# What a Mess! The Effect of Messiness in Food Pictures on Unhealthy Food Choices

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Consumers are more likely to choose unhealthy food when pictures present the food in a messy (vs. neat) way. The 'messy food picture trend' displays food in an unbalanced, unlevel, random, unsorted and untidy way. Three studies ($N$ = 1796) involving both snacks and meals show that exposure to a messy (vs. neat) food presentation in pictures renders consumers more likely to choose unhealthy food. Three possible mechanisms underlying this effect were tested: processing style, self-control, and product vividness. Evidence was found for the latter. The 'messy food effect' occurs because a messy (vs. neat) food presentation increases product vividness, which elevates consumers' need for instant gratification. Furthermore, the 'messy food effect' is moderated by consumers' orderliness in eating contexts. For consumers who usually eat in a highly orderly way, messy (vs. neat) food pictures do not affect product vividness and the number of unhealthy food choices.

Keywords: unhealthy food choices, food pictures, messy food presentation, product vividness, need for instant gratification, orderliness in eating contexts

## 1. Introduction

Food pictures play a central role in many food choice contexts. For instance, on online food delivery platforms (e.g., Deliveroo) and meal kit services (e.g., Hello Fresh), meal options are accompanied with pictures of the food. In addition, online grocery stores present products with pictures. However, food pictures do not only play an important role in online contexts. For instance, on screens above cash registers and on order displays in fast food restaurants, different meal options are displayed with pictures.

It is clear that food pictures are omnipresent in food choice contexts. But does it matter how the food in the pictures is presented? Research has shown that visual food presentation affects the healthiness of consumers' food choices (Vermeir & Roose,

2020). For example, food shapes (Van Kleef et al., 2014), package material (De Temmerman, Vermeir, & Slabbinck, 2018), nutrition label colours (Zhang et al., 2020; De Temmerman et al., 2021), product positioning on shelves (Romero & Biswas, 2016), in-store assortment order (Verstraeten & Geuens, 2019), and whether products are presented in an online or physical store (Huyghe et al., 2017) affect (un)healthy food choices. Furthermore, consumers' unhealthy food choices can be influenced by food presentation within pictures. More specific, the camera angle in food pictures affects unhealthy food choices (Meersseman, Vermeir, & Geuens, 2021).

The current research investigates the effect of another presentation aspect in food pictures on unhealthy food choices: a messy (vs. neat) food presentation in pictures. Messy food presentation is a popular and contemporary trend in food photography (Cherrydeck, 2022; Hamilton, n.d.; Gottfried, M., 2010; Yuppiechef, n.d.). As a counterreaction to the typical "perfect" food pictures in which food is carefully positioned while making sure no crumb or spill is present, the messy food photography trend intentionally presents the food in a seemingly more nonchalant and effortless way. This nonchalance typically presents itself in a random, scattered, unbalanced formation of food, while intentionally leaving or adding some crumbs, spills and fallen food particles on and next to the plate. Notwithstanding, the aim is to make the food look attractive in its intentional imperfect way (Bright, 2017; Cherrydeck, 2022; Hamilton, n.d.; Gottfried, 2010; Yuppiechef, n.d.).

### *1.1. Messiness and disorder (vs. neatness and order) defined in literature*

Messiness (vs. neatness) and disorder (vs. order) are closely related and often refer to the same concept. Messiness and disorder are described with words such as "disorganized," "unsorted," "turbulent," "asymmetric," "non-straight," "scattered," "unlevel," "cluttered," "strewn at random," "chaotic," and "non-patterned." On the

contrary, neatness and order are defined with terms such as “organized,” “sorted,” “structured,” “symmetric,” “straight,” “level,” “clear,” “carefully placed,” “coherent,” and “patterned” (Chae & Zhu, 2014; Coskun, Gupta, & Burnaz., 2019; 2020; Doucé et al., 2014; Gilboa & Rafaeli, 2003; Gupta & Coskun, 2021; Kotabe, 2014; Kotabe, Kardan, & Berman, 2016; Li et al., 2019; 2020; Ye, Huang, & Zhang, 2018; Zellner et al., 2011). However, messiness (vs. neatness) additionally refers to an element of “dirtiness” and “untidiness” (vs. “cleanness” and “tidiness”), which does not seem to be the case for disorder (vs. order) (Coskun, Gupta, & Burnaz, 2019; 2020; Doucé et al., 2014). The current research focuses on all elements of messiness (i.e., including dirtiness in the form of crumbs and spills), which are relevant in the context of messy food pictures. Therefore, the terms “messy” and “neat” will be used to describe the manipulations in the current research.

### *1.2. Previous research on messiness and disorder (vs. neatness and order)*

Previous research has investigated the effects of visual messiness and disorder (vs. neatness and order) on processing style, self-control, in-store behaviour, and attitudes towards food.

A first research stream investigated the effect of messiness and disorder on processing style. Li and colleagues (2019) found that words about disorder (e.g., “cluttered”) were associated more with words about concreteness (e.g., “detail”) compared to abstractness (e.g., “entirety”). On the contrary, words about order (e.g., “symmetry”) were associated more with words about abstractness (vs. concreteness). As another indication of a link with construal level, Li et al. (2020) found that exposure to pictures of disordered (vs. ordered) environments led respondents to categorize less items into a category, indicating that they adopted a more concrete processing style (i.e., low construal level).

A second research stream tapped into the effect of visual disorder and messiness on self-control. Kotabe and colleagues (2016) found that after respondents were exposed to abstract visuals containing disorder (vs. order), they displayed more rule-breaking behaviour in a subsequent task. Other research found that after exposure to a messy (vs. neat) room, respondents were less persistent in a subsequent task. Resource depletion resulting from the perception that the messy environment threatened their personal control explained the effect (Chae & Zhu, 2014).

A third research stream investigated the effects of messy and disordered store environments on consumer attitudes, intentions, and behaviours towards (1) non-food products and (2) food products. Research involving *non-food products* found that messy stores lead to confusion (Coskun, Gupta, & Burnaz, 2019), product contamination perceptions (Gupta, & Coskun, 2021), and lower product attitudes for products of which the appearance matters (Ye, Huang, & Zhang, 2018). Furthermore, when non-food products are scarce, store messiness triggers competitive consumer behaviors (Coskun, Gupta, & Burnaz, 2020). Additionally, unsystematic product arrangement causes perceptual disfluency, increasing choices for unfamiliar products (Walter et al., 2020). Store messiness also leads to lower purchase intentions for non-food products (Gupta & Coskun, 2021). However, when scarce, purchase likelihood of non-food products increases (Castro, Morales, & Nowlis, 2013). Research involving *food products* found that store messiness leads to perceptions of product contamination (Gupta & Coskun, 2021). Moreover, an unsystematic product arrangement increases unfamiliar food choices (Walter et al., 2020). Furthermore, a messy store leads to lower purchase intentions (Gupta & Coskun, 2021). However, in contrast to non-food products, messy food product displays with scarce amounts of food products reduce purchase likelihood (Castro, Morales, & Nowlis, 2013).

