Backman, A.-M. and Tuorila, H. (2004), "Willingness to try new foods as predicted by social representations and attitude and trait scales", *Appetite*, Vol. 43 No. 1, pp. 75-83.

Bassett, R., Chapman, G.E. and Beagan, B.L. (2008), "Autonomy and control: the co-construction of adolescent food choice", *Appetite*, Vol. 50 No. 2, pp. 325-332, doi: 10.1016/j.appet.2007.08.009.

Battacchi, D., Verkerk, R., Pellegrini, N., Fogliano, V. and Steenbekkers, B. (2020), "The state of the art of food ingredients' naturalness evaluation: a review of proposed approaches and their relation with consumer trends", *Trends in Food Science and Technology*, Vol. 106, pp. 434-444.

Bearth, A., Cousin, M.E. and Siegrist, M. (2014), "The consumer's perception of artificial food additives: influences on acceptance, risk and benefit perceptions", *Food Quality and Preference*, Vol. 38, pp. 14-23, doi: 10.1016/j.foodqual.2014.05.008.

Berner-Rodoreda, A., Bärnighausen, T., Eyal, N., Sarker, M., Hossain, P., Leshabari, M., Metta, E., Mmbaga, E., Wikler, D. and McMahon, S.A. (2021), "'Thought provoking', 'interactive', and 'more like a peer talk': testing the deliberative interview style in Germany", *SSM-Qualitative Research in Health*, 100007.

Bisogni, C.A., Jastran, M., Seligson, M. and Thompson, A. (2012), "How people interpret healthy eating: contributions of qualitative research", *Journal of Nutrition Education and Behavior*, Vol. 44 No. 4, pp. 282-301.

Bissonnette, M.M. and Contento, I.R. (2001), "Adolescents' perspectives and food choice behaviors in terms of the environmental impacts of food production practices: application of a psychosocial model", *Journal of Nutrition Education*, Vol. 33 No. 2, pp. 72-82.

Bower, J.A. and Whitten, R. (2000), "Sensory characteristics and consumer liking for cereal bar snack foods", *Journal of Sensory Studies*, Vol. 15 No. 3, pp. 327-345.

Brennan, L., Klassen, K., Weng, E., Chin, S., Molenaar, A., Reid, M. and McCaffrey, T.A. (2020), "A social marketing perspective of young adults' concepts of eating for health: is it a question of morality?", *International Journal of Behavioral Nutrition and Physical Activity*, Vol. 17, pp. 1-14.

Bryman, A. (2016), *Social Research Methods*, Oxford University Press, Oxford.

Bucher, T., Collins, C., Diem, S. and Siegrist, M. (2016), "Adolescents' perception of the healthiness of snacks", *Food Quality and Preference*, Vol. 50, pp. 94-101.

Burke, G.L., Bertoni, A.G., Shea, S., Tracy, R., Watson, K.E., Blumenthal, R.S. and Carnethon, M.R. (2008), "The impact of obesity on cardiovascular disease risk factors and subclinical vascular disease: the Multi-Ethnic Study of Atherosclerosis", *Archives of Internal Medicine*, Vol. 168 No. 9, pp. 928-935.

Chambers, E., Tran, T. and Chambers IV, E. (2019), "Natural: a $75 billion word with no definition—why not?", *Journal of Sensory Studies*, Vol. 34 No. 4, e12501.

Charmaz, K. (2014), *Constructing Grounded Theory*, Sage, Los Angeles.

Corallo, A., Latino, M.E., Menegoli, M. and Spennato, A. (2019), "A survey to discover current food choice behaviors", *Sustainability*, Vol. 11 No. 18, p. 5041, doi: 10.3390/su11185041.

Craigie, A.M., Lake, A.A., Kelly, S.A., Adamson, A.J. and Mathers, J.C. (2011), "Tracking of obesity-related behaviours from childhood to adulthood: a systematic review", *Maturitas*, Vol. 70 No. 3, pp. 266-284, doi: 10.1016/j.maturitas.2011.08.005.

Cunha, L.M., Cabral, D., Moura, A.P. and de Almeida, M.D.V. (2018), "Application of the Food Choice Questionnaire across cultures: systematic review of cross-cultural and single country studies", *Food Quality and Preference*, Vol. 64, pp. 21-36.

Damen, F.W.M. and Steenbekkers, B.L.P.A. (2022), "Added value of physical food products as a stimulus during interviewing", *Appetite*, Vol. 169, 105819, doi: 10.1016/j.appet.2021.105819.

