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What you say and what you do: Exploring the link between consumers' perception of portion size norms and reported behaviour for consumption of sweets and crisps

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ABSTRACT

Portion size decisions are embedded in a complex system of individual, socio-economic, and environmental factors. The objective of this study was to explore consumers' descriptive and injunctive portion size norms and how these norms are related to reported behaviour and further to psychological eating attitudes. The study includes data from two consumer samples ($n = 1020$). Respondents completed four tasks where they chose the portion size they normally eat, the appropriate portion size, the portion size they would like to eat, and the portion size they believed others like them would eat from eight pictures varying in portion sizes. After this, respondents' psychological eating attitudes were measured. Consumers chose larger portions of both sweets and crisps than they perceive as appropriate, but at the same time they reported to choose smaller portions than they would like to eat or what they believe others at the same age and gender eat. We identified two clusters based on respondents' psychological eating attitudes. Those with higher versus lower scores on emotional eating and disinhibition reported not only larger portion sizes, but also a higher norm for an appropriate portion size and a higher gap between what they reported to eat and what is appropriate to eat. Interestingly, the chosen portion size for the high scoring cluster did not differ from those they reported other people to choose. This indicates that consumers that are vulnerable to emotional eating or losing control over eating when exposed to food cues have less bias in thinking that they eat less than others like them would eat.

1. Introduction

We live in an obesogenic environment where energy dense and sugary snacks and treats are easily available for consumption. A recent report from Denmark indicates a rise in sales of crisps and pick 'n' mix sweets over the last five years (Hansen, Kragelund, Kidmose, & Lähteenmäki, 2020). In Danish culture, sweets and snacks are often consumed especially during the weekend (Nordman, Matthiessen, Biltoft-Jensen, Ritz, & Hjorth, 2020). While there is evidence that the portion sizes of these snacks have grown since the 1960 s (Matthiessen, Fagt, Biltoft-Jensen, Beck, & Ovesen, 2003), little is known about how much is normally eaten or considered as appropriate to eat in one eating occasion.

Portion size decisions are embedded in a complex system influenced by individual, socio-economic, and environmental factors, which impact

how much individuals choose to consume in a given situation (Bauer & Reisch, 2019). Individuals' food-related decisions are a result of a socialisation process where bodily needs are learnt to be fulfilled in a manner that is culturally acceptable (Higgs & Thomas, 2016). In this study, we are interested in two factors that are known to influence decisions on how much we eat: social norms reflecting the social and cultural conventions influencing portion size decisions (Herman & Polivy, 2008), and psychological eating attitudes reflecting how individuals relate to eating in general, and how they regulate their eating and thereby portion size decisions (Karlsson, Persson, Sjöström, & Sullivan, 2000). Studying these two aspects together is interesting because they both reflect controlling forces in portion size decisions, and in addition, they provide two different perspectives on consumers' perception of portion sizes. Perception of the social norms in relation to portion size decisions provides insights to what people believe that

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others do or what people believe they are expected to do (Higgs, 2015), while psychological eating attitudes describe how individuals relate to food and eating from a psychological perspective (Karlsson et al., 2000). Foods used as treats, such as crisps and sweets, are an interesting target when studying portion sizes as they are foods that taste pleasurable and thereby tempt towards large portions. At the same time, there is an interest to restrict the use of these foods due to low nutritional quality, which is also supported in official dietary guidelines in several countries (Herforth et al., 2019; Council, 2014).

The objective of the current study is twofold. First, we explore how consumers' perception of portion size norms are linked to their reported behaviour in food categories that are eaten as treats and perceived as unhealthy, namely sweets and crisps. Second, we explore the role of consumers' psychological eating attitudes on these norm perceptions.

1.1. The link between norms and behaviour

Norms can be defined as implicit rules of conduct that guide individual behaviour and can be divided into two sub-categories, namely descriptive and injunctive norms (Cialdini & Goldstein, 2004). Descriptive norms represent what individuals perceive as typical behaviour by others, whereas injunctive norms describe what is expected to be the "correct" behaviour that carries the perceived social approval an individual will garner by acting accordingly (Cialdini & Goldstein, 2004; Jacobson, Mortensen, & Cialdini, 2011). Both types of norms can be used as reference points when making decisions, but following the descriptive versus the injunctive norm often results in different outcomes (Cialdini, Reno, & Kallgren, 1990). Descriptive norms can be used to fit in to a social group or situation by following what we expect others to do, while injunctive norms encourage us to act in a manner that we perceive as approved by others. In order to follow the norms, we may be happy to have a beer with friends as a result of descriptive norms but avoid having it when having lunch with our employer based on injunctive norms.