Finally, some researchers started to explore messiness in the context of *food presentation* and consumption. Michel and colleagues (2014) compared respondents' reactions towards a salad presented in an artistic way (i.e., mimicking an abstract painting), compact way (i.e., all ingredients put together on a pile), or structured way (i.e., all ingredients are separated from each other). Participants receiving the artistically presented salad reported a higher liking, willingness to pay, and tastiness compared to the other two plating styles. Velasco and colleagues (2016) found that people have a preference for symmetric and balanced (vs. asymmetric and unbalanced) food plating. Zellner and colleagues (2011) found that messy (vs. neat) food presentation (i.e., actual food, not in pictures) reduces taste expectations, willingness to pay, liking of the taste, restaurant quality perceptions, and perceived care taken by the preparer. Moreover, Wu and colleagues (2021) found that when they forced participants to eat messily (i.e., by instructing them to mash a piece of cake with a fork before eating it), visual appeal of food decreased, causing disgust feelings and reduced liking of the taste. Consequently, respondents consumed less of the food. To our knowledge, only one study has yet tapped into the *food choice* consumers make in a messy (vs. neat) context. Vohs and colleagues (2013) invited their respondents into a messy (vs. neat) room (i.e., a room with scattered papers and other office supplies vs. a room without clutter). In the room, participants could choose between receiving a chocolate bar or an apple. Those exposed to the messy (vs. neat) room were more likely to choose the more unhealthy food option.

### *1.3. Aims of the present research*

In view of (1) food pictures being omnipresent in digital and non-digital food choice environments, (2) messy food presentations becoming increasingly popular in food photography (Cherrydeck, 2022; Hamilton, n.d.; Gottfried, 2010; Yuppiechef,

n.d.), and (3) messy contexts having been shown to lead to negative cognitive, affective and behavioural consequences (see section 1.2.), research on the effect of messy food presentations in pictures on consumers' food choices is called for. This research seeks to move research on messiness further (1) by investigating messiness in *food pictures* rather than in the environment and (2) by focusing on *food choice* as the dependent variable. Would pictures of messy (vs. neat) food lead consumers to make more (un)healthy food choices? If so, why would that be? Answers to these questions could inform governments, retailers, and all actors in food environments in a joint effort to get consumers on a 'healthier' track.

## 2. Theoretical framework

Previous research found that exposing people to a messy (vs. neat) environment increased the likelihood of them choosing an unhealthy snack (i.e., a chocolate bar) over a healthy snack (i.e., an apple) (Vohs, Redden, & Rahinel, 2013). Therefore, it is possible that exposure to messiness in the presentation of food in pictures (instead of exposure to a messy environment) also increases unhealthy food choices.

**Hypothesis 1 (H1).** *Messily (vs. neatly) presented food in pictures increases unhealthy food choices.*

Three different theories could possibly explain the positive effect of messily (vs. neatly) presented food in pictures on unhealthy food choices.

The first possible mechanism to drive the effect of a messy (vs. neat) food presentation in pictures on unhealthy food choices is processing style. Previous research found that messiness leads to people adopting a more concrete (vs. abstract) processing style (i.e., a lower construal level) (Li et al., 2019; 2020). Lower construal levels have been shown to lead to a focus on aspects related to lower-order consumption goals such

as the tastiness of products (vs. aspects related to higher-order goals such as the healthiness of products), resulting in more unhealthy food choices (Dhar & Kim, 2007). While higher-order goals require long-term commitment and effort (e.g., maintaining a healthy weight in the future), lower-order goals are situated in the short-term future, require less effort, and can impede the attainment of higher-order goals (e.g., indulging on unhealthy foods) (Fishbach, Dhar, Zhang, 2006). Therefore, it is possible that messily (vs. neatly) presented food in pictures induces more concrete (vs. abstract) processing styles in consumers' minds, making unhealthy food choices more likely.

**Hypothesis 2 (H2).** *A lower construal level underlies the 'messy food effect.'*

The second possible mechanism to drive the effect of a messy (vs. neat) food presentation in pictures on unhealthy food choices is self-control. Previous research has found that exposure to messy (vs. neat) visual stimuli leads to increased rule-breaking behaviour and self-regulation failure, which are linked to self-control (Kotabe, Kardan, & Berman, 2016; Chae & Zhu, 2014). If a messy (vs. neat) food presentation in pictures would bring respondents into a state of reduced self-control, they would be less likely to resist the temptation of unhealthy food. Hence, they would choose more unhealthy food (Hofmann, Friese, & Wiers, 2008; Schwarzer, 2008).

**Hypothesis 3 (H3).** *Reduced self-control underlies the 'messy food effect.'*

Finally, the third possible mechanism to drive the effect of a messy (vs. neat) food presentation in pictures on unhealthy food choices is based on the ease by which people imagine consuming the food in the pictures (i.e., product vividness). It is well-established that people can imagine familiar (vs. unfamiliar) things more vividly (Loewenstein, 1996; Arnold, McDermott, & Szpunar, 2011; Elder & Krishna, 2012). In

turn, higher product vividness, and thus the ease with which one can imagine the satisfaction one would get from consuming the product, has been shown to increase consumers' need for instant gratification (Shiv & Fedorikhin, 1999; 2002). Furthermore, research found that if the camera angle in food pictures is a more familiar way of looking at food in real life, it is easier for consumers to imagine consuming the food in the pictures (i.e., product vividness increases). In turn, this causes a higher need for instant gratification, and therefore results in more unhealthy food choices (Meersseman, Geuens, & Vermeir, 2021). Similarly, a messy (vs. neat) food presentation in pictures may resemble to a greater extent the food people see in real life. After all, in daily life, food usually is not perfectly aligned and balanced on the plate, and crumbs and spills are often present. Therefore, it is possibly easier to imagine consuming the food in pictures of messily (vs. neatly) presented food, which would lead to increased product vividness and need for instant gratification, resulting in more unhealthy food choices.

**Hypothesis 4a (H4a).** *Increased ability to imagine consuming the pictured food (i.e. product vividness) and need for instant gratification underly the 'messy food effect.'*

However, individuals can largely differ in the personality trait 'orderliness' (De Young & Quilty, 2007). It seems likely that for consumers who generally like to eat messily (i.e., consumers who have low orderliness in eating contexts), the effect of messy (vs. neat) food pictures on unhealthy food choices is stronger. Namely, they are probably more familiar with messily (vs. neatly) presented food and can therefore more easily imagine consuming food in pictures with a messy (vs. neat) presentation.

**Hypothesis 4b (H4b).** *The effect of messiness (vs. neatness) in food pictures on product vividness is moderated by orderliness in eating contexts in the sense that the effect is stronger for people who are less orderly in eating contexts.*

## 3. Study Overview

To test these hypotheses, three studies were conducted. Study 1 tested the main effect of a messy (vs. neat) food presentation in pictures on food choices (i.e., healthy vs. unhealthy). Study 2 aimed to replicate the 'messy food effect' and tested a first possible underlying mechanism: processing style (H2). Only this specific mechanism was tested in study 2, as the measure of construal level (i.e., categorization of non-food objects) is seemingly unrelated to the measure of the main effect (i.e., food choices). Therefore, the construal level measure was presented as a separate, unrelated task in a consumer lab session in which respondents are used to the bundling of different unrelated studies in one and the same session. Doing so, did not allow to take in the three possible mechanisms simultaneously as randomization of the order of the mediators would not be possible. Namely, having the non-food related construal level measure in between food-related questions would cause confusion and suspicion in the respondents. Study 3 replicated the 'messy food effect' and investigated the two remaining potential underlying mechanisms: self-control (H3) and vividness (H4a). The moderating effect of orderliness in eating contexts was also investigated (H4b).