Damen, F.W.M., Luning, P.A., Fogliano, V. and Steenbekkers, B.L.P.A. (2019), "What influences mothers' snack choices for their children aged 2-7?", *Food Quality and Preference*, Vol. 74, pp. 10-20, doi: 10.1016/j.foodqual.2018.12.012.

Damen, F.W.M., Luning, P.A., Hofstede, G.J., Fogliano, V. and Steenbekkers, B.L.P.A. (2020a), "Value conflicts in mothers' snack choice for their 2-7 years old children", *Maternal and Child Nutrition*, e12860.

Damen, F.W.M., Steenbekkers, B.L.P.A., Fogliano, V. and Luning, P.A. (2020b), "Youngest versus oldest child: why does mothers' snack choice differ?", *Appetite*, Vol. 144, doi: 10.1016/j.appet.2019.104455.

Damen, F.W.M., Luning, P.A., Pellegrini, N., Vitaglione, P., Hofstede, G.J., Fogliano, V. and Steenbekkers, B.L. (2020c), "Mothers' considerations in snack choice for their children: differences between the North and the South of Italy", *Food Quality and Preference*, Vol. 85, 103965.

Damen, F.W.M., Luning, P.A., Fogliano, V. and Steenbekkers, B.L.P.A. (2021), "Mothers choose a snack for their 2-3-year-old children based on different health perceptions", *Food Quality and Preference*, Vol. 94, 104328.

Daniels, S.R. (2009), "Complications of obesity in children and adolescents", *International Journal of Obesity*, Vol. 33, pp. 60-65.

Deakin, H. and Wakefield, K. (2014), "Skype interviewing: reflections of two PhD researchers", *Qualitative Research*, Vol. 14 No. 5, pp. 603-616.

Devia, G., Forli, S., Vidal, L., Curutchet, M.R. and Ares, G. (2021), "References to home-made and natural foods on the labels of ultra-processed products increase healthfulness perception and purchase intention: insights for policy making", *Food Quality and Preference*, Vol. 88, doi: 10.1016/j.foodqual.2020.104110.

Ditlevsen, K., Sandøe, P. and Lassen, J. (2019), "Healthy food is nutritious, but organic food is healthy because it is pure: the negotiation of healthy food choices by Danish consumers of organic food", *Food Quality and Preference*, Vol. 71, pp. 46-53, doi: 10.1016/j.foodqual.2018.06.001.

Duffey, K.J., Pereira, R.A. and Popkin, B.M. (2013), "Prevalence and energy intake from snacking in Brazil: analysis of the first nationwide individual survey", *European Journal of Clinical Nutrition*, Vol. 67 No. 8, pp. 868-874.

Dunford, E. and Popkin, B. (2018), "37 year snacking trends for US children 1977-2014", *Pediatric Obesity*, Vol. 13 No. 4, pp. 247-255.

Eckel, R.H., Kahn, S.E., Ferrannini, E., Goldfine, A.B., Nathan, D.M., Schwartz, M.W. and Smith, S.R. (2011), "Obesity and type 2 diabetes: what can be unified and what needs to be individualized?", *The Journal of Clinical Endocrinology and Metabolism*, Vol. 96 No. 6, pp. 1654-1663.

Falk, L.W., Sobal, J., Bisogni, C.A., Connors, M. and Devine, C.M. (2001), "Managing healthy eating: definitions, classifications, and strategies", *Health Education and Behavior*, Vol. 28 No. 4, pp. 425-439.

Flodmark, C.-E. (2018), "Prevention models of childhood obesity in Sweden", *Obesity Facts*, Vol. 11 No. 3, pp. 257-262.

Gallo, L.A., Gallo, T.F., Young, S.L., Moritz, K.M. and Akison, L.K. (2020), "The impact of isolation measures due to COVID-19 on energy intake and physical activity levels in Australian university students", *Nutrients*, Vol. 12 No. 6, p. 1865.

Geng, D., Liu, J. and Zhu, Q. (2017), "Motivating sustainable consumption among Chinese adolescents: an empirical examination", *Journal of Cleaner Production*, Vol. 141, pp. 315-322, doi: 10.1016/j.jclepro.2016.09.113.

Geurts, M., van Bakel, A., van Rossum, C., de Boer, E. and Ocké, M. (2017), *Food Consumption in the Netherlands and its Determinants: Background Report to'What Is on Our Plate? Safe, Healthy and Sustainable Diets in the Netherlands*.

