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Sensory Perception and Psychological Aspects of Eating Behaviour: Factors Influencing Fat Hedonics in Malaysia

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Abstract

Understanding the causes of obesity epidemic requires examination of what contributes to preference of palatable foods. Using a sensorial-consumer approach, this research examined the relationship between the sensation of the hedonic liking of fat with psychological and weight profiles. The study began with preliminary testing of the hedonic ratings of 24 food items (12 low fat (LF), 12 high fat (HF)) and completion of the Three Factor Eating Questionnaire (TFEQ-R18) investigating cognitive restraint, uncontrolled eating and emotional eating aspects. Eight (8) out of the twelve (12) food pairs that had discriminating characteristics were selected, for inclusion in the study, by 347 panellists. Results showed that overweight individuals had significantly lower liking towards LF sensation (4.27 ± 2.13, $p = 0.001$) but significantly higher liking towards HF sensation (5.26 ± 2.33, $p = 0.001$), compared to normal BMI individuals who had a significantly higher liking towards LF sensation (5.69 ± 2.35, $p = 0.001$) but significantly lower liking towards HF sensation (4.17 ± 2.40, $p = 0.001$). The Pearson product-moment correlation revealed similar trends on the association between liking of fat sensation and eating behaviour regardless of weight statuses. Specifically, cognitive restrainers were found to prefer the LF sensation while HF sensation were more favoured among uncontrolled and emotional eaters. This highlights the importance of investigating the combined effect of psychological aspects of eating behaviour and weight profiles towards liking of fat sensation.

Keywords: Fat sensation; Cognitive restraint; Uncontrolled eating; Emotional eating

1 Introduction

Fat sensation enhances the palatability and hedonic appeal of food products, therefore preference for fat sensation often leads to overconsumption. According to Coccurello and Maccarrone (2018), most palatable foods have a unique fat "taste" that contributes to food hedonic characteristics. The foods consumed are usually high in both calories and fat content, in comparison with foods that are less energy-dense such as fruits and vegetables. Through its contribution to food palatability and hedonic characteristics, the presence of fat in food leads to overconsumption. This food intake is often beyond human basic physiological need of essential fats as source of energy, regulation of hormone functions, and protection of internal organs (Folken-

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berg & Martens, 2003). Since diets high in fat are detrimental and lead to multiple health complications such as obesity (Hurt, Kulisek, A Buchanan & A McClave, 2010), it is therefore important to measure the preference for fat sensation and influence of hedonics to tackle the issue of overconsumption as cause of obesity.

Many factors affect human's food selection, taste remains as one of the major contributing factors of food choice and food consumption; with preference for foods that are high in fats, sugars and salts (Shepherd, 2001). Apart from taste, emotion and mood affect food choices in various ways. A person chooses food according to his/her state of emotion and makes food choices to enhance their state of emotion (Gutjar et al., 2015). When bored, one tends to indulge in variety of foods in order to kill time; state of mind or feeling tend to affect appetite and satiety. Stressful events disturb mental equilibrium such that people tend to choose foods that are higher in sugars and fats (Kavitha, Souji & Prabh, 2011), hence food consumption might differ from the usual settings. This suggests the importance of psychological effects on involuntary food choice and food intake that affect body weight status. Overall, psychology has a huge effect on food consumption and therefore needs exploration from consumer's point of view (Jansson-Boyd, 2010; Koster, 2009; Shepherd, 2001).

Studying consumer behaviour involves understanding the why, what, how, where and when consumer purchase products (Kavitha et al., 2011). It leads us to the understanding of complex consumers'decision-making procedures. TFEQ is one of the most frequently used questionnaires that measure consumer eating behaviour, it was originally developed by Stunkard and Messick (1985), with a total of 51 items that measures scales of cognitive inhibition, disinhibition of eating and hunger behaviour mainly targeted at obese population. Modified from the previous version, TFEQ-R18 consists of three subscales which are known as cognitive restraint (CR), uncontrolled eating (UE) (grouping of disinhibition and hunger) and emotional eating (EE) (Karlsson, Persson, Sjostrom & Sullivan, 2000). Validated across age, gender and BMI variations, several studies have proven that TFEQ-R18 can also be used to evaluate eating behaviour in populations other than those who are obese (de Lauzon et al., 2004; Elfhag & Linne, 2005; Loeffler et al., 2015).