## 4. Study 1

Study 1 explored the main effect of a messy (vs. neat) food presentation in pictures on unhealthy food choices. To this end, a two conditions (i.e., messy vs. neat food pictures) between-participants online experiment was set up.

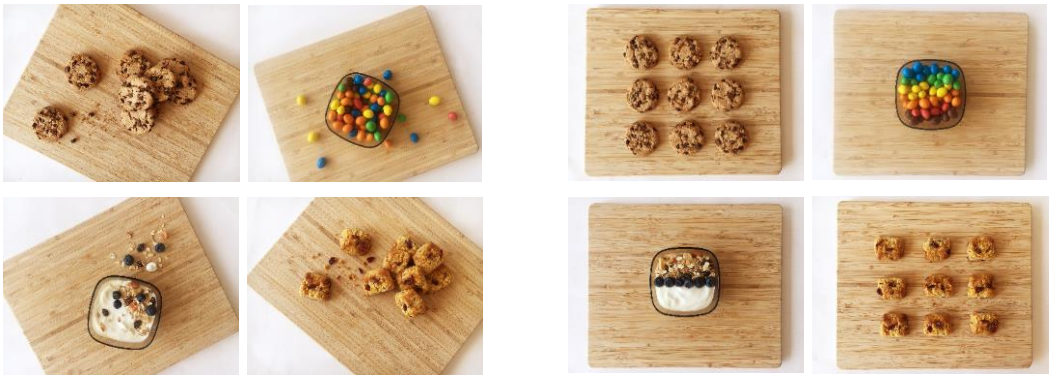
### *4.1. Creating and pretesting materials*

A messy and neat picture of eight different snacks served as the stimulus material (see Figure 1). The messy food pictures contained different elements of messiness such as symmetry, skewness, a random, unbalanced, and unsorted formation of the products, and untidiness (i.e., spills and crumbs) (see section 1.1). The neat food pictures contained various elements of neatness such as symmetry, levelness, a precise,

balanced, and sorted formation of the products, and tidiness (i.e., no spills or crumbs). As food pictures in commercial and social media typically show elements of messiness (vs. neatness) in the presentation of the actual food as well as the surface on which it is presented, we also pictured the latter in a skewed (vs. level) way as a part of the manipulation. The messy and neat food pictures showed the same amount of food and were taken from an equal distance, using the same camera angle.

**Figure 1.** Examples of snacks pictured in a messy and neat way (stimuli study 1 & study 2).

| Messy snack pictures | Neat snack pictures |
|---|---|



A (within-participants) pretest made sure the snacks were perceived as being either healthy or unhealthy, but also attractive, tasty, and familiar. Fifty British participants, recruited on the online research platform Prolific (50% women, $M_{age}$ = 36.60 years, $SD_{age}$ = 12.62 years), participated in the study. For each snack, the messy and neat pictures were presented to the respondents simultaneously (but in a random order), accompanied by a description (e.g., "chocolate chip cookie"). Next, respondents indicated how healthy, tasty, attractive, and familiar they perceived the snacks to be on 7-point bipolar scales (e.g., 1 = "this food is not healthy:" 7 = "this food is healthy").

One-sample t-tests showed that four of the snacks were perceived as unhealthy (i.e., brownie, chocolate chip cookie, chocolate candy, and pancakes) and four as healthy (granola bar, hazelnuts and berries, pomegranate arils, yogurt with muesli and

berries). All eight snacks were perceived as being attractive, tasty, and familiar. Table 1 gives an overview of the results for the healthy and unhealthy snacks (see section A of Supplementary Materials for individual results of each snack).

**Table 1.** Pretest results of one-sample t-tests on the perceptions for healthy and unhealthy snacks (stimuli used in study 1 & study 2).

| | 4 unhealthy snacks combined | | | | 4 healthy snacks combined | | | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *t* | *p* | *M* | *SD* | *t* | *p* |
| Healthiness | 2.31 | .89 | -13.45 | < .001 | 5.93 | .61 | 22.13 | < .001 |
| Attractiveness | 5.83 | .97 | 13.26 | < .001 | 4.87 | 1.33 | 4.62 | < .001 |
| Tastiness | 5.83 | 1.04 | 12.50 | < .001 | 5.20 | 1.06 | 7.95 | < .001 |
| Familiarity | 6.12 | .84 | 17.89 | < .001 | 5.52 | 1.44 | 7.48 | < .001 |

*Note: The one-sample t-tests used 4 - the mean value of the scale - as the test value.*

### *4.2. Participants*

As effect sizes for this type of food picture studies are typically low (cf. Meersseman, Vermeir & Geuens, 2021), 621 British participants were recruited on Prolific. Of these, 15 respondents were excluded from the analyses for incomplete responses and 31 respondents were excluded as they were identified as outliers on the total amount of snacks they chose to eat in a week by a stem and leaf plot (Landwehr & Watkins, 1985). This left 575 respondents (49% women, $M_{age}$ = 39.32 years, $SD_{age}$ = 13.77 years) for analyses.

### *4.3. Procedure*

First, respondents indicated their hunger on a slider ranging from 1 (“not at all hungry”) to 10 (“extremely hungry”). Next, participants were told they would see a series of food pictures after which they would have to answer some questions about the food pictures. Then, they saw in a random order a picture series of eight snacks (four healthy; four unhealthy as indicated by the pretest, see section 4.1.). Depending on the randomly assigned condition, the pictures showed the same snacks presented in a messy or neat way. Subsequently, respondents saw an overview of all the pictures and were instructed to choose the snacks from this variety they would like to eat in the next week.

They could choose as many different kinds and servings of snacks as they desired. Below the pictures, the serving size was mentioned (e.g., “a handful of chocolate candy”). We also mentioned that they had to imagine they would not have access to any other snacks besides the ones from this assortment during the full week. In addition, they could also choose one snack that they would like to eat at that very moment. The survey was filled in by respondents in the afternoon at a relevant time to eat a snack. After measurement of these hypothetical choices, respondents indicated their age and gender, and were thanked for their participation.

### *4.4. Results*

Four one-way ANCOVA’s were performed with messiness (vs. neatness) as the independent variable, (1) the ratio of unhealthy snack portions chosen to the total amount of snack portions chosen, (2) the unhealthy snack portions chosen, (3) the healthy snack portions chosen, and (4) the total amount of snack portions chosen as the dependent variables. Hunger was included as a covariate. The results showed a significant difference in the ratio of unhealthy snack portions chosen to the total amount of snack portions chosen (cf. H1). Respondents who saw the pictures of messy snacks chose relatively more unhealthy snacks to their total amount of snack portions chosen (57%) compared to respondents who saw the pictures of neat snacks (52%). The covariate hunger had a significant positive effect on the ratio of unhealthy snack portions chosen to the total amount of snack portions chosen. There was no significant difference among the messy and neat conditions for the unhealthy, healthy, and total amount of snacks portions chosen. Table 2 shows the results for the different dependent variables.