Godfrey, D.M. and Feng, P. (2017), "Communicating sustainability: student perceptions of a behavior change campaign", *International Journal of Sustainability in Higher Education*.

Gram, M., Hohnen, P. and Pedersen, H.D. (2017), "'You can't use this, and you mustn't do that': a qualitative study of non-consumption practices among Danish pregnant women and new mothers", *Journal of Consumer Culture*, Vol. 17, pp. 433-451.

Green, E.M., Spivak, C. and Dollahite, J.S. (2021), "Early adolescent food routines: a photo-elicitation study", *Appetite*, Vol. 158, 105012, doi: 10.1016/j.appet.2020.105012.

Grunert, K.G. (2006), "How changes in consumer behaviour and retailing affect competence requirements for food producers and processors", *Economía Agraria Y Recursos Naturales-Agricultural and Resource Economics*, Vol. 6, pp. 3-22.

Hagen, L. (2020), "Pretty healthy food: how and when aesthetics enhance perceived healthiness", *Journal of Marketing*, 0022242920944384.

Hartmann, C., Siegrist, M. and Van Der Horst, K. (2013), "Snack frequency: associations with healthy and unhealthy food choices", *Public Health Nutrition*, Vol. 16 No. 8, pp. 1487-1496, doi: 10.1017/s1368980012003771.

Hartmann, C., Hieke, S., Taper, C. and Siegrist, M. (2018), "European consumer healthiness evaluation of 'Free-from'labelled food products", *Food Quality and Preference*, Vol. 68, pp. 377-388.

Hemmerling, S., Canavari, M. and Spiller, A. (2016), "Preference for naturalness of European organic consumers: first evidence of an attitude-liking gap", *British Food Journal*, Vol. 118 No. 9, pp. 2287-2307, doi: 10.1108/BFJ-11-2015-0457.

Hermans, R.C.J., de Bruin, H., Larsen, J.K., Mensink, F. and Hoek, A.C. (2017), "Adolescents' responses to a school-based prevention program promoting healthy eating at school", *Frontiers in Public Health*, Vol. 5 Nov, doi: 10.3389/fpubh.2017.00309.

Jacquier, E.F., Gatrell, A. and Bingley, A. (2017), "We don't snack: attitudes and perceptions about eating in-between meals amongst caregivers of young children", *Appetite*, Vol. 108, pp. 483-490.

Johnson, G.H. and Anderson, G.H. (2010), "Snacking definitions: impact on interpretation of the literature and dietary recommendations", *Critical Reviews in Food Science and Nutrition*, Vol. 50 No. 9, pp. 848-871, doi: 10.1080/10408390903572479.

Krouwel, M., Jolly, K. and Greenfield, S. (2019), "Comparing Skype (video calling) and in-person qualitative interview modes in a study of people with irritable bowel syndrome–an exploratory comparative analysis", *BMC Medical Research Methodology*, Vol. 19 No. 1, pp. 1-9.

Lake, A.A., Hyland, R.M., Rugg-Gunn, A.J., Wood, C.E., Mathers, J.C. and Adamson, A.J. (2007), "Healthy eating: perceptions and practice (the ASH30 study)", *Appetite*, Vol. 48 No. 2, pp. 176-182, doi: 10.1016/j.appet.2006.08.065.

Larson, N. and Story, M. (2013), "A review of snacking patterns among children and adolescents: what are the implications of snacking for weight status?", *Childhood Obesity*, Vol. 9 No. 2, pp. 104-115, doi: 10.1089/chi.2012.0108.

Larson, N., Laska, M.N. and Neumark-Sztainer, D. (2019), "Do young adults value sustainable diet practices? Continuity in values from adolescence to adulthood and linkages to dietary behaviour", *Public Health Nutrition*, Vol. 22 No. 14, pp. 2598-2608, doi: 10.1017/S136898001900096X.

Licciardello, F. (2017), "Packaging, blessing in disguise. Review on its diverse contribution to food sustainability", *Trends in Food Science and Technology*, Vol. 65, pp. 32-39, doi: 10.1016/j.tifs.2017.05.003.

Lobstein, T. and Jackson-Leach, R. (2006), "Estimated burden of paediatric obesity and co-morbidities in Europe. Part 2. Numbers of children with indicators of obesity-related disease", *International Journal of Pediatric Obesity*, Vol. 1 No. 1, pp. 33-41.

Magnier, L., Schoormans, J. and Mugge, R. (2016), "Judging a product by its cover: packaging sustainability and perceptions of quality in food products", *Food Quality and Preference*, Vol. 53, pp. 132-142, doi: 10.1016/j.foodqual.2016.06.006.