Portion size decisions are often normative, following either cultural conventions of what is expected as descriptive norms, or what we know we should do according to the injunctive norms, especially when making decisions on foods that are perceived as unhealthy. In a food context, research has shown that descriptive norms help to guide individuals' portion size decisions, even when no others are present (Feeney, Pliner, Polivy, & Herman, 2017; Higgs, 2015), while the injunctive norm is related to what should be chosen and described as appropriate portion size. People tend to underreport their typical portion sizes of hedonic foods due to a desire to behave in a manner that is perceived to be socially acceptable (Macdiarmid & Blundell, 1998; Vartanian et al., 2017), which is typically referred to as a social desirability bias (Hebert, Clemow, Pbert, Ockene, & Ockene, 1995; King & Bruner, 2000). There are several ways to counter the social desirability bias, and one such way is using projective techniques that ask people to respond to questions related to desired state or to how they think other people similar to themselves would behave. Asking about the desired consumption should remove the possible practical concerns and barriers related to reporting own behaviour (Almiron-Roig, Navas-Carretero, Emery, & Martinez, 2018). Studies have shown that perceived intake norms of others are a good predictor of how much adolescent respondents report that they actually consume (Lally, Bartle, & Wardle, 2011; Perkins, Perkins, & Craig, 2010). This can be partly explained, in addition to social desirability tendency, by an optimal bias people have when they assess themselves in relation to others (vanDellen, Isherwood, & Delose, 2016). As appropriateness is largely socially defined, one expects the appropriateness ratings to be relatively similar across individual respondents (Cialdini & Trost, 1998; Robinson, Blissett, & Higgs, 2013). Based on this, we expect that people underreport their own portion sizes, but what is interesting is how these reported portion sizes deviate from the norm of appropriate portion size and descriptive norm of what we expect other people to do, or people's own desired portion size, if free of constraints.

1.2. Psychological eating attitudes

Psychological eating attitudes describe how individuals relate to eating and how they regulate their intake and may thereby influence portion size decisions and norms (Karlsson et al., 2000; Stunkard & Messick, 1985). Some individuals consciously restrain their eating and eat less than what they would like to eat. Those scoring high on cognitive restraint can be named as dieters, as they are expected to choose smaller portions as compared to individuals low in restraint. Individuals high in restraint often wish to avoid appearing as overeaters, and restraint is more prevalent among women and obese individuals (Bublitz, Peracchio, & Block, 2010; Herman, 2007; Maurer et al., 2006). The other two psychological eating attitudes are disinhibition and emotional eating (Karlsson et al., 2000). Individuals with high scores on these traits are more likely to choose bigger portions as compared to individuals with lower scores, but the cues promoting larger portion size decisions differ. Individuals high in disinhibition tend to be vulnerable to external cues, such as the served food itself, and once being exposed to external cues, they tend to lose control over how much to eat (Elfhag & Morey, 2008; Fay & Finlayson, 2011). Emotional eaters, on the other hand, eat in response to internal cues of negative feelings and emotions (De Lauzon et al., 2004; Elfhag, Tholin, & Rasmussen, 2008).

Psychological eating attitudes are likely to influence portion size decisions: cognitive restraint should be linked to smaller portion sizes, while disinhibition and emotional eating should be linked to larger portion sizes. Although those high on cognitive restraint in general are likely to choose smaller portion sizes, restraint can also backfire and result in higher intake if linked with high disinhibition. According to a study by Fedoroff, Polivy, and Herman (1997), individuals who scored high on restraint ate significantly larger portions of food following an exposure to a food cue when compared to unrestrained eaters. Based on this, the effect of cognitive restraint on portion size decisions is somehow challenging to anticipate and needs to be further scrutinised. Whether higher levels of disinhibition or emotional eating are associated with larger portion sizes thus seems to depend on the context; i.e. the presence of cues that trigger eating or negative emotions. For disinhibition, it is possible that external cues in a survey may not be strong enough to trigger desire to eat and thereby larger portion size decisions (Almiron-Roig et al., 2018). Emotional eating on the other hand, refers to a response to an internal cue that can be present to different degrees when reporting behaviour, but because hedonic foods are often eaten to subdue negative emotions, the expectation is that emotional eaters report larger portion sizes of these foods (O'Connor, Jones, Conner, & McMillan, 2008). Overall, we expect that respondents with high scores on emotional eating and/or disinhibition report larger portion sizes and have a larger gap between their portion size norms and reported behaviour, whereas portion sizes and the gap to norms is smaller for restrained eaters.