**Table 2.** Impact of messy (vs. neat) food pictures on food choice (one-way ANCOVA's).

| | Messy food pictures | | Neat food pictures | | | | Covariate hunger | |
|---|---|---|---|---|---|---|---|---|
| Dependent variable | *M* | *SD* | *M* | *SD* | *F*(1,575) | *p* | *F*(1,575) | *p* |
| (1) Ratio of the number of unhealthy snack portions chosen to the total number of snack portions chosen | .57 | .29 | .52 | .32 | 5.77 | .017 | 7.83 | .005 |
| (2) Number of unhealthy snack portions chosen | 6.62 | 4.98 | 6.13 | 4.79 | 1.52 | .219 | 5.76 | .017 |
| (3) Number of healthy snack portions chosen | 5.54 | 5.20 | 6.05 | 4.92 | 1.47 | .226 | .40 | .529 |
| (4) Total number of snack portions chosen | 12.16 | 6.87 | 12.18 | 6.11 | .001 | .981 | 1.70 | .193 |

Next, a binary logistic regression with messiness (vs. neatness) as the independent variable, hunger as covariate, and the type of snack (unhealthy vs. healthy) they would chose to eat at that specific moment as the dependent variable was performed. Messiness was a significant predictor of whether respondents chose an unhealthy or healthy snack to eat at that moment ($b$ = .34, Wald $x^2(1)$ = 4.06, $p$ = .044). When seeing pictures of messily (vs. neatly) presented snacks, respondents were more likely to choose an unhealthy snack (odds ratio = 1.41, 95% CI [1.009, 1.971]; cf. H1). Of those who saw pictures of messily (vs. neatly) presented snacks, 63% (vs. 55%) chose an unhealthy snack to eat that specific moment. Hunger was not a significant predictor of snack choice ($b$ = .057; Wald $x^2(1)$ = 2.09, $p$ = .149; odds ratio = 1.06; 95% CI [.980, 1.143]).

## 5. Study 2

Study 2 sought to (1) replicate the main effect of messy (vs. neat) food pictures on unhealthy food choices (H1) and to (2) investigate the underlying mechanism of the 'messy food effect' (H2). We again manipulated the food presentation in the pictures (messy vs. neat) in a two conditions between-participants design and measured construal level as potential mediator. In addition to the previously measured covariate hunger, BMI and health consciousness were also measured as possible covariates.

### *5.1. Materials and participants*

The exact same stimuli as in study 1 were used (see section 4.1.). For this study, 701 British participants were recruited on Prolific. Of these, six respondents were excluded from the analyses for incomplete responses (i.e., they did not indicate their height and weight), ten respondents failed the attention check, and 25 respondents were identified as outliers on the total number of snacks they chose to eat in a week by a stem and leaf plot. This left 660 respondents (51% women, $M_{age}$ = 41.37 years, $SD_{age}$ = 14.55 years) for analyses.

### *5.2. Procedure*

First, participants were informed that they would complete two unrelated tasks: one about food and one about objects. Next, respondents indicated their hunger on a slider ranging from 1 ("not at all hungry") to 10 ("extremely hungry"). Subsequently, participants were told they would see a series of food pictures after which they would have to answer some questions about the food pictures. Respondents saw in random order a picture series of eight snacks (four healthy; four unhealthy, see section 4.1.). Depending on the condition they had randomly been assigned to, the pictures showed the same snacks presented in a messy or neat way. After each picture was presented individually, respondents saw an overview of all pictures together and were instructed

to make a hypothetical choice. Specifically, they were asked to choose the snacks from the presented overview they would like to eat in the next week. They could choose as many different kinds and servings of snacks as they desired. In addition, they could also choose one snack that they would like to eat at that very moment. Next, respondents proceeded to the seemingly unrelated task about objects. A categorization task was used to measure respondents' construal level (Rosch, 1975, as also used in e.g., Hansen, 2019; Li et al., 2020; Roose et al., 2019; Van Kerckhove, Geuens, & Vermeir, 2015). Participants gave their opinion on the extent to which three typical examples (e.g., table, bus), three neither atypical nor typical examples (e.g., clothing hanger, tractor), and three atypical examples (e.g., radio, sled) belonged to a category (i.e., furniture, vehicles). Category membership was indicated on a 10-point Likert scale (1 = "the object definitely does not belong to the category;" 5 = "the object does not belong to the category, but shares some similarities with objects that do belong to the category;" 6 = "the object belongs to the category, but is not a good example of the category;" 10 = "the object definitely belongs to the category"). A more inclusive way of categorizing objects signals a more abstract processing style or higher construal level (Rosch, 1975). The two categories and the objects within the categories were displayed in a random order. Next, participants' health consciousness was measured with the 3-item "health self-consciousness" factor of the health consciousness scale by Gould (1990) on a 7-point Likert scale ("I reflect about my health a lot," "I'm very self-conscious about my health," "I'm generally attentive to my inner feelings about my health"; 1 = "strongly disagree," 7 = "strongly agree"; $\alpha$ = .80). We also added an instructional attention check item to this scale ("Please indicate strongly agree here", Oppenheimer, Meyvis, & Davidenko, 2009).

Finally, respondents indicated their length, weight, age, and gender, and were thanked for their participation.

### *5.3. Results*

#### *5.3.1. Main effect (H1)*

Four one-way ANCOVA's were performed with messiness (vs. neatness) as the independent variable, (1) the ratio of unhealthy snack portions chosen to the total number of snack portions chosen, (2) the unhealthy snack portions chosen, (3) the healthy snack portions chosen, and (4) the total number of snack portions chosen as the dependent variables. Hunger, BMI, and health consciousness were included as covariates. The results indicated a significant difference in the ratio of unhealthy snack portions chosen to the total number of snack portions chosen (cf. H1). Respondents who saw the pictures of messy snacks chose relatively more unhealthy snacks to their total number of snack portions chosen (54%) compared to respondents who saw the pictures of neat snacks (50%). Covariates hunger and health consciousness respectively had a marginally significant positive effect and a significant negative effect on the ratio of unhealthy snack portions chosen to the total number of snack portions chosen. Furthermore, messily (vs. neatly) presented food in pictures marginally significantly affected the absolute number of unhealthy snacks portions chosen. Covariate hunger had a significant positive effect on the number of unhealthy snacks chosen. There was no significant difference among the messy and neat conditions for the healthy and total number of snacks portions chosen. Table 3 shows the effects of messy (vs. neat) food pictures on the different dependent variables. Table 4 shows the effect of the covariates on the dependent variables.