Studies on sensory evaluation were either based on single stimuli such as sweet/sour/salty taste or using solutions such as sucrose/citric acid/sodium chloride (Baharuddin & Sharifudin, 2015; Balan, Chua, Choong, Chang & Say, 2013; Sia et al., 2013; Thai et al., 2011). In this study, a wider dimension of fat sensation was investigated by using real food stimuli to imitate a real food eating situation, to obtain a better representative of an eating event. This study aims to fill the knowledge gap by proposing explanations based on how CR, UE, and EE lead to heightened hedonics for fat sensation in a more holistic approach.

2 Materials and Methods

This study was divided into two stages, first, a preliminary test was conducted to explore the appropriateness of the questionnaires and to ensure that the panellists were able to distinguish between foods of low fat (LF) sensation from those of high fat (HF) sensation. This preliminary study helped to refine the questions and identify additional key factors from panellists' opinion that would either be included or excluded from the full-blown study (second stage). Such modifications rendered the questionnaires more suitable to the food items in use or represented in the panels. In the second stage, study panellists completed the modified questionnaires and had a better understanding of the phrases used. Furthermore, the food items selected from preliminary study were more representative of LF and HF sensations, which helped to achieve the research objective (Table 1). A written informed consent was obtained from all panellists prior to their participation. This study protocol has been approved by the Human Ethics Committee at Taylor's University (Ethics reference no: HEC/2016/SBS/005).

2.1 Preliminary Study

Panellists were recruited via a mailing list of Taylor's University Lakeside Campus (Selangor,

Malaysia) staff and students aged between 18-59 years old. Panellists were eligible, if they met the following inclusion criteria: have a habitual breakfast eating routine, in good overall physical and mental condition, and not lactating or pregnant. Exclusion criteria were: having food allergies, intolerances, dislike of the food items to be evaluated and with a smoking history/current smoker including the electronic cigarette, as smoking prejudices sensory acuity (Tamime et al., 2011). Eligible panellists subsequently completed a short questionnaire that dealt with their usual consumption of the food items to be evaluated (Table 1). Those who consumed any of the food items less than 1 to 3 times a month were disqualified from the study. Finally, panellists performed hedonic evaluation of the food items representing LF and HF sensations and a set of consumer behaviour TFEQ-R18 questionnaires (Karlsson et al., 2000).

Twelve food items with varying physical properties, food matrix, serving temperature and representations of food groups were selected from a list of 165 food items in the Food Frequency Questionnaire (FFQ) used in the 2014 Malaysian Adult Nutrition Survey (MANS) (Institute for Public Health, 2014). Among the selected food items, 6 food items were chosen to represent the fatty-sweet sensation and another 6 food items represented the fatty-salty sensation (Table 1). Each food item was further divided into 2 categories representing low fatty-sweet/salty and high fatty-sweet/salty sensations, resulting in a total of 24 food items.

Each panellist attended one session, each morning, for 3 days. Protocols for each session were as follows: The first session consisted of, briefing and sensory evaluation of 3 food pairs (1 h); the second session, involved hedonic evaluation of 6 food pairs (1 h); The third session, involved completion of TFEQ-R18 questionnaire and 3 food pairs (1 h). A short briefing was presented before the start of each session. Panellists first recorded basic demographic information such as age, race, gender, and smoking status. The panellists' digital height and weight, and Body Mass Index (BMI) were measured and calculated. The WHO reference scale for BMI was used as a reference.: normal weight (BMI 18.5-24.9 kg/m^2) and overweight (BMI 25.0-29.9 kg/m^2) (WHO, 1998). All food items were prepared 3 h before each sensory evaluation session. To standardize appetite, all panellists were advised to consume breakfast as usual and refrain from consuming foods or beverages other than water 2 h before the start of each session. For sensory evaluation, panellists were presented with food pairs similar in nutrient contents but representing LF and HF sensations, respectively. Each sample was presented in a tasting cup or bowl labelled with a randomized 3-digit numbers in single-blinded balanced order. To allow sensation discrimination, appropriate portion size and serving temperature were monitored throughout the evaluation sessions. A ballot sheet was presented to the panellists to rate hedonic liking on a 9-point hedonic scale, from dislike extremely (1) on the left end towards like extremely (9) on the right end. Panellists rinsed their mouth with distilled water until no aftertaste remained and tested the next sample. In the final session, TFEQ-R18 was administered to panellist after the completion of the hedonic evaluation of food items.