Malmqvist, J., Hellberg, K., Möllås, G., Rose, R. and Shevlin, M. (2019), "Conducting the pilot study: a neglected part of the research process? Methodological findings supporting the importance of piloting in qualitative research studies", *International Journal of Qualitative Methods*, Vol. 18, 1609406919878341.

McKeown, A. and Nelson, R. (2018), "Independent decision making of adolescents regarding food choice", *International Journal of Consumer Studies*, Vol. 42 No. 5, pp. 469-477, doi: 10.1111/ijcs.12446.

Molenaar, A., Choi, T.S., Brennan, L., Reid, M., Lim, M.S., Truby, H. and McCaffrey, T.A. (2020), "Language of health of young Australian adults: a qualitative exploration of perceptions of health, wellbeing and health promotion via online conversations", *Nutrients*, Vol. 12 No. 4, p. 887.

Moore, A.M., Vadiveloo, M., McCurdy, K., Bouchard, K. and Tovar, A. (2021), "A recurrent cross-sectional qualitative study exploring how low-income mothers define snacks and reasons for offering snacks during infancy", *Appetite*, Vol. 162, 105169.

Moscato, E.M. and Machin, J.E. (2018), "Mother natural: motivations and associations for consuming natural foods", *Appetite*, Vol. 121, pp. 18-28, doi: 10.1016/j.appet.2017.10.031.

Murimi, M., Chrisman, M., McCollum, H. and Mcdonald, O. (2016), "A qualitative study on factors that influence students' food choices", *J Nutri Health*, Vol. 2 No. 1, p. 6.

Núñez-Cacho, P., Leyva-Díaz, J.C., Sánchez-Molina, J. and van der Gun, R. (2020), "Plastics and sustainable purchase decisions in a circular economy: the case of Dutch food industry", *PLoS One*, Vol. 15 No. 9, September, doi: 10.1371/journal.pone.0239949.

Olsson, D. and Gericke, N. (2016), "The adolescent dip in students' sustainability consciousness—implications for education for sustainable development", *The Journal of Environmental Education*, Vol. 47 No. 1, pp. 35-51.

Peano, C., Merlino, V.M., Sottile, F., Borra, D. and Massaglia, S. (2019), "Sustainability for food consumers: which perception?", *Sustainability*, Vol. 11 No. 21, p. 5955, doi: 10.3390/su11215955.

Pelletier, J.E., Laska, M.N., Neumark-Sztainer, D. and Story, M. (2013), "Positive attitudes toward organic, local, and sustainable foods are associated with higher dietary quality among young adults", *Journal of the Academy of Nutrition and Dietetics*, Vol. 113 No. 1, pp. 127-132, doi: 10.1016/j.jand.2012.08.021.

Perkovic, S., Otterbring, T., Schärli, C. and Pachur, T. (2021), "The perception of food products in adolescents, lay adults, and experts: a psychometric approach", *Journal of Experimental Psychology: Applied*. doi: 10.31234/osf.io/uya7m.

Piernas, C. and Popkin, B.M. (2010), "Trends in snacking among US children", *Health Affairs*, Vol. 29 No. 3, pp. 398-404.

Pietrobelli, A., Pecoraro, L., Ferruzzi, A., Heo, M., Faith, M., Zoller, T., Antoniazzi, F., Piacentini, G., Fearnbach, S.N. and Heymsfield, S.B. (2020), "Effects of COVID-19 lockdown on lifestyle behaviors in children with obesity living in Verona, Italy: a longitudinal study", *Obesity*, Vol. 28 No. 8, pp. 1382-1385.

Pinto, V.R.A., Campos, R.F.d.A., Rocha, F., Emmendoerfer, M.L., Teixeira Ribeiro Vidigal, M.C., Soares dat Rocha, S.J.S., Maria Della Lucia, S., Fernandes Melo Cabral, L., Fernandes de Carvalho, A. and Tuler Perrone, I. (2021), "Perceived healthiness of foods: a systematic revieuw of qualitative studies", *Future Foods* No. 4, 100056, doi: 10.1016/j.fufo.2021.100056.

Pries, A.M., Filteau, S. and Ferguson, E.L. (2019), "Snack food and beverage consumption and young child nutrition in low- and middle-income countries: a systematic review", *Maternal and Child Nutrition*, Vol. 15 No. S4, doi: 10.1111/mcn.12729.