**Table 3.** Impact of messy (vs. neat) food pictures on food choice (one-way ANCOVA's).

| | Messy food pictures | | Neat food pictures | | | |
|---|---|---|---|---|---|---|
| Dependent variable | *M* | *SD* | *M* | *SD* | *F*(1,655) | *p* |
| (1) Ratio of the number of unhealthy snack portions chosen to the total number of snack portions chosen | .54 | .29 | .50 | .30 | 4.32 | .038 |
| (2) Number of unhealthy snack portions chosen | 6.87 | 4.86 | 6.25 | 4.75 | 3.47 | .063 |
| (3) Number of healthy snack portions chosen | 6.19 | 5.11 | 6.61 | 5.16 | 1.34 | .248 |
| (4) Total number of snack portions chosen | 13.06 | 6.62 | 12.86 | 6.69 | .208 | .649 |

**Table 4.** Impact of covariates on food choice (one-way ANCOVA's).

| | Covariate hunger | | Covariate BMI | | Covariate health consciousness | |
|---|---|---|---|---|---|---|
| Dependent variable | *F*(1,655) | *p* | *F*(1,655) | *p* | *F*(1,655) | *p* |
| (1) Ratio of the number of unhealthy snack portions chosen to the total amount of snack portions chosen | 3.52 | .061 | .002 | .962 | 18.46 | < .001 |
| (2) Number of unhealthy snack portions chosen | 17.65 | < .001 | .136 | .731 | 2.06 | .152 |
| (3) Number of healthy snack portions chosen | 2.36 | .125 | .191 | .663 | 20.23 | < .001 |
| (4) Total number of snack portions chosen | 17.91 | < .001 | .365 | .546 | 5.93 | .015 |

A binary logistic regression with messiness (vs. neatness) as the independent variable, hunger, BMI, and health consciousness as covariates, and the hypothetical choice of the snack (unhealthy vs. healthy) they wanted to eat at that moment as the dependent variable indicated that messiness was a marginally significant predictor of respondents' unhealthy or healthy snack choice (see Table 5). Respondents who saw pictures with messily (vs. neatly) presented food were more likely to choose an unhealthy snack (cf. H1). Of those who saw messy (vs. neat) snack pictures, 62% (vs. 56%) chose an unhealthy snack. Hunger and BMI did not predict snack choice.

However, health consciousness significantly predicted snack choice in the sense that a higher health consciousness made an unhealthy snack choice less likely.

**Table 5.** Impact of messy (vs. neat) food pictures and covariates on food choice (binary logistic regression).

| | *b* | Wald $x^2(1)$ | *p* | odds ratio | 95% CI for odds ratio |
|---|---|---|---|---|---|
| Messy (vs. neat) food pictures | .29 | 2.21 | .073 | 1.33 | [.973, 1.825] |
| Hunger | .06 | 2.24 | .134 | 1.06 | [.983, 1.139] |
| BMI | .00 | .05 | .816 | 1.00 | [.993, 1.009] |
| Health Consciousness | -.18 | 6.19 | .013 | .84 | [.726, .963] |

#### *5.3.2. Construal level (H2)*

Next, four independent samples t-tests with messy and neat food pictures as the independent variable and with the mean score of (1) all items, (2) three typical examples, (3) three neither atypical nor typical examples, and (4) three atypical examples of both furniture and vehicles as the dependent variables were performed. The analyses showed no differences in the construal level between respondents who were exposed to messy (vs. neat) food pictures ((1) $t(658) = -1.16$, $p = .248$; (2) $t(658) = .63$, $p = .527$; (3) $t(658) = -1.15$, $p = .250$; (4) $t(658) = -1.24$, $p = .214$). Hence, no evidence for H2 was found.

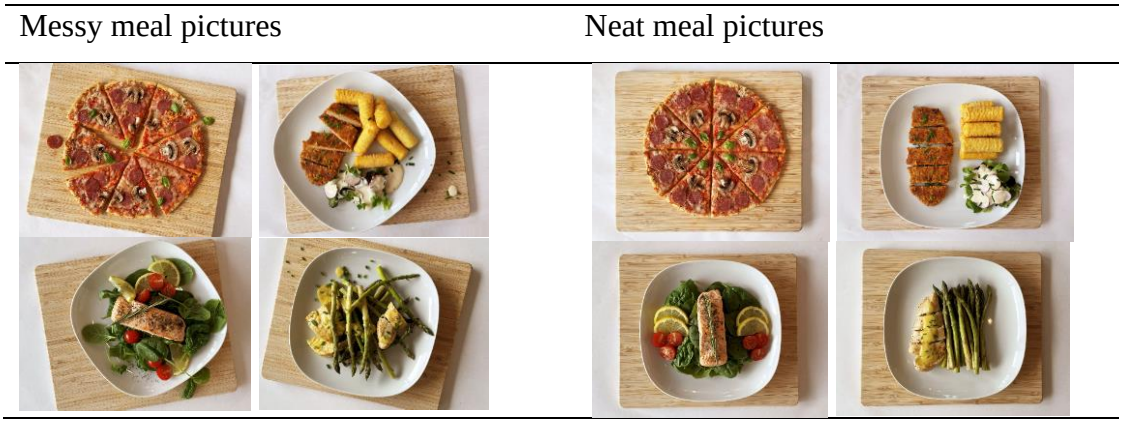
## 6. Study 3

Study 3 sought to (1) replicate the effect of messy (vs. neat) food pictures on unhealthy food choices for other foods (i.e., meals instead of snacks) (H1), to (2) further investigate the underlying mechanism of the 'messy food effect' (H3 and H4a), and (3) to investigate orderliness in eating contexts as moderator (H4b). To this end, we again manipulated the food presentation in the pictures (messy vs. neat) in a two conditions between-participants design and measured two potential mediating paths (via self-control on the one hand and via vividness and instant gratification on the other hand) and orderliness in eating contexts as potential moderator.

*6.1. Creating and pretesting materials*

A messy and neat picture of 16 meals , taking the same messiness and neatness elements into account served as stimuli (see Figure 2).

**Figure 2.** Examples of meals pictured in a messy and neat way (stimuli study 3).




A pretest made sure the meals were perceived as being either healthy or unhealthy, but also attractive, tasty, and familiar. Ninety-nine British participants (50% women, $M_{age}$ = 39.71 years, $SD_{age}$ = 13.50 years) were recruited on Prolific for the (within-participants) online pretest. Only non-vegetarians were recruited as most of the meals in the pictures contained meat. The procedure and measures were identical to the ones used for the pretest of study 1. To limit respondents' fatigue of answering the same questions several times, each respondent was exposed to a random selection of eight out of the 16 meals.

Based on one-sample t-tests, ten meals were selected for use in study 3 (i.e., meals that were indicated to be unattractive, unfamiliar, or neither healthy nor unhealthy, were not selected). Of these ten meals, five were perceived as unhealthy (i.e., cheeseburger, grilled cheese sandwich, pizza, fried pork chop, and fried chicken wings) and five as healthy (i.e., avocado toast, grilled beef with carrots, grilled chicken with asparagus, salad with feta, and grilled salmon with spinach). All meals were perceived as being attractive, tasty, and familiar. Table 6 gives an overview of the results for the

healthy and unhealthy meals (see section B of Supplementary Materials for individual results of each meal).