2. Material and methods

2.1. Design and procedure

To address the objective of the current study, we designed two surveys. The first focused on consumption of sweets, while the second focused on consumption of crisps. Each survey included four tasks where respondents were presented with eight pictures of different portions of sweets in the first study and crisps in the second study. In both studies, respondents were asked to indicate 1) the portion they *normally consume* in one go, 2) the portion they perceived as *appropriate to consume* in one go, 3) the portion they *wanted to consume* in one go, and 4) the portion they *believe that a person with the same gender and age as themselves would consume* in one go.

Portions of sweets and crisps were presented in transparent glass bowls measuring 16 cm in diameter in the sweets study, and 20 cm in diameter in the crisps study. Portion sizes in the sweets study ranged

from 50 to 400 g, while portions in the crisps study ranged from 25 to 300 g. In the sweets study, portions increased by 50 g for each picture, while in the crisps study, portions increased by 25 g for portions between 25 and 100 g, and by 50 g for portion sizes between 100 and 300 g, yielding a total of eight different portions in both studies. Each portion was weighed twice on a digital kitchen scale to ensure accuracy, and all pictures were shot from the same position. The sweets pictures included a selection of most common types of sweets such as wine gum, liquorice and chocolate, while the crisps pictures included salted crisps only. Selection of portion sizes and products were based on field observations of products that are typically available in Danish food stores. Pictures of portion sizes used in the sweets and crisps surveys can be found in Appendix A.

After completing the portion choice tasks, respondents' psychological eating attitudes were measured by the short version of the Three Factor Eating Questionnaire (TFEQ), originally developed by Karlsson et al. (2000). The short version of the TFEQ counts 18 items and is a validated instrument that includes three dimensions measuring cognitive restraint, disinhibition and emotional eating, respectively. Finally, data on respondents' gender, age, height and weight (BMI) were collected to investigate whether responses to portion size decisions differ according to these background variables.

2.2. Sample and data analysis

The current paper includes data from two separate Danish consumer samples ('sweets' and 'crisps' samples, respectively) that were recruited to take part in an online questionnaire study from a consumer panel run by the market research agency Userneeds. The sweets sample included 528 respondents of which 56% were female, age ranged from 18 to 65 years ($M = 43.7$, $SD = 14.3$) and 51% held at least a bachelor level education. Mean BMI in the sweets sample was 25.8 ($SD = 4.9$), 44% were categorised as having a normal weight ($BMI = 18.6$ – 24.9), 35% were categorised as being overweight ($BMI = 25.0$ – 29.9) and 18% were categorised as obese ($BMI \geq 30.0$). The crisps sample included 492 respondents of which 60% were female, age ranged from 18 to 65 years ($M = 44.9$, $SD = 14.1$) and 46% held at least a bachelor level education. Mean BMI in the crisps sample was 25.8 ($SD = 5.2$), 46% were categorised as having a normal weight ($BMI = 18.6$ – 24.9), 32% were categorised as being overweight ($BMI = 25.0$ – 29.9) and 19% were categorised as obese ($BMI \geq 30.0$).

All analyses were performed with the statistical software package

IBM SPSS Statistics 25. First, mean scores for the four portion size tasks in both surveys were calculated, and we also estimated what these mean scores equal in grams and kcals to illustrate what they represent in actual portion sizes. Next, paired sample t-tests were run to investigate the difference between respondents' reported behaviour and portion size choices related to norms. Descriptive data and results of t-tests are provided in Table 2.

Next, we wanted to explore if respondents' psychological eating attitudes were linked to portion size decisions and the gaps between perceived portion size norms and reported behaviour. The response on *normally eat* was used as the reference category, and the gaps between the choices were calculated by subtracting the scores on each of the three other portions size decisions (appropriate to eat, want to eat and a person with the same gender and age as myself would eat) from the score on normally eat. This procedure yielded three new variables in each of the datasets.

Calculation of the three psychological eating attitudes (cognitive restraint, disinhibition and emotional eating) were formed according to the scoring system used by Karlsson and colleagues (2000). The reliability of each factor was checked with Cronbach's alpha, which ranged from 0.72 to 0.87 indicating good reliability for cognitive restraint, disinhibition and emotional eating, respectively in both study samples. In the sweets sample, respondents' scores on cognitive restraint ranged from 1.0 to 4.3 ($M = 2.32$, $SD = 0.64$), the scores on disinhibition ranged from 1.0 to 3.7 ($M = 1.97$, $SD = 0.55$), and the scores on emotional eating ranged from 1.0 to 4.0 ($M = 1.77$, $SD = 0.77$). In the crisps sample, respondents score on cognitive restraint ranged from 1.0 to 4.3 ($M = 2.42$, $SD = 0.63$), the score on disinhibition ranged from 1.0 to 3.7 ($M = 1.97$, $SD = 0.56$), and the score on emotional eating ranged from 1.0 to 4.0 ($M = 1.82$, $SD = 0.82$). The descriptive data reported above indicates high consistency in scores on the TFEQ between the two samples.