2.2 Application Stage of the Study

Final selection of food items was based on samples that received mean ratings of 3 to 7 on a 9-point hedonic scale from preliminary study (Prescott et al., 1998). There were 8 final food pairs for application study (Table 2 and 3). The nutrient contents of the food items were derived from the Malaysian Food Composition Database (Malaysian Food Composition Database, 2017) and nutrition labelling of respective commercial food products. Presentation order, procedures, directions and rules for hedonic evaluation were similar to that used in the preliminary study. TFEQ-R18 was administered after the panellists completed hedonic evaluation of food items.

2.3 Statistical Analysis

Descriptive statistics were used to describe frequency and percentages (n, %) for categorical data, mean and standard deviation for continuous variables. Kolmogorov-Smirnov normality test was carried out on preliminary data to

Table 1: Food items served in preliminary test

Sensation	Food Item[a]		Prevalence (%)[a]	Serving Temperature[b]	Portion Size (g)[c]	Food Group Category[a]
Fatty-sweet	*Teh Tarik* (Milk tea)		70.35	Warm	20	Beverages
	Seri kaya toast	: Bread	78.25	Warm	25	Cereal and cereal products; Spreads
		: Seri kaya	35.31			
		: Butter	22.20			
	Cereals	: Milk	29.57	Cold	20	Milk and milk products; Cereal and cereal products
		: Cereal	12.89			
	Kuih Keria (Sweet potato doughnuts)		79.94	Room	15	Confectioneries
	Malted milk		59.09	Warm	20	Beverages
	Ice cream		38.45	Cold	15	Confectioneries
Fatty-salty	French fries		36.58	Warm	20	Starchy vegetables
	Egg mayonnaise sandwich	: Bread	78.25	Room	20	Cereal and cereal products; Eggs; Condiments and misc.
		: Egg	95.17			
		: Dressing	17.56			
	Coleslaw		32.74	Cold	20	Vegetables; Condiments and misc.
	Chicken hamburger		39.99	Warm	25	Meat and meat products
	Mashed potato		31.15	Warm	20	Starchy vegetables
	Curry puff		79.94	Room	25	Confectioneries

[a]Selected food items commonly consumed among Malaysian population, their prevalence and food group categories according to MANS 2014 (Institute for Public Health, 2014)
[b]Serving temperature of each food item according to suggestion by respective manufacturer and that of habitual consumption condition
[c]Serving portion of each food item in order to evoke fatty-sweet or fatty-salty sensation

Table 2: Nutrient contents of low and high fatty-sweet sensation food items

Sensation	Food Item	Description	Fat Content	Sugar Content
Low fatty-sweet	*Teh Tarik*	BOH *Teh Tarik* modified[c]	1.4g/100ml	2.9g/100ml
	Cereal	Dutch Lady Pure Farm Low Fat High Calcium Milk[a]	1.3g/100ml	4.6g CHO/100ml
		Nestle Cornflakes[a]	2.0g/100g	10.0g/100g
	Kuih Keria	*Kuih Keria* modified[c]	1.8g/100g	23.9g CHO/100g
	Ice Cream	Bulla Real Dairy 98% Fat Free Light Vanilla[a]	1.6 g/100g	17.1g/100g
High fatty-sweet	*Teh Tarik*	BOH *Teh Tarik* original[a]	2.8g/100ml	5.8g/100ml
	Cereal	Dutch Lady Pure Farm Full Cream Milk[a]	3.3g/100ml	4.8g CHO/100ml
		Nestle Honey Gold Cornflakes[a]	2.1g/100g	33.8g/100g
	Kuih Keria	*Kuih Keria* original[b]	3.9g/100g	47.7g CHO/100g
	Ice Cream	Bulla Real Dairy Vanilla[a]	6g/100g	21g/100g

[a]Nutrition labelling of respective commercial food product
[b]Malaysian Food Composition Database
[c]Reduced nutrient level compared to the original food item

Table 3: Nutrient contents of low and high fatty-salty sensation food items

Sensation	Food Item	Description	Fat Content	Sodium Content
Low fatty-salty	French fries	Kawan Shoestring French Fries[a]	4.00/100g	0.04g/100g
	Egg mayonnaise sandwich	Gardenia Original Classic[a]	2.60g/100g	0.44g/100g
		Whole hen egg[b]	12.80g/100g	0.01g/100g
		Praise traditional 99% Fat-free creamy mayonnaise[a]	0.80g/100g	0.73g/100g
	Chicken hamburger	Chicken burger patty[b]	11.50g/100g	0.24g/100g
		Praise traditional 99% Fat-free creamy mayonnaise[a]	0.80g/100g	0.73g/100g
	Curry puff	Wheat flour-based curry puff modified[c]	7.05g/100g	0.09g/100g
High fatty-salty	French fries	Simplot Shoestring French Fries[a]	6.00g/100g	0.04g/100g
	Egg mayonnaise sandwich	Gardenia Original Classic[a]	2.60g/100g	0.44g/100g
		Whole hen egg[a]	12.80g/100g	0.01g/100g
		Praise traditional mayonnaise[a]	66.00g/100g	0.52g/100g
	Chicken hamburger	Chicken burger patty[b]	11.50g/100g	0.24g/100g
		Praise traditional mayonnaise[a]	66.00g/100g	0.52g/100g
	Curry puff	Wheat flour based curry puff original[b]	14.10g/100g	0.17g/100g