Román, S., Sánchez-Siles, L.M. and Siegrist, M. (2017), "The importance of food naturalness for consumers: results of a systematic review", *Trends in Food Science and Technology*, Vol. 67, pp. 44-57, doi: 10.1016/j.tifs.2017.06.010.

Ronto, R., Ball, L., Pendergast, D. and Harris, N. (2016), "Adolescents' perspectives on food literacy and its impact on their dietary behaviours", *Appetite*, Vol. 107, pp. 549-557, doi: 10.1016/j.appet.2016.09.006.

Rose, D., Heller, M.C. and Roberto, C.A. (2019), "Position of the society for nutrition education and behavior: the importance of including environmental sustainability in dietary guidance", *Journal of Nutrition Education and Behavior*, Vol. 51 No. 1, pp. 3-15, e11, doi: 10.1016/j.jneb.2018.07.006.

Rozin, P., Spranca, M., Krieger, Z., Neuhaus, R., Surillo, D., Swerdlin, A. and Wood, K. (2004), "Preference for natural: instrumental and ideational/moral motivations, and the contrast between foods and medicines", *Appetite*, Vol. 43 No. 2, pp. 147-154, doi: 10.1016/j.appet.2004.03.005.

Rozin, P., Fischler, C. and Shields-Argelès, C. (2012), "European and American perspectives on the meaning of natural", *Appetite*, Vol. 59 No. 2, pp. 448-455, doi: 10.1016/j.appet.2012.06.001.

Rusmevichientong, P., Jaynes, J. and Chandler, L. (2021), "Understanding influencing attributes of adolescent snack choices: evidence from a discrete choice experiment", *Food Quality and Preference*, Vol. 92, 104171.

Ryan, D., Holmes, M. and Ensaff, H. (2020), "I control what I eat and I'm sensible with what I eat, apart from school–A qualitative study of adolescents' food choices and the school environment", *Current Developments in Nutrition*, Vol. 4 Supplement_2, p. 1345.

Saint Pol, T.D. and Hébel, P. (2021), "Practices and representations of snacking in a highly standardized food culture: the scenario in France", *Food Quality and Preference*, Vol. 93, 104245.

Sanchez-Siles, L.M., Michel, F., Román, S., Bernal, M.J., Philipsen, B., Haro, J.F. and Siegrist, M. (2019), "The Food Naturalness Index (FNI): an integrative tool to measure the degree of food naturalness", *Trends in Food Science and Technology*, Vol. 91, pp. 681-690, doi: 10.1016/j.tifs.2019.07.015.

Scott, S.E. and Rozin, P. (2017), "Are additives unnatural? Generality and mechanisms of additivity dominance", *Judgment and Decision Making*, Vol. 12 No. 6, p. 572.

Sedgwick, M. and Spiers, J. (2009), "The use of videoconferencing as a medium for the qualitative interview", *International Journal of Qualitative Methods*, Vol. 8 No. 1, pp. 1-11.

Seitz, S. (2016), "Pixilated partnerships, overcoming obstacles in qualitative interviews via Skype: a research note", *Qualitative Research*, Vol. 16 No. 2, pp. 229-235.

Shim, S.M., Seo, S.H., Lee, Y., Moon, G.I., Kim, M.S. and Park, J.H. (2011), "Consumers' knowledge and safety perceptions of food additives: evaluation on the effectiveness of transmitting information on preservatives", *Food Control*, Vol. 22 No. 7, pp. 1054-1060, doi: 10.1016/j.foodcont.2011.01.001.

Sick, J., Højer, R. and Olsen, A. (2019), "Children's self-reported reasons for accepting and rejecting foods", *Nutrients*, Vol. 11 No. 10, doi: 10.3390/nu11102455.

Siegrist, M. and Sütterlin, B. (2017), "Importance of perceived naturalness for acceptance of food additives and cultured meat", *Appetite*, Vol. 113, pp. 320-326.

Sirieix, L., Kledal, P.R. and Sulitang, T. (2011), "Organic food consumers' trade-offs between local or imported, conventional or organic products: a qualitative study in Shanghai", *International Journal of Consumer Studies*, Vol. 35 No. 6, pp. 670-678.

Stevenson, C., Doherty, G., Barnett, J., Muldoon, O.T. and Trew, K. (2007), "Adolescents' views of food and eating: identifying barriers to healthy eating", *Journal of Adolescence*, Vol. 30 No. 3, pp. 417-434.