In order to categorise respondents according to psychological eating attitudes, a K-means cluster analysis was run for the eating attitudes. This procedure yielded two roughly evenly sized clusters in both datasets. Cluster 1 (labelled low emotion & disinhibition) comprised respondents who were slightly lower in restraint, but clearly lower in emotional eating and disinhibition than those belonging to second cluster. Cluster 2 (labelled high emotion & disinhibition) comprised respondents who were slightly higher in restraint, but clearly higher in emotional eating and disinhibition. In both datasets, the low emotion and disinhibition cluster had fewer women, higher mean age and lower

Table 1
Clusters for sweets and crisps with mean scores for eating styles, age, BMI and gender distribution.

	Sweets (n = 528)		Crisps (n = 492)	
	Low emotion and disinhibition (n = 305)	High emotion and disinhibition (n = 223)	Low emotion and disinhibition (n = 260)	High emotion and disinhibition (n = 232)
Restraint	<i>M (SD)</i> 2.21 (0.64)**	<i>M (SD)</i> 2.47 (0.62)	<i>M (SD)</i> 2.38 (0.66)**	<i>M (SD)</i> 2.53 (0.58)
Disinhibition	1.69 (0.43)**	2.35 (0.46)	1.66 (0.45)**	2.32 (0.45)
Emotional eating	1.22 (0.32)**	2.52 (0.54)	1.17 (0.28)**	2.54 (0.57)
Age	45.7 (14.9)**	40.9 (13)	49.1 (13.3)**	40.1 (13.5)
BMI	25.45 (4.54)*	26.53 (5.62)	25.22 (4.85)*	26.55 (5.19)
Gender	46% female	70% female	50% female	71% female

* $p < 0.05$, ** $p < 0.001$; Restraint, disinhibition and emotional eating scale range from 1 to 4

Table 2

Descriptive results of portion size tasks for sweets ($n = 528$) and crisps ($n = 492$) samples and results of paired sample t-tests measuring gaps between reported behaviour and perceived norms.

	Sweets ($n = 528$)			Crisps ($n = 492$)		
	On scale M (SD)	≈ in grams	≈ in kcal*	On scale M (SD)	≈ in grams	≈ in kcal*
I normally eat	2.64 (1.80)	132 g	462 kcal	3.71 (1.87)	108 g	540 kcal
Appropriate to eat	1.89 (1.44)	95 g	333 kcal	3.10 (1.72)	87 g	435 kcal
Want to eat	2.91 (2.09)	146 g	511 kcal	4.00 (2.10)	121 g	605 kcal
Others normally eat	3.06 (1.75)	153 g	536 kcal	4.15 (1.71)	123 g	615 kcal
I vs. appropriate	0.74 (1.52)	37 g	+130 kcal	0.61 (1.49)	21 g	+105 kcal
I vs. want	-0.27 (1.33)	-14 g	-49 kcal	-0.29 (1.37)	-13 g	-65 kcal
I vs. others	-0.42 (1.89)	-21 g	-74 kcal	-0.45 (1.88)	-15 g	75 kcal
I vs. appropriate	$t(527) = 11.2, p < 0.001$			$t(491) = 9.0, p < 0.001$		
I vs. want	$t(527) = -4.8, p < 0.001$			$t(491) = -4.7, p < 0.001$		
I vs. others	$t(527) = -5.2, p < 0.001$			$t(491) = -5.3, p < 0.001$		

*Based on the average energy content of selected mixed sweets (350 kcal / 100 g) and crisps (500 kcal / 100 g).

mean BMI than in the high emotion and disinhibition cluster. Table 1 provides mean scores for eating styles, age, BMI and gender in the two clusters. ANOVAs were used to explore the role of the psychological eating attitudes as clustered on the difference between reported behaviour and norm perceptions. The clusters were included as independent variables, while the portion sizes and the gaps were included as dependent variables (results are shown in Table 3).

3. Results

Perception of the appropriate portion size for both sweets and crisps was smaller than what respondents reported that they normally eat or what they would like to eat (Table 2). Furthermore, respondents chose larger portions as what they would have liked to eat than what they normally do, but they believed that others at the same gender and age as themselves consume even higher portions of both sweets and crisps than themselves. As shown in Table 2, the pattern of responses for sweets and crisps coincide. The difference in portion size decisions is biggest when comparing what respondents report that they normally consume in one go and the portion that they perceive to be appropriate to consume in

one go for both sweets (37 g difference) and crisps (21 g difference).