[a]Nutrition labelling of respective commercial food product
[b]Malaysian Food Composition Database
[c]Reduced nutrient level compared to the original food item

identify parametric or non-parametric properties, followed by Skewness and Kurtosis analyses. A non-normal distribution was observed among food pairs; therefore, Mann-Whitney U test was carried out to compare difference of the independent groups of each food pair. Food pairs that had significant differences, $p < 0.05$, were selected to represent each sensation for the application stage. Data from the application stage yielded normal distribution, hence, independent t-test was carried out to compare liking for fat sensation between normal and overweight individuals with $p < 0.05$ considered significant. The Pearson correlation (r) coefficient was calculated to measure association between fat sensation and variables of the TFEQ-R18 questionnaire. To measure internal consistency of (responses to) the questionnaire, Cronbach's alpha value was calculated, consistency of items within each LF and HF sensations, as well as within and between subscales of the TFEQ-R18 questionnaire were measured accordingly (Gliem & Gliem, 2003). Cronbach's alpha was 0.965 for 8 items of LF sensation and 0.968 for 8 items of HF sensation. Cronbach's alpha for 6 items of CR was 0.937, 0.913 for 9 items of UE and 0.854 for 3 items of EE. Cronbach's alpha of items within each subscale of TFEQ-R18 also showed good reliability

and were highly acceptable. All statistical analyses were carried out with IBM SPSS statistics version 20 (IBM Corporation, Armonk, NY, USA).

3 Results and Discussion

3.1 The Preliminary Study

There were 41 responses of which 11 were invalid (responses), therefore 30 sets of results were usable in the preliminary stage of the study. There were significant differences ($p < 0.05$) in hedonic ratings between LF and HF content level for each food item and 4 food pairs did not show significant differences between liking scores, coleslaw ($p = 0.107$), mashed potatoes ($p = 0.467$), *Seri kaya* toast ($p = 0.625$) and malted milk ($p = 0.222$) and were not considered further, during application study.

3.2 The Study

Hedonic Liking of Fat Sensation in Relation to Weight Status

A total of 379 panellists participated in the application stage of the study, there were 32 sets of unusable data which included incomplete questionnaires and inappropriate data such as blurred or stained handwriting, resulting in final 347 sets of usable data. The majority of panellists were under the age of 25 years old (73.2%), with 46.1% male and 53.9% female. Up to 64.0% of panellists belong to normal BMI (18.5-24.9 kg/m2) whereas 36.0% panellists belong to overweight BMI (25.0-29.9 kg/m^2) (Table 4).

In our study, we found that overweight individuals had statistically significant ($p = 0.001$) lower mean liking towards LF sensation foods compared to normal BMI individuals (Table 5). Overweight individuals were found to show enhanced preference for fat and tended to consume more energy-dense diets (Drewnowski & Almiron-Roig, 2010). Similarly, in a five-year longitudinal study on the relationship between obesity risk and liking for fat sensation, Lampure et al. (2016) also found that fat liking was prospectively linked with an increased risk of obesity and diet appeared to greatly explain this relationship.

People with high liking with regards to HF sensation have proportionally higher intake of energy dense foods, fats, butter, sweet pastry and desserts which makes them more prone towards weight gain. With respect to specific food types, HF sensation likers consume more high fat foods along with less fruits and vegetables. HF sensation likers also have a higher consumption of sodium, and they preferred more savoury tastes than bland tastes (Mejean et al., 2014). As most palatable foods are high in energy density and calories, HF sensation likers therefore have a higher risk for weight gain problems. While there were studies supporting positive relation between weight and likings for HF sensation (De Graaf, 2005; Rissanen et al., 2002), other studies reported that liking towards fat sensation does not differ between different weight status (Matsushita et al., 2009; Salbe, DelParigi, Pratley, Drewnowski & Tataranni, 2004).