**Table 6.** Pretest results of one-sample t-tests on the perceptions for healthy and unhealthy meals (stimuli used in study 3).

| | 5 unhealthy meals combined | | | | 5 healthy meals combined | | | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *t* | *p* | *M* | *SD* | *t* | *p* |
| Healthiness | 3.01 | .55 | -12.57 | < .001 | 6.06 | .52 | 27.50 | < .001 |
| Attractiveness | 4.83 | 1.54 | 3.77 | < .001 | 5.07 | 1.53 | 4.87 | < .001 |
| Tastiness | 5.78 | 1.05 | 10.48 | < .001 | 5.14 | 1.11 | 7.46 | < .001 |
| Familiarity | 5.74 | .78 | 15.73 | < .001 | 5.22, | .79 | 10.85 | < .001 |

*Note: The one-sample t-tests used 4 - the mean value of the scale - as the test value.*

### *6.2. Participants*

In this study, 622 British participants recruited on Prolific participated in a two conditions between-participants online experiment. Only respondents who had indicated on Prolific not to follow a vegan, vegetarian, or pescatarian diet were eligible to participate as the meal assortment in this study did not contain enough relevant options for respondents with these diets. However, as this diet information on Prolific might not be up to date for some respondents, a diet question was added to the end of the survey. On the basis of this question, 58 participants were excluded who mentioned to currently follow a vegan, vegetarian, or pescatarian diet. Three additional participants were discarded because they failed the attention check (i.e., "Please indicate "disagree" here"), which left 561 respondents (48% women, $M_{age}$ = 41.71 years, $SD_{age}$ = 14.53 years) for analyses.

### *6.3. Procedure*

First, respondents indicated their hunger on a slider ranging from 1 ("not at all hungry") to 10 ("extremely hungry"). Subsequently, participants were informed that they would see a series of 10 food pictures, after which they would have to answer some questions about the pictures. Next, participants saw a randomly ordered picture series of

ten meals (five healthy; five unhealthy; see section 6.1.). Depending on the condition they had randomly been assigned to, the pictures showed the exact same meals in a messy or neat way, accompanied by a description (e.g., "pizza with tomato sauce, mozzarella cheese, salami, mushroom, and basil").

Subsequently, respondents saw an overview of all the pictures and were instructed to choose three meals they would like to eat in the following three days. In addition, they could choose one meal that they would like to eat as dinner that evening.

Thereafter, self-control state, product vividness, and need for instant gratification were measured in a random order. In order to measure product vividness, respondents were instructed to look at the picture of their chosen meal to eat that evening for ten seconds. They were asked to imagine eating the meal while looking at it. Next, respondents filled out a 7-point bipolar scale with three items (e.g., "While looking at the meal, I found it ..." "not easy: easy to visualize myself consuming the meal"; $\alpha = 0.96$) (Shiv & Fedorikhin, 1999). Respondents' need for instant gratification was measured with a 7-point bipolar scale containing four items (e.g., "While making my meal choice, my goal was one of avoiding pleasure: seeking pleasure"; $\alpha = 0.85$) (Shiv & Fedorikhin, 2002). Respondents' self-control state was measured with items of the brief self-control measure of Tangney and colleagues (2004). Only the six items of the "inhibitory self-control" factor identified by de Ridder and colleagues (2018) (e.g., "I am good at resisting temptation") were used. As inhibitory self-control is defined as people's ability to stop to engage in undesired behavior and hold back from perusing it, these items seemed the most relevant for the current study (de Ridder et al., 2018). However, as the goal was to measure respondents' self-control state, and not their general self-control as a trait, the items were slightly revised (e.g., "I am good at

resisting temptation" was changed into "Right now, I would be good at resisting temptation"; $\alpha$ = 0.79).

Thereafter, orderliness in eating contexts was measured with four items ("I want the food on my plate to be arranged in an orderly way;" "Food is usually scattered on my plate (R);" "I like eating in a messy way (R);" "I am bothered by people who eat in a messy way"; $\alpha$ = 0.71). The items were inspired by the orderliness scale (De Young & Quilty, 2007).

Finally, respondents indicated their diet (i.e., no diet, vegan, vegetarian, pescatarian or other diet), age and gender, and were thanked for their participation.

### *6.4. Results*

#### *6.4.1. Main effect (H1)*

A one-way ANCOVA with messiness (vs. neatness) as the independent variable and the number of unhealthy meals chosen for the following three days as the dependent variable was performed, including hunger as a covariate. The results pointed to a significant difference in the (un)healthiness of meals chosen to eat in the following three days ($F$(1,558) = 4.08; $p$ = .044). Respondents who saw the pictures of messily (vs. neatly) presented meals chose more unhealthy meals ($M_{messy}$ = 1.84; $SD_{messy}$ = .97; $M_{neat}$ = 1.66; $SD_{neat}$ = .93) (cf. H1). The covariate hunger had a significant positive effect on the number of unhealthy meals chosen ($F$(1,558) = 8.01, $p$ = .003).

Next, a binary logistic regression was performed with messiness (vs. neatness) as the independent variable, hunger as covariate, and the unhealthy or healthy meal they hypothetically chose to eat for dinner that evening as the dependent variable. The analysis indicated that messiness was not a significant predictor of whether respondents chose an unhealthy or heathy meal to eat that evening ($b$ = .26, Wald $x^2(1)$ = 2.22, $p$ = .137, odds ratio = 1.30, 95% CI [.921, 1.823]) (cf. H1). Of those who saw pictures of

messy (vs. neat) meals, 61% (vs. 54%) of respondents chose an unhealthy meal to eat that evening. Hunger was a significant predictor of whether they chose an unhealthy or healthy meal to eat that evening ($b$ = .17, Wald $x^2(1)$ = 16.94, $p$ < .001, odds ratio = 1.19, 95% CI [1.095, 1.290]) in the sense that hungry participants were more likely to choose an unhealthy meal.

### *6.4.2. Self-control (H3), product vividness, need for instant gratification (H4a), & orderliness in eating contexts (H4b)*

We tested whether the effect of messiness (vs. neatness) in food pictures was mediated by respondents' state of self-control (H3) on the one hand, and by increased product vividness and increased need for instant gratification (H4a) on the other hand, and whether this effect was stronger for respondents who have less orderliness in eating contexts (H4b).

First, a one-way ANCOVA was performed with messy (vs. neat) food pictures as the independent variable and self-control state, product vividness, and need for instant gratification as the dependent variables. Hunger served as covariate. Picture type significantly affected product vividness ($F$(1,558) = 4.69, $p$ = .031). Respondents who saw the messy (vs. neat) meal pictures reported higher levels of product vividness ($M_{messy}$ = 6.32; $SD_{messy}$ = 1.08; $M_{neat}$ = 6.10; $SD_{neat}$ = 1.19). There was no effect of picture type on self-control ($F$(1,558) = .72, $p$ = .397) and the need for instant gratification ($F$(1,558) = .95, $p$ = .331). The covariate hunger had a significant negative effect on self-control ($F$(1,558) = 10.46, $p$ = .001), and a significant positive effect on vividness ($F$(1,558) = 4.50, $p$ = .034) and need for instant gratification ($F$(1,558) = 14.80, $p$ < .001).

Since messy (vs. neat) food pictures affected product vividness, and not self-control, it is only relevant to test the former mechanism in a mediation analysis. Two

moderated serial mediation analyses (PROCESS model 83, Hayes, 2022) were performed (see Figure 3). The messy (vs. neat) food pictures served as the independent variable, product vividness and need for instant gratification were added as serial mediators, orderliness in eating contexts was included as moderator, hunger served as a covariate, and (1) the number of unhealthy meal choices for the following 3 days, and (2) whether or not respondents made an unhealthy meal choice for that evening served as the dependent variables.