Table 3 shows the link between psychological eating attitudes and portion size decisions in the two clusters for both sweets and crisp samples. Those who scored higher on emotional eating and disinhibition chose larger portion sizes as what they would normally eat and want to eat compared to those whose emotional eating and disinhibition scores were lower. They also chose larger portions as being appropriate to eat in one go. Further, respondents in the high emotion and disinhibition cluster had a larger gap between what they considered appropriate to eat and what they reported to normally eat, compared to respondents in the low emotion and disinhibition cluster. However, the normal portion chosen by this cluster did not differ from what they thought that others like them would choose. Conversely, respondents with lower scores on emotional eating and disinhibition had a larger gap between their reported behaviour, and what they believe that others do, meaning that they were more likely to believe that others eat more than they do.

As mean BMI significantly differed between the two clusters in both the sweets and the crisps survey, we also checked whether the portion size decisions varied according to BMI category, but no significant differences were found for either study based on respondents' BMI (Ap-

Table 3

ANOVAs exploring the role of the psychological eating attitudes as clustered on the difference between reported behaviour and portion size choices¹.

	Sweets ($n = 528$)		Crisps ($n = 492$)	
	Low emotion and disinhibition ($n = 305$)	High emotion and disinhibition ($n = 223$)	Low emotion and disinhibition ($n = 260$)	High emotion and disinhibition ($n = 232$)
	M (SD)	M (SD)	M (SD)	M (SD)
I normally eat	2.24 (1.57)**	3.17 (1.95)	3.31 (1.78)**	4.15 (1.87)
Appropriate to eat	1.70 (1.15)**	2.16 (1.72)	2.85 (1.70)**	3.38 (1.71)
Want to eat	2.44 (1.87)**	3.56 (2.21)	3.46 (1.96)**	4.60 (2.07)
Others normally eat	2.91 (1.57)*	3.17 (1.95)	4.13 (1.70)	4.17 (1.75)
I vs. appropriate	0.55 (1.31)**	1.01 (1.74)	0.45 (1.24)*	0.78 (1.7)
I vs. want	-0.20 (1.11)	-0.38 (1.57)	-0.15 (1.09)*	-0.45 (1.62)
I vs. others	-0.67 (1.68)**	-0.09 (2.11)	-0.83 (1.78)**	-0.02 (1.90)

¹ Portion sizes varied from 1 to 8; * $p < 0.05$, ** $p < 0.001$.

pendix B).

4. Discussion

This study shows that there is a gap between consumers' reported behaviour and perception of portion size norms in food categories that are eaten as treats and perceived as unhealthy. Consumers refer differently to portion sizes dependent on whether they make decisions about their own portion sizes or refer to either the appropriate portion size norm or the descriptive norm of what others choose. Our respondents reported that they normally eat larger portions of both sweets and crisps than they perceive as appropriate. At the same time, respondents believed that others of the same age and gender as themselves eat larger portions of both sweets and crisps than themselves, a finding that coincides with previous literature on the social desirability bias (Almiron-Roig et al., 2018). Similar findings on the self-others bias are also reported in a study by Sproesser, Kohlbrenner, Schupp, and Renner (2015), who investigated this in actual eating behaviour and found that on average, people chose healthier meals with less calories for themselves than when they chose meals for an average peer. Still, our results also indicate that consumers show some restraint in their portion size decisions as they report that they normally eat less than what they would like to eat, when the question is about foods that are typically eaten outside a meal context.

Reported portion size decisions are influenced by the way questions are formulated and underreporting is an issue in foods that are regarded as unhealthy (Macdiarmid & Blundell, 1998; Vartanian et al., 2017). Sweets and crisps are typically categorised as foods that should be eaten in limited amounts according to food-based dietary guidelines (e.g. Council, 2014). Based on this, the norm of correct, appropriate behaviour implies a small portion size. Our study demonstrates that consumers acknowledge the recommended view in their assessment of an appropriate portion size of sweets and crisps which is lower than the portion they would normally eat. Although the low appropriate portion size is reported, consumers do not live up to this norm and report larger portion sizes as the ones they eat. Similarly, what one would like to eat was higher than what one reported to eat, suggesting that consumers try to restrict their portion size between what they desire and what they think is appropriate. The relationship between what "I would like to eat" and what "others eat" is interesting, as it seems that these two portion size decisions are close to each other: The closeness of these measures suggests that these questions offer two ways to ask about portion size decisions in a way that tackles the social desirability biases, as suggested by earlier literature (Almiron-Roig et al., 2018).