Hedonic liking of fat sensation is not solely dependent on sensory cue, instead a complete or partial interaction of taste, odour and texture mediate liking towards fat sensation (Mattes, 2005; Proserpio et al., 2016; Slocombe, Carmichael & Simner, 2016). Individuals exhibiting higher oral sensitivity towards fat sensation have a lower total energy and fat intake, which leads to lower BMI. Similarly, those with overweight BMI might have reduced oral sensitivity which leads to reduced capability to detect fat taste, and a higher consumption of milk products, butter, and meat products (Stewart, Newman & Keast, 2011). In this study, high BMI individuals responded to higher taste intensity and therefore experienced less taste sensation compared to normal weight responders, in other words they tend to select food that are higher in fat that are more palatable and hence lead to excess energy and calories consumption. Taste and olfactory functions are correlated negatively with BMI, according to Carlos Fernandez-Garcia et al. (2017) those that are normal weight showed a higher score of taste and olfactory function measurements compared to overweight individuals. Human's basic senses also has a collaborative effect on liking of fat sensation, individuals evaluating similar taste sensation might exhibit vari-

Table 4: Panellists characteristics for the study

Characteristic	Male		Female		Total	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Age						
≤25 years old	111	31.99	143	41.21	254	73.20
>25 years old	49	14.12	44	12.68	93	26.80
Race						
Malay	76	21.90	50	14.41	126	36.31
Chinese	58	16.71	99	28.53	157	45.24
Indian	26	7.50	38	10.95	64	18.44
BMI						
Normal	103	29.68	119	34.29	222	64.00
Overweight	57	16.43	68	19.59	125	36.00

Table 5: Mean and standard deviation (SD) of subscale scores of TFEQ-R18[a]

TFEQ-R18 subscales	Normal BMI (n=222)	Overweight (n=125)	Independent value t-test p value
LF sensation	5.69 ± 2.35	4.27 ± 2.13	0.001
HF sensation	4.17 ± 2.40	5.26 ± 2.33	0.001
CR (score 1-6)	3.94 ± 1.43	3.37 ± 1.42	0.001
UE (score 1-6)	2.53 ± 0.78	3.49 ± 1.28	0.001
EE (score 1-6)	3.47 ± 2.06	4.13 ± 1.92	0.003

[a]Subscale scores of TFEQ-R18
CR = Cognitive restraint behaviour subscale of TFEQ-R18
UE = Uncontrolled eating behaviour subscale of TFEQ-R18
EE = Emotional eating behaviour subscale of TFEQ-R18

ation on degree of sensorial liking due to different physiological characteristics such as tongue shape, temperature of oral cavity and sensitivity of oral receptors (Engelen & Van Der Bilt, 2008).

Eating Behaviour and Weight Status Relationship

Effectiveness of weight management is dependable on one's self-control and psychological well-being, which is also correlated with the variable CR (Lazzeretti, Rotella, Pala & Maria Rotella, 2015). Although promotion of weight loss by means of physical activity has been long executed by government and private health interventions, it has led to disappointing outcomes due to different levels of unsupervised exercise adherence (Colley et al., 2008). Besides, food choices have a huge influence on weight status. Restraint eaters tend to be extra stringent on food selection by conscientious calorie counting and calculating energy density in order to limit or control daily energy intake. They also have a better adherence to strict diet, coupled with determination to live a healthy lifestyle and intensified physical activity. Restraint eaters who control their diet tend to reduce weight on a long-term basis (Keranen et al., 2009) and may create an overall improved self-control over food intake (Elfhag & Morey, 2008) hence having healthy BMI and not developing eating disorders such as uncontrolled eating or binging activities. In our study, results showed that CR level was significantly (p = 0.001) higher among normal BMI compared to those with overweight BMI (Table 5). There-

Table 6: Pearson correlation matrix between fat sensation and TFEQ-R18 variables among panellists with normal BMI and overweight BMI

	CR	UE	EE	LF sensation	HF sensation
Normal BMI (n=222)					
CR	*1*				
UE	-0.318**	*1*			
EE	-0.827**	0.328**	1		
LF sensation	0.926**	-0.344**	-0.825**	1	
HF sensation	-0.928**	0.300**	0.837**	-0.950**	1
Overweight (n=125)					
CR	*1*				
UE	-0.691**	*1*			
EE	-0.462**	0.403**	1		
LF sensation	0.850**	-0.698**	-0.462**	1	
HF sensation	-0.907**	0.739**	0.496**	-0.936**	1

** Correlation is significant at $p < 0.01$
CR = Cognitive restraint behaviour subscale of TFEQ-R18
UE = Uncontrolled eating behaviour subscale of TFEQ-R18
EE = Emotional eating behaviour subscale of TFEQ-R18

fore, high CR scorers tend to achieve a higher success rate in weight management compared to those without restraint eating behaviour. High CR scorers proved better adherence, motivation to exercise and were more adapted to change in healthy lifestyle and diet (Bryant, Caudwell, Hopkins, King & Blundell, 2012).