(1) The first moderated serial mediation analysis (see Figure 3) revealed that messy (vs. neat) food pictures increased product vividness, which in turn led to a higher need for instant gratification. Subsequently, a higher need for instant gratification increased the number of unhealthy meal choices for the following three days (cf. H4a). Furthermore, the results showed a significant interaction effect between messy (vs. neat) food pictures and orderliness in eating contexts on product vividness (see Figure 4). The analysis revealed that there was a significant moderated serial mediation (index = -.01, 95% CI [-.025, -.001]). The conditional indirect effects (see Table 7) indicate that for respondents with low and medium orderliness in eating contexts, messy (vs. neat) food pictures led to significantly more unhealthy meal choices for the following three days. For respondents with a high orderliness in eating contexts, messy (vs. neat) food pictures had no effect on the number of unhealthy meal choices (cf. H4b).

(2) The second moderated serial mediation analysis (see Figure 3) showed that a higher need for instant gratification also increased respondents' choices for an unhealthy meal for that evening (cf. H4a). Furthermore, there was a significant moderated serial mediation (index = -.04, 95% CI [-.086, -.001]). The conditional indirect effects (see Table 7) showed that significantly more respondents with low and medium orderliness in eating contexts chose for an unhealthy meal for that evening

when the meals in the pictures were presented in a messy (vs. neat) way. For respondents with a high orderliness in eating contexts, messy (vs. neat) food pictures had no effect on whether they chose an unhealthy meal (cf. H4b).

**Figure 3.** Moderated serial mediation model.

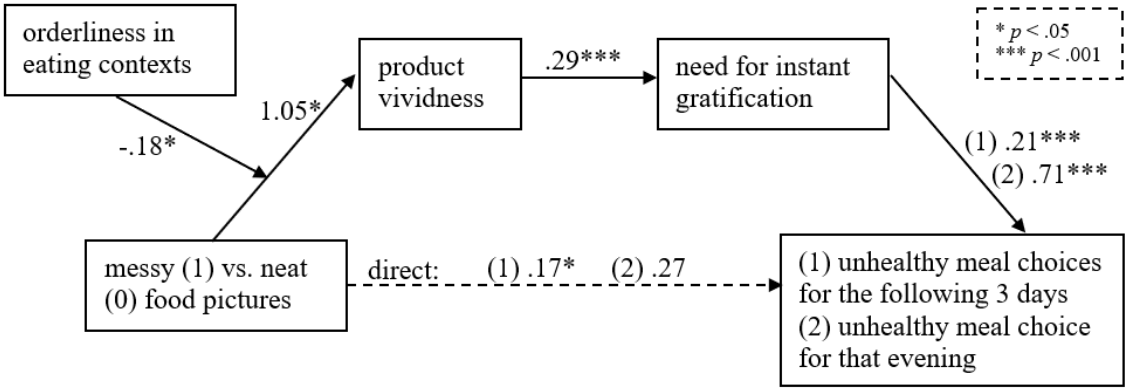



**Figure 4.** Interaction effect of messy (vs. neat) food pictures and orderliness in eating contexts on product vividness.

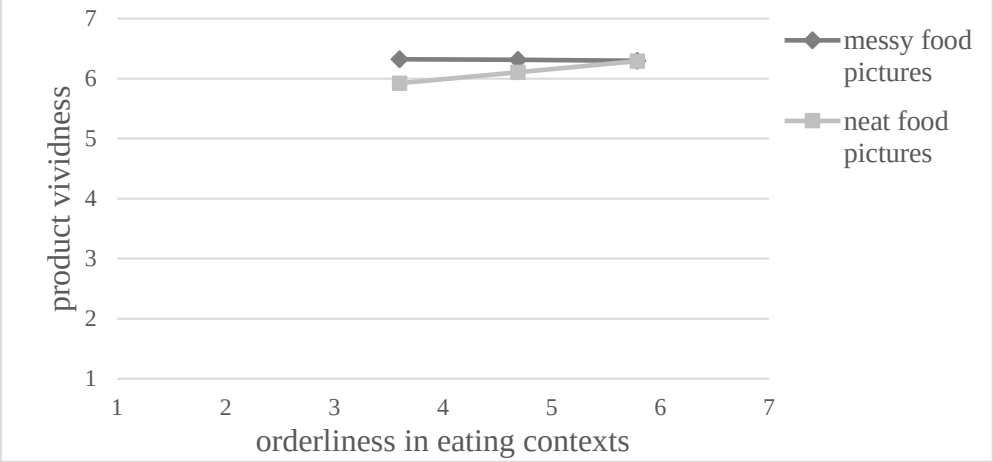



**Table 7.** The conditional indirect effects of messy (vs. neat) meal pictures on the two dependent variables at different levels of the moderator.

| | (1) Unhealthy meal choices for the following 3 days | | (2) Unhealthy meal choice for that evening | |
|---|---|---|---|---|
| Orderliness in eating contexts | Conditional indirect effect | Confidence interval | Conditional indirect effect | Confidence interval |
| 3.60 | .20 | [.006, .050] | .80 | [.024, .164] |
| 4.69 | .10 | [.001, .027] | .40 | [.004, .091] |
| 5.79 | .00 | [-.016, .016] | .00 | [-.055, .053] |

*Note: The 3 displayed levels of the moderator orderliness in eating contexts are M – 1 SD (low), M (medium), and M + 1 SD (high).*

## 7. Discussion

The results of the three studies provide evidence for some of our predictions. A messy (vs. neat) food presentation in pictures led to more unhealthy food choices (H1). This effect was found for both snacks (study 1 & study 2) and meals (study 3). Furthermore, a messy (vs. neat) food presentation in pictures led to more product vividness, which increased the need for instant gratification, and resulted in more unhealthy food choices (H4a). Additionally, only for respondents with a low to medium level of orderliness in eating contexts, messy (vs. neat) food pictures had an effect on product vividness and the number of unhealthy food choices (H4b). However, no evidence of an effect of messily (vs. neatly) presented food in pictures on construal level (H2) and respondents' state of self-control (H3) could be found.

### *7.1. Theoretical and managerial relevance*

The contributions of this research are both theoretical and managerial.

First, the findings add to the literature about the effect of visual messiness and disorder on consumer behaviour in two ways. This research shows a new relevant way in which visual messiness (vs. neatness) can be manipulated: the way food is presented in pictures. Previous research tested the effect of visual messiness on consumer behaviour by manipulating messiness in other ways. They used messy stores, rooms, product displays, abstract images, and presentations of food in real life (see section 1.2). By exposing respondents to messily (vs. neatly) presented food in pictures, a new independent variable was added to the messiness literature. Research has shown that consumers react in a less intense way to food pictures compared to actual food. Namely, they are less able to imagine consuming pictured food (Huyghe et al., 2017). Therefore, it is relevant to show that also messiness in food pictures affects consumer behaviour.