Most countries have no quantified recommendations for maximum consumption of sweets and crisps, but as mentioned above, the general advice in food-based dietary guidelines is to limit the consumption of such products (Herforth et al., 2019; Council, 2014). The Danish food-based dietary guidelines were updated in November 2020 (Fødevarestyrelsen, 2021) and, in addition to a general recommendation of limiting consumption of energy dense foods such as sweets and crisps, the guideline also provides quantitative examples to illustrate the maximum amount that should be consumed in a week. For women and men aged 14–60, the weekly maximum recommendation is exemplified as a bag of sweets (135 g) per week together with one slice of cake for women and three for men. The portion of sweets that the respondents normally report to consume in our study is close to the maximum weekly recommendation (132 g), and furthermore, the portion that respondents believe that others like themselves consume in one go exceeds the

weekly recommendation (153 g). As mentioned above, people tend to underreport their consumption of unhealthy products, and the reported amount of how much respondents believe that others of the same gender and age as themselves consume might therefore be a better indicator of real consumption. Our findings thus indicate that, if eaten more than once per week, the consumption of sweets exceeds the recommendation in the Danish food-based dietary guidelines and leave little space for any other sweet or savoury energy dense foods in the diet.

As shown in Table 2, the gap between what people normally eat and what they perceive to be an appropriate portion produces a reasonable gap in calories (130 kcal for sweets and 105 kcal for crisps). What is interesting though, is that the perception of an appropriate portion size is also substantially larger than those provided as on-package information on some sweets and crisps products. On-package information typically sets one portion of crisps to about 30 g, while one portion of sweets depends on the type, but typically varies from 25 to 40 g. The findings from our study show that both portion size norms and reported behaviour for consumption of sweets and crisps significantly exceed the portion sizes that are recommended on the products. This might indicate that on-product information about recommended portion sizes has low impact on how much is consumed, but this needs to be further investigated in future studies.

The overall portion size findings are in line what could be expected based on earlier literature and how the descriptive and injunctive norms are defined. Typically in health interventions, descriptive norms are used to reduce the undesired behaviours by demonstrating that our expectations of what others do may not be correct, such as the typical number of beers young people drink at a party being lower than commonly believed and thus reducing target persons norm on what behaviour is expected (Bourgeois & Bowen, 2001). Our studies suggest that in trying to promote smaller portion sizes for unhealthy foods, such as sweets and crisps, this approach would be counterproductive as others are assessed to eat more. Instead, paying attention to psychological eating attitudes and how we relate to food may be a better route to influence behaviour.

Psychological eating attitudes describe how good individuals are at consciously restricting their intake and how vulnerable they are in losing the control over eating (Karlsson et al., 2000). Psychological eating attitudes are typically used to explain problematic eating, such as eating in response to external food cues or internal cues of negative emotions (Karlsson et al. 2000; Van Strien, Frijters, Bergers, & Defares, 1986). In this study, we used these measures to segment consumers and identified two clusters that clearly differed in their responses to emotional eating and disinhibition. Those high in these traits were also slightly more restrained, but this difference, although statistically significant, was small.

As expected, respondents who scored higher on emotional eating and disinhibition reported larger portion sizes in questions regarding what they normally eat and what they would like to eat, but they also reported larger portion sizes as what is appropriate to eat. Although they reported larger portion sizes, they also had a larger difference between the portions they indicated they would normally eat and what they found appropriate or wanted to eat. However, there is no gap between 'what I eat' and 'what others like me eat' for those who have higher emotional eating and disinhibition, whereas those with low scores on these eating attitudes think that others would eat more than they do. This finding is highly interesting as it suggests that having difficulties in restricting the amount one eats may result in a more realistic assessment of one's own behaviour.

Linking the lower social desirability bias with those that are typically considered as vulnerable eaters due to their higher scores on emotional eating and disinhibition is an interesting finding. It should be noted that the scores in our vulnerable group are not very high and do not suggest any problematic eating in this group on average, but they still influence how we relate to portion sizes. Furthermore, they estimated the amount 'they would like to eat' as higher than what they think others would eat demonstrating lower optimism in relation to their reported behaviour. They clearly restrain themselves when choosing portions, but report to eat more and find the norms of appropriate eating higher than those who are in the cluster with lower emotional eating and disinhibition eating scores. Those who are not considered as vulnerable eaters due to their lower reactivity to external and internal cues seem to lodge portion size perceptions that are more influenced by biases of what is seen as socially desirable and being optimistic about own behaviour. One possible explanation is that those who are high in emotional eating and disinhibition are more aware of their responses to foods in different contexts and are therefore able to respond in a more realistic manner to the portion size question. However, interestingly, these two groups made similar portion size decisions in how much others would eat suggesting the descriptive norm to be rather stable regardless of how individuals related to eating in general. Further studies should explore the social desirability and optimistic bias and how it is related to our psychological eating attitudes when reporting food-related behaviour.