On the other hand, UE and EE levels were significantly ($p = 0.001$) higher among those with overweight BMI compared to those with normal BMI (Table 5). These results are in line with the results of Loeffler et al. (2015). Highest mean BMI was recorded for individuals rated high on both UE and EE, while lowest mean BMI was recorded for those who rated low on all three subscales of TFEQ-R18. A review on relationship between BMI and eating behaviour reported consistent linkage between UE and eating disinhibition with BMI (French, Epstein, Jeffery, Blundell & Wardle, 2012). These findings are also similar to those by Koenders and van Strien (2011) who also found consistent link with EE and weight gain, whereas the reverse was true for CR eating. Those who are physically active may reduce effects of EE on BMI but not completely solving the problem, instead, psychological factors such as mindful eating, emotion regulation and positive body image might be more effective in reducing weight gain issues (Frayn, Livshits & Knauper, 2018).

Our research also corroborates the findings of Geliebter and Aversa (2003) that concluded that overweight subjects consumed more during negative emotional states and bad moods, whereas those with underweight BMI consumed lesser than usual during bad emotion states and were more correlated with restrictive eating behaviour. With the use of Dutch eating behaviour questionnaires, another study also demonstrated that EE scores were higher among those morbidly obese than obese patients whom had underwent gastric restrictive operation (Horchner, Tuinebreijer & Kelder, 2002). Negative emotions and state of despair resulted in an increase in appetite and consumption of foods that are high in fats such as sweet foods and junk foods, coupled with reduced consumption of leafy vegetables leading to negative energy balance and weight gain problems (Konttinen, Mannisto, Sarlio-Lahteenkorva, Silventoinen & Haukkala, 2010). During critical emotional states, inabilities to control emotions disrupt body's psycho-

logical regulatory processes, which lead to failure in appetite suppression and disruption of normal eating behaviour (Macht, 2008).

Eating Behaviour Association with Hedonics of Fat Sensation

A Pearson product-moment correlation analysis was carried out to determine the relationship between eating behaviour and liking for LF and HF sensations (Table 6). Our results found that for those who are overweight, liking for LF sensation was statistically positively strong correlated ($r = 0.850$, $n = 125$, $p = 0.001$) with CR. This is in accordance with research that compared hedonic rating among restraint and non-restraint eaters on regular and zero fat fudge, wherein authors concluded that that those with high restraint preferred zero fat or fat-free sensation (Tuorila, M Kramer & Engell, 2001). Individuals with low CR have higher liking for palatable food and consume more than 43% of energy from fat in daily diet (Blundell et al., 2005). In addition, they also experience less satiety compared to restraint eaters, which explains their excess energy intake with high preference for HF food items. Restraint eaters tend to restrict intake of fats or foods that are high in fats, however, blinded sensory fat test showed restraint eaters have no increased tastes aversion towards HF sensation (Schebendach et al., 2014). This shows that psychological control rather than actual taste preference has an effect on eating behaviour. We speculate that restrictive eaters do not discriminate between LF and HF sensations but rather rely more on cognitive and psychological control on food selection. For instance, a recent low-fat diet may have led to frustration due to high CR, thus Lampure et al. (2014) found that women who were currently dieting were more likely to prefer fat.

4 Conclusions

Eating behaviours are often driven by psychological factors other than sensory properties of a food. Evidences from the present study suggest that overweight individuals favoured HF sensation as opposed to LF sensation foods. Nevertheless, similar trends were observed on the association between liking of fat sensation and eating behaviour regardless of weight statuses. Specifically, cognitive restrainers had a heightened liking for LF sensation whereas HF sensation was more preferred among uncontrolled and emotional eaters. Hence, understanding consumer eating behaviour that contributes towards liking of fat sensation and obesity consequences deserve more attention to tackle effectively the underlying cause of overconsumption. This would assist food authorities and organizations to implement impactful health policies and educational strategies that guide consumers on proper food selection with emphasis on maintenance of healthy body weight in order to improve health status of the population.

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