Stok, F.M., De Ridder, D.T.D., Adriaanse, M.A. and De Wit, J.B.F. (2010), "Looking cool or attaining self-rule. Different motives for autonomy and their effects on unhealthy snack purchase", *Appetite*, Vol. 54 No. 3, pp. 607-610, flen purchases by Swiss consumers. Psychology & Marketing, 20(10), 883-902, doi: 10.1016/j.appet.2010.02.017.

Sulistyawati, I., Sijtsema, S., Dekker, M., Verkerk, R. and Steenbekkers, B. (2019), "Exploring consumers'health perception across cultures in the early stages of new product development, dried mango as a case study", *British Food Journal*, Vol. 121 No. 9, pp. 2116-2131, doi: 10.1108/BFJ-02-2019-0091.

Sy, M., O'Leary, N., Nagraj, S., El-Awaisi, A., O'Carroll, V. and Xyrichis, A. (2020), "Doing interprofessional research in the COVID-19 era: a discussion paper", *Journal of Interprofessional Care*, Vol. 34 No. 5, pp. 600-606.

Tang, T., Wang, W., Croden, F., Vazirian, M. and Hetherington, M.M. (2020), "Wrap healthy snacks with cool packaging-A qualitative study of mothers' portion size strategies for their children", *Appetite*, Vol. 147, 104537.

Tanner, C. and Wölfing Kast, S. (2003), "Promoting sustainable consumption: determinants of green purchases by Swiss consumers", *Psychology and Marketing*, Vol. 20 No. 10, pp. 883-902.

Thana, Y.A., Takruri, H.R. and Tayyem, R.F. (2019), "Dietary practices and nutrient intake among adolescents: a general review", *Obesity Medicine*, Vol. 16, 100145.

Tobler, C., Visschers, V.H. and Siegrist, M. (2011), "Eating green. Consumers' willingness to adopt ecological food consumption behaviors", *Appetite*, Vol. 57 No. 3, pp. 674-682.

Tyson, N. and Frank, M. (2018), "Childhood and adolescent obesity definitions as related to BMI, evaluation and management options", *Best Practice and Research Clinical Obstetrics and Gynaecology*, Vol. 48, pp. 158-164, doi: 10.1016/j.bpobgyn.2017.06.003.

Velazquez, C.E., Black, J.L., Billette, J.M., Ahmadi, N. and Chapman, G.E. (2015), "A comparison of dietary practices at or en route to school between elementary and secondary school students in Vancouver, Canada", *Journal of the Academy of Nutrition and Dietetics*, Vol. 115 No. 8, pp. 1308-1317.

Verhoog, H., Matze, M., Van Bueren, E.L. and Baars, T. (2003), "The role of the concept of the natural (naturalness) in organic farming", *Journal of Agricultural and Environmental Ethics*, Vol. 16 No. 1, pp. 29-49.

Vermeir, I. and Verbeke, W. (2006), "Sustainable food consumption: exploring the consumer 'attitude–behavioral intention' gap", *Journal of Agricultural and Environmental Ethics*, Vol. 19 No. 2, pp. 169-194.

Videon, T.M. and Manning, C.K. (2003), "Influences on adolescent eating patterns: the importance of family meals", *Journal of Adolescent Health*, Vol. 32 No. 5, pp. 365-373.

Watts, A.W., Barr, S.I., Hanning, R.M., Lovato, C.Y. and Mâsse, L.C. (2018), "The home food environment and associations with dietary intake among adolescents presenting for a lifestyle modification intervention", *BMC Nutrition*, Vol. 4 No. 1, doi: 10.1186/s40795-018-0210-6.

WHO (2020), "World health organization", *Obesity and Overweight*.

Xue, H., Maguire, R.L., Liu, J., Kollins, S.H., Murphy, S.K., Hoyo, C. and Fuemmeler, B.F. (2019), "Snacking frequency and dietary intake in toddlers and preschool children", *Appetite*, Vol. 142, 104369, doi: 10.1016/j.appet.2019.104369.

Zarantonello, L. and Luomala, H.T. (2011), "Dear Mr Chocolate: constructing a typology of contextualized chocolate consumption experiences through qualitative diary research", *Qualitative Market Research*, Vol. 14 No. 1, pp. 55-82, doi: 10.1108/13522751111099328.

Zhao, H.H., Gao, Q., Wu, Y.P., Wang, Y. and Zhu, X.D. (2014), "What affects green consumer behavior in China? A case study from Qingdao", *Journal of Cleaner Production*, Vol. 63, pp. 143-151.

Corresponding author
Bea Steenbekkers can be contacted at: bea.steenbekkers@wur.nl