Apart from psychological eating attitudes, these differences can be caused by other factors. First, the high cluster had more women, and sweets are often gender-typed as feminine foods (Rodrigues, Gómez-Corona, & Valentin, 2020), but this cannot explain the same difference being observed in the crisps data as well. The high emotional eating and disinhibition group had higher BMI which is in accordance with existing literature (Koenders & Van Strien, 2011), but when the portion size decisions were tested according to the commonly used weight categories of normal weight, overweight and obese, there were no significant differences between these groups. Although emotional eating and disinhibition trigger larger portion sizes, responses in this group have a wider gap between what they want to eat and what they eat. If we assume that the descriptive norm of what others would eat describes a (close to) true portion size without social desirability and optimism bias, the high cluster is better in reporting their true behaviour, but similarly to the low cluster, they have a gap between what they would like to do and what they do. The pattern of results in portion size decisions are very similar in the two datasets, one with a savoury snack and the other with a sweet treat. As the two datasets were gathered independently, this suggests that these findings are robust in the studied population.

These results demonstrate the value of psychological eating attitudes in understanding what influences our portion size decisions. For messages trying to limit the portion sizes, any guilt-inducing technique is likely to have a negative effect for those who tend to alleviate negative emotions with eating, resulting in emotional eating (Karlson et al. 2000). It seems that the current norm for appropriate portions for both sweets and crisps is very low, and thereby the actual amounts eaten are likely to be guilt-inducing per se, if the appropriate portion represents official norm. For many products, the package size functions as an external cue for how much to eat (Benton, 2015; Chandon, 2012; Marchiori, Corneille, & Klein, 2012). When the packages selling sweets and crisps are clearly larger, and sometimes several times larger than the

appropriate portion size, this is likely to induce a vicious circle of negative emotions that can be momentarily reduced by eating. In order to support these more vulnerable consumers, there should be an increasing attention to the packaging sizes of unhealthy treats as a possible way to support lower portion size decisions. Also, it would be interesting to explore if the patterns for the association between portion size norms and reported behaviour are similar for healthier snacks like fruits, berries and vegetables, and this could be the focus of future studies.

The study has some limitations. It is based on cross-sectional data which gives a snapshot of the portion size decisions and how they are linked to psychological eating attitudes, but we cannot conclude any causality in these relationships. The study is based on reported behaviour, which is known to be vulnerable to social desirability bias and underreporting of consumption of unhealthy foods. However, in this study we were partly interested in how the different questions on portion sizes are related to each other and thereby also on biases that appear in the responses. Instead of using numerical scales, we used pictures of portion sizes which should connect directly to respondents' experiences and did not give an explicit indication of grams or energy content of portions.

Our two consumer samples were recruited as a representative sample of Danish consumers, but the final data had more women taking part in the study. Yet, the large sample size contained good distribution of respondents from both sexes and age distribution. The constancy of findings over the two consumer samples suggests that our findings are reliable and represent well the consumers' perceptions of portion size.

This study demonstrates that portion size decisions vary according to which norm consumers refer to when describing their decisions. Own portion sizes are described as larger than what is appropriate, but less than what others would eat. Those with higher scores on emotional eating and being vulnerable to lose control overeating report larger portions except for what they think others would eat. The shared opinion on the descriptive norm of what others would eat suggests that this measure can be used to avoid social desirability bias in portion size measure. The lower optimism and social desirability in portion size estimations from those considered as more vulnerable eaters is an interesting finding and should be explored further in responses related to food, including portion sizes of foods regarded as healthy or portion sizes at meals.

5. Author statement

The authors equally contributed to all parts of this study.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Fig. A1