A second way in which this research adds to the literature of visual messiness and disorder is the addition of a new dependent variable. The results of this research show that visual messiness (vs. neatness) affects the likelihood of choosing unhealthy food, in addition to the previously found effects on dependent variables such as taste expectations, willingness to pay, product attitudes, and purchase intentions (see section 1.2.). Only one single study reported that more respondents exposed to a messy (vs. neat) room chose chocolate over an apple (Vohs, Redden, & Rahinel, 2013).

Third, this research contributes to food consumption literature, by showing a new determinant of consumers' unhealthy food choices. Previous research had already investigated several presentation aspects that can affect consumers' unhealthy food choices (see section 1.), but messiness of the food presentation in pictures had been left unexplored.

Fourth, this research adds to product vividness literature. Previous research had already shown other aspects of visual food presentation that affect how vividly consumers imagine consuming a product, such as product orientation (Elder & Krishna, 2012), bitten food presentation (Meersseman, Geuens, & Vermeir, 2021), pictures of different consumption phases (Palcu, Haasova, & Florack, 2019), realistic and unrealistic food pictures (Kim, Choi, & Wakslak, 2019), offline and online presentations (Huyghe et al., 2017), camera angle (Meersseman, Vermeir, & Geuens, 2021), and first- and third-person representations (Christian et al., 2016). We add a new way by which the visual food presentation affects product vividness: messy and neat food pictures.

Finally, the results hold various practical implications. Presenting food in pictures (i.e., by food delivery sites, meal kit services, online grocery stores, food order displays,...) in a neat instead of a messy way could (to a small extent) diminish

consumers' unhealthy food choices. Furthermore, this is a budget-friendly and easy-to-implement intervention for field practitioners. As such, the way food is presented in a picture is an attainable way to help reduce unhealthy food consumption.

*7.2. Limitations*

A first limitation of this research is that the effect of a messy (vs. neat) food presentation in pictures on unhealthy food choices is small. For example, in study 1, respondents' share of unhealthy snacks chosen to their total number of snacks chosen for the following week was on average 5% higher when exposed to messy (vs. neat) food pictures. In addition, 8% more respondents chose an unhealthy snack to eat at that moment if the snacks were messily (vs. neatly) presented in the pictures. These small differences would likely not have a noticeable impact on consumers' health. Nevertheless, even though significant improvements of one's lifestyle are essential to attain active weight loss, slight changes can help to avert progressive weight gain in the long run (Lutes et al., 2008; Hill, 2009; Cooremans, Geuens, & Pandelaere, 2017).

Second, no effect of messily (vs. neatly) presented food in pictures on construal level and self-control was found, even though previous literature did observe effects of visual messiness on these variables (Li et al., 2019; 2020; Kotabe, Kardan, & Berman, 2016; Chae & Zhu, 2014). This is surprising as this research, for example, used the same categorization task to measure construal level as in previous research (Li et al., 2020, Rosch, 1975). Potentially, the messiness in food pictures is not intense enough to evoke a difference in construal level and self-control. For the absence of an effect of self-control in our study, another explanation could be that respondents' state of self-control was measured with a self-reported measure (Tangney, Baumeister, & Boone, 2004; de Ridder, Kroese, & Gillebaart, 2018). Perhaps the use of a behavioural self-control measure to test the effect of messy (vs. neat) food pictures on respondents' state

of self-control, such as a delay of gratification task (Green, Fry, & Myerson, 1994; Kirby, Petry, & Bickel, 1999) or rule-breaking behaviour and persistence in an insolvable task (Kotabe, Kardan, & Berman, 2016; Chae & Zhu, 2014) would show a messiness effect on self-control.

Third, in study 3, a messy (vs. neat) presentation of meals in pictures affected the number of unhealthy meals chosen to eat in the following three days, but not whether participants chose an unhealthy meal to eat that evening ($x^2$ = 2.22, $p$ = .137). Notwithstanding, the results did show an indirect effect of messy (vs. neat) meal pictures on respondents' (un)healthy meal choice for that evening via serial mediators vividness and need for instant gratification. It is noteworthy that participants filled in the survey between 3 and 5 P.M. Potentially, they already had a concrete idea of their actual dinner for that evening. Therefore, it could have been hard for participants to truly engage with the hypothetical question. This possibly attenuated the effect of the messy (vs. neat) presentation in the pictures on whether they chose an unhealthy meal for that evening.

Fourth, the current experiments involved hypothetical food choices. This choice set-up did not include real consequences when it comes to the costs (i.e., the respondents did not have to pay for the chosen food products) and the gains (i.e., the respondents did not actually receive the chosen food products) (Klein & Hilbig, 2019). Potentially, this made them choose other foods than they would in a real-life context. A more realistic experiment in terms of consequences would be a set-up in which consumers receive a certain endowment (e.g., a certain amount of money), after which they can use the endowment to "buy" food products that they actually receive during or after the experiment, and keep the money they did not spend (Klein & Hilbig, 2019). Nevertheless, as the limitation of the lack of real consequences is equally relevant for both conditions

in the experiments, it seems reasonable that the reported discrepancies in food choices are valid.

Lastly, in food photography on commercial and social media, food is presented with different degrees of messiness or neatness (i.e., both extreme and moderate messiness and neatness). Based on these pictures, the stimuli in the current research seem to be situated close to the ends of the messy-neat spectrum of food presentation in pictures. However, when it comes to food in real life (i.e., no pictures), consumers often don't see the ends of the messy-neat spectrum. Therefore, one could argue that respondents were not familiar with seeing food presented like that, which could have affected the product vividness and food choices.

### *7.3. Recommendations for future research*

Future research could look into the effect of a messy (vs. neat) food presentation in real life (i.e., instead of pictures) on unhealthy food choices. As research has shown that product vividness is higher when looking at products in real life (vs. in pictures), the effect of messy (vs. neat) food presentation on unhealthy food choices could potentially be stronger in real life (vs. in pictures) (Huyghe et al., 2017). For example, when choosing food from a buffet, consumers see different food options presented in real life next to each other. It would be interesting to see whether they choose more unhealthy options when the food on the buffet is presented in a more messy (vs. neat) way. However, it would be important to make sure the food still looks attractive in the messy condition.

Moreover, the effect of a messy (vs. neat) food presentation in pictures (and in real life) could be tested on other food-related dependent variables besides (un)healthy food choices. For example, it could be valuable to test the effect of a messy (vs. neat) food presentation (i.e., in pictures and real life) on the portion sizes consumers choose

and eat. Potentially, consumers might choose bigger portions or eat more of fixed portions when seeing the food presented in a messy (vs. neat) way.

Lastly, previous research has investigated the effect of store messiness and product display messiness (vs. neatness) on purchase intentions and product attitudes (see section 1.2.). However, to our knowledge, no research has investigated the effect of a messy store and messy food product presentation in stores on the number of purchases of (un)healthy products. Therefore, this could be an interesting option for future research.

## 8. Conclusion

A neat (vs. messy) food presentation in pictures leads to less unhealthy food choices. As it is harder to imagine consuming neatly (vs. messily) presented food in pictures (i.e., lower product vividness), consumers' need for instant gratification is reduced, resulting in less unhealthy food choices. However, for consumers with a high orderliness in eating contexts, neat (vs. messy) food presentations in pictures do not affect product vividness and (un)healthy food choices. These findings show a low-cost and accessible way for field practitioners to reduce consumers' unhealthy food choices.

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