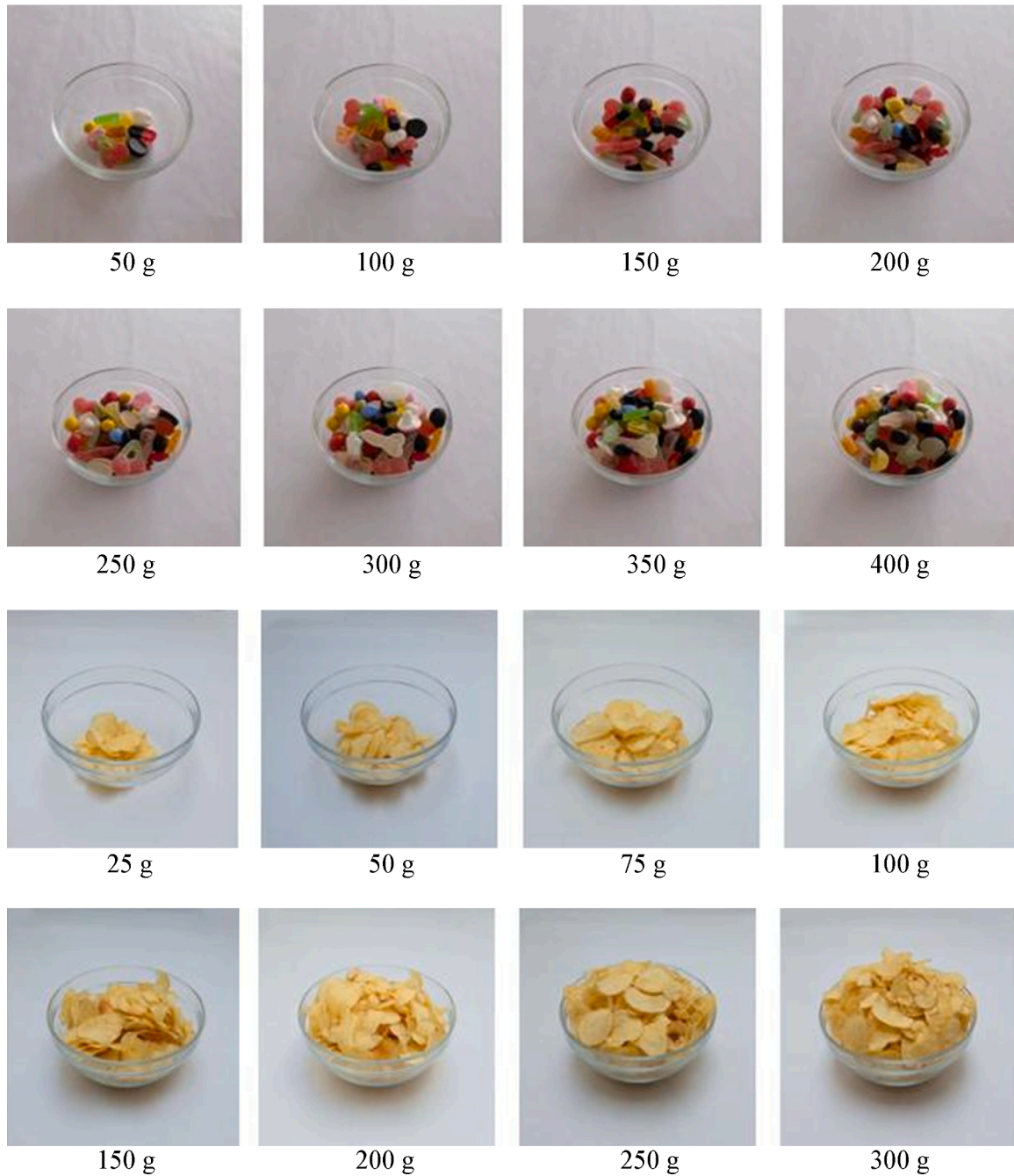


Fig. A1. Pictures of portion sizes presented in the two surveys. Please note that information about how many grams each portion included was not given to the respondents.

Appendix B

Table A4

Table A4
Portion size decisions categorized by BMI-groups in the two samples¹.

	Sweets (n = 528)					Crisps (n = 492)				
	n	Appropriate	Want	Normally eat	Others	n	Appropriate	Want	Normally eat	Others
		M (SD)	M (SD)	M (SD)	M (SD)		M (SD)	M (SD)	M (SD)	M (SD)
Normal weight	212	1.96 (1.45)	2.85 (1.99)	2.52 (1.67)	3.18 (1.71)	206	3.17 (1.74)	3.92 (2.06)	3.63 (1.88)	4.16 (1.67)
Overweight	170	1.85 (1.37)	3.05 (2.14)	2.64 (1.76)	3.06 (1.74)	143	3.02 (1.71)	4.07 (2.17)	3.72 (1.88)	4.27 (1.77)
Obese	85	1.99 (1.56)	3.06 (2.26)	2.98 (2.00)	3.04 (1.89)	84	3.25 (1.77)	4.33 (1.97)	4.17 (1.77)	4.19 (1.75)
Missing	44					44				

Note. ¹ Portion sizes varied from 1 to 8; * $p < 0.05$, ** $p < 0.001$;

Analyses showed no significant differences in PS-decisions categorized by BMI-groups, i.e. no asterix in the table.

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